MAMMOTH TRUMPET

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

# A Labor of Love

BUFFALO MUSEUM OF SCIENCE

**Thank God for volunteers! Where can you find anyone today who will work this hard for money? During the 1997 season at the Hiscock site in upstate New York, it took nine people to lift this field-jacketed mastodon tusk—more than 9 feet long—out of the pit and a dozen to carry it back to the workers' camp. Excavation director Dick Laub of the Buffalo Museum of Science depends on his volunteer force. They range in age from 13 to 80, they come from as far away as North Carolina and Michigan, and in 2000 they logged 7,500 hours recovering artifacts and animal remains.**

**The Hiscock site has been excavated since 1983. To date only about 20 percent of the site has been explored, but already it has yielded a diversity of late-Pleistocene and Holocene finds rich enough to engage a sizable force of multidisciplinary scientists. Many will present their findings at the Smith Symposium II, hosted by Dr. Laub in Buffalo October 14–15. You'll find the agenda of the Symposium in this issue, and an overview of the Hiscock site on page 18.**

**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.

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# KENNEWICK MAN'S LEGAL ODYSSEY NEARS AN END

*by Brad Lepper*

U.S. Magistrate John Jelderks has the fate of Kennewick Man in his hands. Will this 9,000-year-old skeleton be available for scientific study, or will it be handed over to a coalition of modern Native Americans for reburial? After reading hundreds of pages of documents submitted by attorneys for both sides and spending two days in June listening to arguments over the many contentious issues, he said he would make his decision in coming weeks.

An indication of just how difficult it will be for Jelderks to untie this Gordian knot of controversy is the surprising nature of some of the alliances forged in this case. Native Americans are siding with the U.S. Army Corps of Engineers. The Society for American Archaeology, an organization of professional archaeologists, submitted a statement to the court disagreeing with part of the argument the scientists have made for why they think the skeleton should be studied.

There are a number of issues in question. However, the court spent most of its two days of deliberations in June considering two fundamental questions:

- Did Bruce Babbit, the former Secretary of the Department of the Interior (DOI), properly define and apply the term "Native American" in determining that Kennewick Man should be repatriated to a coalition of four Native American tribes?
- Did Secretary Babbit properly understand and apply the concept of "cultural affiliation" in deciding that Kennewick Man was "culturally affiliated" to the coalition of modern tribes?

## Who is a Native American?

According to NAGPRA, "Native American" means "of, or relating to, a tribe, people, or culture that is indigenous to the United States." The DOI has interpreted "indigenous" to mean living in America prior to 1492—the accepted date of the arrival of Columbus in this hemisphere. The Society for American Archaeology accepts this definition, but the group of scientists who are challenging the DOI decision argue that this definition is too simplistic. First of all, it would encompass skeletons of Vikings or Portuguese and Japanese fisherman who may have arrived here prior to 1492.

More importantly, the NAGPRA definition refers to "a tribe, people, or culture that *is* indigenous to the United States"—not that "was" indigenous. So if an early group left no descendants it would have no relationship to a current tribe and therefore should not be covered by NAGPRA.

## Can Kennewick Man be culturally affiliated to anyone alive today?

What does it mean to be "culturally affiliated"? According to NAGPRA, it means there is "a relationship of shared group identity

*continued on page 2*

## INSIDE

which can be reasonably traced historically or prehistorically between a present day Indian tribe . . . and an identifiable earlier group." Attorneys for the scientists argue that there is no evidence whatsoever of an identifiable group to which Kennewick Man might have belonged. Jelderks appeared to agree with this assessment. At one point in the proceedings he suggested to David Shuey, attorney for DOI, that "there might well have been some evidence" at the site of Kennewick Man's discovery that might have shed some light onto his cultural affiliation. Unfortunately, the Army Corps "decided to put 500 tons of boulders and debris over the site. So that evidence is not available for either the Secretary or me, if it ever was available."

After extensive questioning about the nature of the supposed "earlier group," Shuey became frustrated at his inability to provide the judge with specific information about the name of the group, its size, and the language spoken by its members. He complained that the judge was setting up an "impossible standard" to meet. Jelderks countered that 9,000 years might be too great a span of time to bridge with any argument for cultural affiliation.

## Is NAGPRA "Indian Law"?

In all the debates over the DOI decision to give the skeleton of Kennewick Man to modern Native Americans for reburial, the Native Americans and their attorneys have argued that NAGPRA is Indian Law. They therefore appeal to the "canons of construction" related to Indian Law, under which all legal "ambiguities" must be resolved in favor of Native Americans. However, the attorneys for the scientists are far from convinced that NAGPRA is "Indian Law." It is compromise legislation balancing the rights and responsibilities of a variety of interests including museums and federal agencies. However, even if NAGPRA is properly interpreted as "Indian Law," Native Americans certainly are not entitled to interpret the law in ways that violate its clear meaning, appealing to the "canons of construction" to uphold their interpretation. Every disagreement is not an "ambiguity" that must be resolved in their favor. Yet this appears to be exactly how the DOI and their Native American supporters have attempted to use the law in this case.

For example, NAGPRA defines "cultural affiliation" as a relationship of shared group identity between a "present day Indian tribe" and an identifiable earlier group. Note that the law refers to a single tribe, not a coalition of tribes. DOI archaeologist Francis McManamon acknowledged in 1992 that "groups of Native Americans of diverse backgrounds who voluntarily associate together for some purpose or purposes are not viewed as proper claimants under NAGPRA provisions." Nevertheless, the DOI decided they would hand over the remains of Kennewick Man to a group of Native Americans of diverse backgrounds who voluntarily banded together in order to make a joint claim on the bones. One of the tribes is not even a federally recognized Native American tribe—another violation of NAGPRA requirements.

For an overview of the Kennewick Man court case, log on to the Web site of the Society for American Archaeology
**www.saa.org/Repatriation/kennewickbriefs.html**
It contains the legal briefs filed by all sides in this hearing.

Another example of a dubious application of NAGPRA by the DOI relates to whether or not Kennewick Man was found on land that once belonged to tribe(s) seeking to claim his bones for reburial. NAGPRA requires a "final judgement" of the Indian Claims Commission (ICC) for establishing whether remains were found on the aboriginal lands of a tribe. The Army Corps of Engineers admitted in 1997 that "there are no ICC final judgements establishing the lands as aboriginal lands of any particular tribe." Nevertheless, the DOI determined that the Kennewick Man site is on the aboriginal lands of the Umatilla, citing a 1966 ICC

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# The Big Eddy Site

*The conclusion of our article on the Big Eddy site, investigated by the Center for Archaeological Research (CAR), Southwest Missouri State University*

NOT ALL THE MATERIALS retrieved at the Big Eddy site yield unambiguous results so readily as soil samples reveal vegetation history, as we described in the first part of this story.

## Who made it—man, nature, or animal?

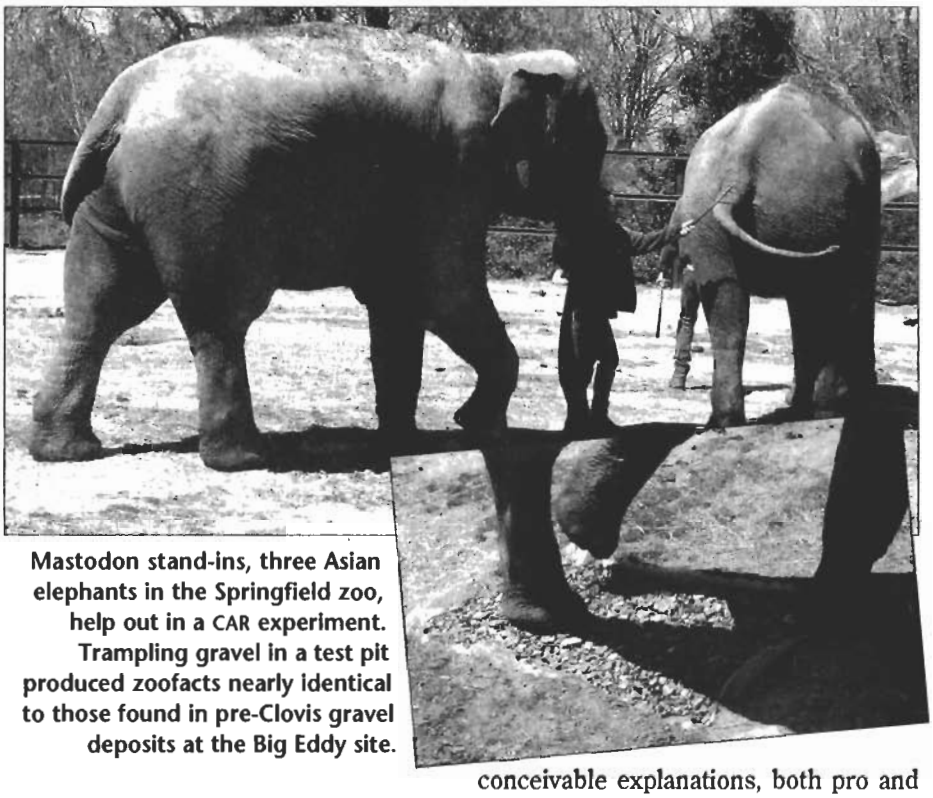
Before attempting to draw conclusions about a worked lump of chert, the archaeologist must first decide if it's an artifact (man-made), a geofact (shaped by natural forces), or a zoofact (chipped or broken by an animal). A beautiful Clovis or San Patrice point leaves no doubt it's the product of a human hand. When the team excavated pre-Clovis gravel deposits, however, it became more difficult to tell if an object had been carried by a human (a manuport) or transported by natural forces. Investigator Jack Ray has noted present-day examples of rootwad rafting in Ozark streams, where large cobbles and boulders become trapped in tree roots, which can carry their cargo considerable distance in flood waters before becoming stranded; transported rocks simply fall in place when the roots disintegrate. Ice rafting was also considered a possible explanation for some of the large rocks found in pre-Clovis deposits; in the frigid Pleistocene, when winters were much colder than today, river ice might have accumulated debris from bank erosion and rock slides, which could be rafted downstream in a subsequent thaw. Ice-rafting, however, seems an unlikely mode of transportation for large pieces of a particular kind of sandstone found at Big Eddy, sandstone normally found on ridge summits in the Sac River valley.

Jack Ray with Nina Howard. The Big Eddy site occupies a pasture on her property. She and landowner Dallas Kramer granted access to their property and made it possible for CAR to do field work. Mrs. Howard graciously donated the artifact collection from the Big Eddy site to Southwest Missouri State University for permanent curation.

Zoofacts are the most difficult lithic evidence to classify. There are two kinds. In situ zoofacts have sharp (unrounded) edges that suggest they have remained undisturbed since modification. (The investigators deem the context undisturbed if at least two refit examples of modified pebbles and adjoining flakes are recovered from a subquadrant measuring 50 x 50 cm—about 20 x 20 in.) Redeposited zoofacts have modified edges, abraded or polished as they were carried by the water and redeposited at the Big Eddy site.

More than 600 kg of alluvial gravel collected from the pre-Clovis level at Big Eddy yielded more than 200 kg of apparent zoofacts. To determine whether it is reasonable to expect that late-Pleistocene megafauna—mastodons and bison, for example—could have produced such a vast quantity of fractured cobbles, CAR investigators conducted a trampling experiment at the Dickerson Park Zoo in nearby Springfield. Unmodified alluvial gravel, 117 kg consisting of about 4,300 pebbles and cobbles 2–10 cm in diameter that were culled during the analysis, was placed in a trench lined with plastic to catch small detached flakes. Cobbles were layered two to four deep. Three adult Asian elephants named Vicky, Patience, and Connie, each weighing 3,062–3,601 kg, walked over the gravel a total of 50 times. The gravel was then collected and examined in the lab.

The elephants produced zoofacts remarkably similar in type and quantity to those found in pre-Clovis gravel deposits at Big Eddy—modified pebbles that resemble cobbles and unifacial scrapers, flakes that resemble primary and secondary decortication



**Mastodon stand-ins, three Asian elephants in the Springfield zoo, help out in a CAR experiment. Trampling gravel in a test pit produced zoofacts nearly identical to those found in pre-Clovis gravel deposits at the Big Eddy site.**

flakes (the kind a knapper would produce), and angular chunks that resemble shatter. Although trampling produces flakes that can be mistaken for primary and secondary decortication flakes, interior flakes and biface thinning flakes were conspicuously absent. The experiment yielded results that will be useful in the future to help archaeologists distinguish zoofacts from artifacts.

### Pre-Clovis, the elusive prize

"We have made a conscientious effort not to jump on the pre-Clovis bandwagon simply because it seems to be in vogue," assert CAR investigators Drs. Ray, Lopinot, and Edwin R. Hajic, referring to near concensus among archaeologists that the Clovis-First model has been dispelled by the finding of a pre-Clovis culture in Monte Verde in Chile. (See "Towards Resolving Clovis Origins," **Mammoth Trumpet** 16-3.) To date they have found two objects "with attributes that may be indicative of human use or modification." They are proceeding cautiously; in fact, they didn't release news of their possible pre-Clovis artifacts until AMS radiocarbon dating confirmed that the contextual sediments were of pre-Clovis age. "We have tried to be as objective as possible and consider a variety of conceivable explanations, both pro and con," they continue. "Furthermore, we have welcomed alternative explanations for the presence of those items that we have favored as pre-Clovis artifacts and not 'naturefacts.' "

The possible artifacts they are referring to were recovered from the earliest deposits at the Big Eddy site, the early Rodgers Shelter submember. It is about 2 m thick in the excavation block and has been dated to 13,000–10,000 RCYBP. The topmost deposits contain abundant evidence of Paleoamerican use of the site. Beginning at a depth of about 3.85–3.80 m, the sedimentation rate rapidly decreases and continues to decrease to about 2.90 m depth. At about 3.85–3.80 m depth, as the local hydrology changed, the surface became relatively stable and attractive for potential human use or occupation. The onset of this decreased sedimentation occurred sometime after about 12,600–12,400 RCYBP, clearly well before 11,600–11,500 RCYBP, when evidence for Clovis activities in North America is generally accepted. Ray, Lopinot, and Hajic feel it may be more than mere coincidence that possible artifacts were found within the earliest increments of

# The Clovis-to-Dalton Transition

MANY AUTHORITIES believe that Dalton points evolved directly from Clovis points. This is thought by some to have occurred around 10,900–10,700 RCYBP. The presence of fluted Dalton points lends credence to this contention.

The record at Big Eddy indicates that Dalton indeed evolved out of the fluted-point tradition. However, the most likely candidate is Gainey and not Clovis. Besides the occasional presence of flutes on Dalton points, there are numerous technological similarities between Gainey and early Dalton forms. They are quite similar in size, shape, thickness, and basal concavity depth, and the basal thinning flake scars on unfluted Dalton points are similar to smaller guide flutes and final basal thinning flake scars on Gainey points.

Based on a series of seven radiocarbon dates from the Dalton horizon (about 2.90–3.20 m below surface) and eight from the underlying fluted point horizon (3.25–3.50 m below surface) at Big Eddy, the transition from Gainey to Dalton occurred sometime between 10,700 and 10,500 RCYBP. (Our current evidence suggests it was closer to 10,500 than to 10,700 RCYBP.) This is well after Clovis had been replaced elsewhere by other forms (e.g., Goshen, Folsom, Cumberland, Quad).

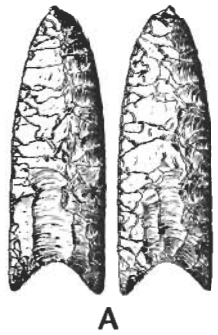
The real developmental sequence hinges on the meaning of the distinction between Clovis and Gainey, that is, the temporal or spatial relevance of this distinction. Julie Morrow [Dr. Juliet Morrow, Station Archeologist with the Arkansas Archeological Survey, Arkansas State University, Jonesboro] makes a strong case that the manufacturing technologies, especially those involving fluting, are quite different for Gainey versus Clovis. Given that they are distinct, are they sequential types or do they simply represent spatially separate, coeval variations on a theme? At least in Missouri and several surrounding states, both types occur in the same regions, suggesting that they are not spatially different, although the two technologies may have co-existed.

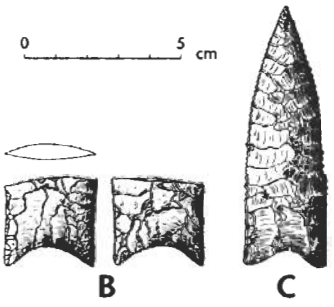
By and large, the vast majority of dates for Gainey (and its Northeastern counterpart, the Bull Brook type) fall within the 11th millennium. For example, the Debert site in Nova Scotia has produced the largest suite of dates for this point type, which indicate an occupation around 10,700–10,600 RCYBP. Dates for at least a few other sites like Vail indicate use of Gainey/Bull Brook–type points at approximately this time as well, or during middle-Paleoindian times, ca. 10,900–10,500 RCYBP. (Note that we are using the traditional concept of *Paleoindian*, although we recognize problems with this term.) At Big Eddy, two fragments of an in situ Gainey point and a medial section of perhaps another Gainey were found near the top of the fluted-point horizon (3.31 m and 3.33 m below surface, respectively). Six acceptable dates for this horizon range between about 11,400 and 10,700 RCYBP. A piece of charcoal located at 3.33 m below surface in the vicinity of the in situ Gainey point and the fluted-point fragment produced an AMS date of 10,710 ± 85 RCYBP. This is the youngest date from this horizon, but it may accurately reflect the temporal position of this Gainey point, since it occurred near the top of the fluted-point horizon.

If indeed Gainey represents a middle-Paleoindian point type, which much evidence seems to indicate, then there is no transition from Clovis to Dalton, but rather there may have been a transition from Clovis to Gainey to Dalton. At Big Eddy, there is an opportunity to find Clovis in lower levels of the fluted-point horizon; this will be one focus of field research during the 2002 field season, when the Paleoindian and pre-Clovis–age horizons at Big Eddy will undergo intensive excavations.

If Gainey is found to be a successor of Clovis and contemporaneous with early to middle Folsom, then we will need to re-evaluate extant models of early Paleoindian (in this case, referring to the bearers of true fluted Clovis points) colonization, adaptation, and population growth in eastern North America.

*–Neal Lopinot*
*–Jack Ray*




**A, Middle-Paleoindian Gainey point from the Needmore site (23CE514) about 17 km southeast of Big Eddy; B,C, late-Paleoindian Dalton points from Big Eddy. Note the similarities in form and flaking.**

those deposits where decreased sedimentation would have invited human occupants.

The objects that show possible signs of modification by human activity are a large possible anvilstone and a possible hammerstone found nearby. (These objects are the subject of an article by Ray, Lopinot, Hajic, and Rolfe D. Mandel in the new 2000 issue of *Current Research in the Pleistocene.*) The possible anvilstone was found fractured in two pieces lying 4–6 cm apart. The fragments refit along a sharp angular fracture. Both pieces weigh 18.4 kg. Human modification of the possible anvilstone is suggested by a pit and a negative percussion spall that could have been created by a large hard hammer. Moreover, the smaller fragment lay rotated 120 degrees relative to the larger fragment and perpendicular to the apparent flow in the nearby Sac River paleochannel.

The other object that shows sign of possible human modification is a large cobble of oolitic chert weighing 4.5 kg. Percussion cones and hairline factures suggest that it made forceful contact with a hard object and that the rounded cobble may have been used as a hammer.

The CAR investigators are keenly aware of the difficulty in proving that these objects found in pre-Clovis-age deposits are indeed artifacts and not geofacts. Mere proximity does not demonstrate that a human hand ever brought the possible

hammerstone into contact with the possible anvilstone. Could the percussion wounds have resulted from crashing into other rocks by water action? It's possible, they admit, but not probable. They demonstrated this by placing three rocks, smaller than the possible hammerstone and pieces of the possible anvilstone and therefore even more amenable to water action, in the Sac River. After three full releases (5,000 cfs) and one partial release (3,000 cfs) from Stockton Dam, none of the test rocks had moved a millimeter, indicating discharges in excess of 5,000 cfs would be required to move the specimens under the modern channel conditions.

Experts can't agree that the specimens are indisputable evidence of human activity at the Big Eddy site in pre-Clovis times. Tom Dillehay, of Monte Verde fame, performed micro-use-wear analysis on the specimens using electronic microscopes and observing selected areas with a scanning electron microscope. He concludes that some surface features may have been caused by human action, the best candidate being the conjoining pieces of the possible anvilstone. Marvin Kay, a lithics expert from the University of Arkansas who analyzed the Monte Verde artifacts, analyzed the specimens using sophisticated equipment that gives an especially detailed 3-dimensional view of the surface. His conclusion? "Use-wear analysis does not support the unambiguous identification of pre-Clovis artifacts." A third micro-use-wear investigator, Stanley Ahler, also contends that the modifications are likely natural.

Today the CAR investigators are left with neither a clear-cut victory nor defeat in proving that the Big Eddy site was home to a pre-Clovis culture. They'll keep looking, though, for as long as the Sac River lets them.

*-JMC*

Lopinot, Ray, Hajic, Mandel, and E. Arthur Bettis III wish to acknowledge the Kansas City District, U.S. Army Corps of Engineers, the National Geographic Society, the Allen P. and Josephine B. Green Foundation, and the Tom and Shirley Townsend family for their support of the investigations since 1997.

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www.smsu.edu/car/ab_eddy.html
Big Eddy Summary
www.smsu.edu/car/bigeddy.html
Big Eddy Paper Abstract
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Big Eddy Update
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Big Eddy 1999 Abstract
www.smsu.edu/car/ab_eddy 1999.html

# New Study on Peopling of Americas Confirms Some Theories, Unsettles Others

The New World was populated in at least two migrations, according to a paper presented by C. Loring Brace to the National Academy of Sciences. The settlers in the first wave, who walked across the Bering Land Bridge 15,000 years ago, were the forebears of present-day inhabitants south of the U.S.-Canadian border. The ancestors of linguistically distinct peoples including the Inuit, Aleut, and Na-Dene speakers made the watery crossing from Asia about 5,000 years ago.

The new study by Dr. Brace, professor of anthropology and curator of biological anthropology at the University of Michigan, also finds that members of the first group are only distantly related to present-day populations on the Asia mainland, but are closely linked genetically to the Ainu (the aboriginal people of the Japanese island of Hokkaido), to their prehistoric Jomon predecessors, and to today's Polynesians. Descendants of the second-wave migrants, on the other hand, are closely related to current mainland populations of East Asia.

Brace's findings are immense in scope. He cites artifacts that date back to the Acheulean age, more than 200,000 years ago, and he traces population movements from human origins in Africa to Europe, Asia, Australia-Melanesia, and ultimately to North America. Following are just a few of the noteworthy points of his study.

- Although Brace supports his theory with archaeological evidence, he bases his findings principally on statistical analysis of craniofacial metrics. These are inherited characteristics, thus indicators of genetic links, and are unaffected by environmental pressures.
- Neanderthals fashioned characteristic tools in northwestern Europe toward 200,000 years ago. Use of their tools can be traced eastward to Mongolia and Siberia, but not to China or Japan or towards Southeast Asia. Although no conclusive skeletal evidence of Neanderthals has been found in Siberia, cultural continuity implies their presence.
- Brace finds evidence of a continuum of late-Pleistocene humans across the northern fringe of Europe and Asia. These are the ancestors of the first migrants to North America, who are closely linked to the Jomon, Ainu, and modern Polynesians. Thus all these people can be described as Eurasian.

Brace's study is sure to cause a stir among archaeologists and anthropologists. The announcement came too late for us to cover it in depth this issue. In the next **Mammoth Trumpet** we hope to explore it in detail with Brace and with other authorities whose work is affected by his findings.

# Survey of Fluted Points in Darke County Area

## An avocationalist shares her findings on the Clovis culture in her native Ohio

*by Elaine Holzapfel*

THIS STUDY was undertaken not only to count fluted points from the Darke County, Ohio, area, but also to determine what additional information the points could yield. This article is taken from a more complete work done by Holzapfel in 2001, which details both the early and late Paleo occupation of the same area.

The term *Paleoamerican* is used here instead of *Paleoindian*. *Paleoindian*, coined by Frank Roberts in 1935, implies a descendant-ancestor relationship between the earliest inhabitants of the New World and modern American Indians. The descriptive, geographical term *Paleoamerican*, used by Grand, Owsley, and others, is more appropriate, since skeletal studies by Jantz and Owsley in 1997 indicate a Eurasian origin for the first Pleistocene and early-Holocene people.

### Methods

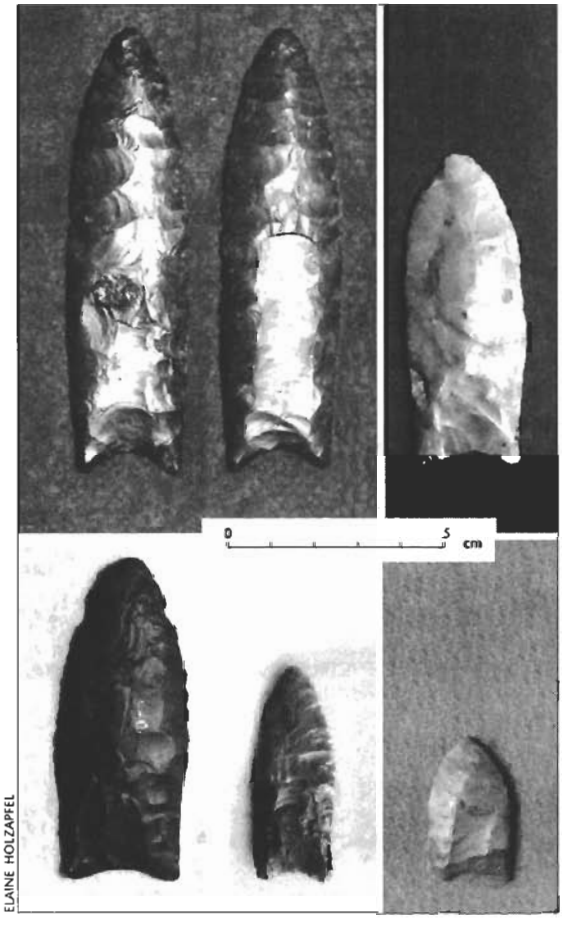
My first line of inquiry was a request for information about fluted points from Darke County that had been published in the *Ohio Archaeologist*. Collectors, avocationalists, and farmers were approached. Additional contacts were made at quarterly meetings of the Archaeological Society of Ohio in Columbus. Only well-documented artifacts with reliable provenience were included in the survey.

The exact recovery location for each artifact was considered of utmost importance. County provenience proved useful in the absence of more detailed information such as farm field, township, or drainage system.

All fluted points were photographed and measured. Data sheets list precise information about each point and the location where it was recovered.

### Pleistocene Geology, Flora, and Fauna of the Darke County Area

For 60,000 years Darke County lay buried beneath glacial ice more than a mile thick. Around 19,000 years ago the ice began to melt, depositing a layer of boulders, sand, and gravel which had been scooped and carried from Canada. This glacial drift, 100 feet thick, blankets the entire county in the form of till plains, which are punctuated by three gravelly end moraines. Thus, flint deposits lie deeply buried and inaccessible.




ELAINE HOLZAPFEL

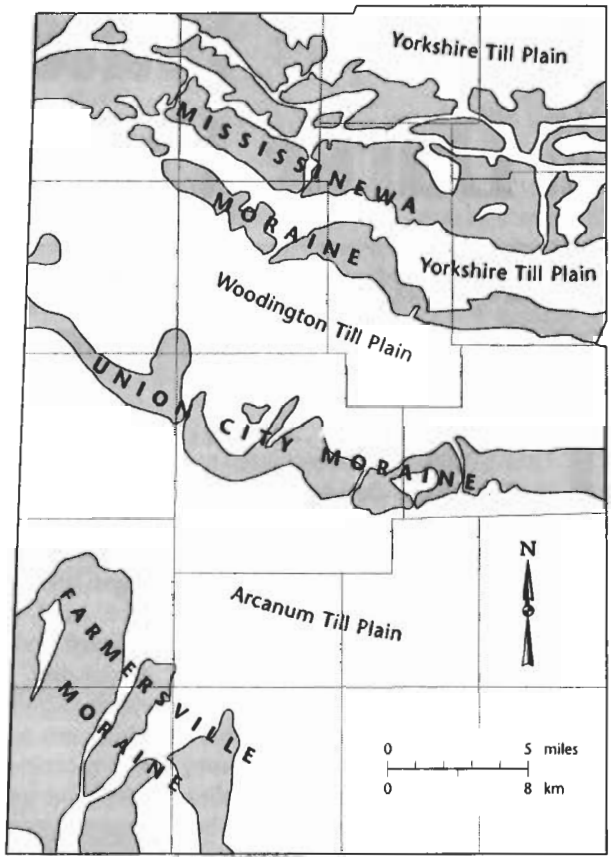
**Five fluted points, representative of the 36 collected from the Darke County area.**


By 14,800 years ago the ice had retreated from Darke County. Glacial kettles, holes where huge chunks of glacial ice had stagnated, began filling with organic debris, both vegetable and animal.

Excavations at the kettle known as Carter Bog in the northern part of the county yielded one of the most complete and diverse assemblages of Pleistocene vertebrates known from Ohio. Excavated were a giant ground sloth about the size of an ox, an elk-moose with massive complex antlers, and mastodons with huge tusks. These extinct megafauna from the bog were radiocarbon dated at 14,000 to 10,000 years old, so the great animals must have been contemporaneous with Paleoamericans.

Although the county would have been suitable for habitation by 14,800 years ago, the first human occupation did not appear until around 11,500 years ago. This occupation is marked by the occurrence of fluted points, which have been dated at numerous sites in the East.

The Darke County area at this time was a unique composite, or mosaic, of grasslands, conifer groves, and hardwood forests, presenting Paleoamericans with a landscape unlike any that exists in the world today. Winters were probably colder than at present and summers were sunnier. The climate was warming at a rate noticeable within the lifetime of an individual, so Paleoamericans




End moraines and till plains in Darke County (after Selby 1978).

may have discussed climate change as much as we do today.

## Results of the Survey

The survey recorded 26 fluted points from Darke County and 10 from contiguous areas in Ohio and Indiana. The most recently recovered fluted point was found in Wayne Township, Darke County, by Garry Mumaw in April 2001.

Raw material for 63 percent of the fluted points was identified as Flint Ridge (Vanport), Laurel/Four-Mile-Creek, Indiana Green/Attica, Upper Mercer, Sonora, Harrodsburg/Allen Creek, and Harrison County (Wyandotte). The material from which the remaining points were made did not originate in the glacial till and must have come from distant sources. Upper Mercer (Coshocton) flint was the favored chert among Darke County Paleoamericans. The chert of second choice, Four-Mile-Creek or Laurel, could have been obtained at no great distance.

Exact provenience is known for 17 of the 26 fluted points found in Darke County. Strangely, all were recovered from till plains and none were found on end moraines.

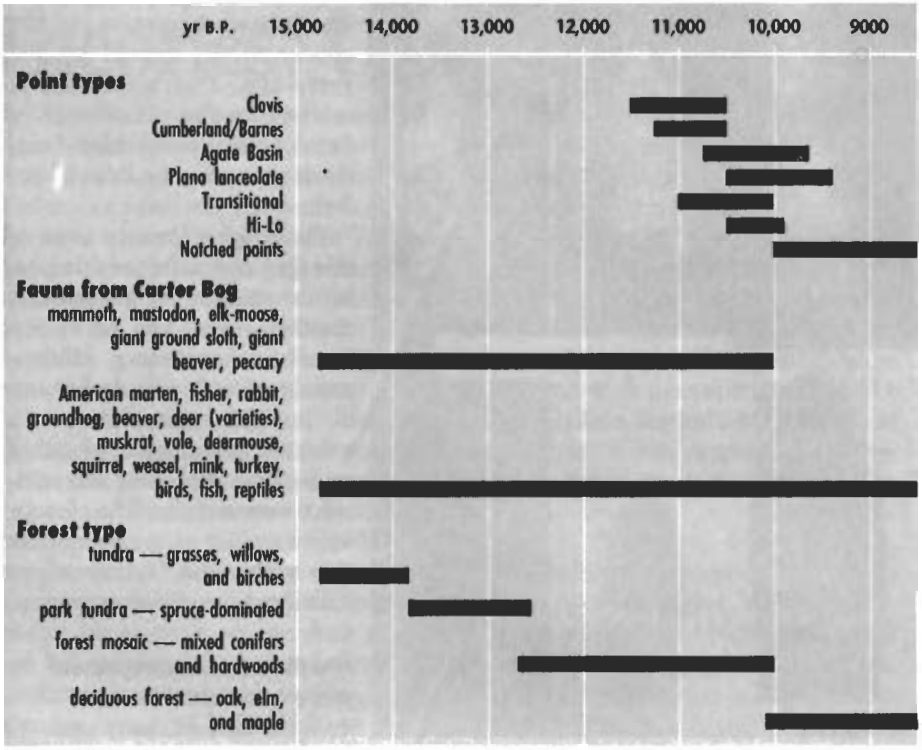
Find spots of 15 examples of fluted points are concentrated in the vicinity of the two largest streams in Darke County, the Stillwater River and Greenville Creek. Such provenience indicates that Paleoamericans followed major waterways into the area.

Fluted points from the Darke County area are 35 to 105 mm long. (Two of the fluted points are miniatures and are not included in measurements.) Most appear to have been extensively resharpened. Average maximum width of the fluted points only slightly exceeds basal width. Basal width and length of later grinding are surprisingly similar. Basal concavities are fairly pronounced, averaging 4 mm deep.

## Conclusions

Find spots of fluted points in Darke County indicate that their makers preferred areas where they could take advantage of several biotic provinces. All fluted points were recovered from till plains that lay adjacent to major streams or bogs. The data suggest a Paleoamerican preference for low, perhaps swampy, hunting areas, marked by damp Brookston and Crosby soils. The lack of finds of fluted points on end moraines indicates a possible avoidance of high, gravelly areas.

Fluted points in Darke County, as in much of Ohio, seemingly occur as isolated finds. However, a thorough examination of site collections sometimes reveals the presence of unrecognized Paleoamerican tools, such as pièces esquillées, unifacial blades, denticulates, flake knives, fan-shaped endscrapers, limaces, and other artifacts. Such a diverse inventory could result from multiple activities that took place at small winter camps occupied by family groups. In Paleoamerican research, Brad-




**Timeline of changing Paleoamerican diagnostic artifacts, fauna from Carter Bog, and forest composition in the late Pleistocene and early Holocene.**

ley Lepper, Curator of Archaeology of the Ohio Historical Society, emphasizes that isolated finds must be analyzed as true sites and that the microvariability of find spots is of great significance.

East of the Mississippi River, there is little evidence that Paleoamericans hunted or even scavenged megafauna. Darke County Paleoamericans almost certainly exploited woodland caribou and deer and trapped small animals. They likely collected berries and ate other vegetable foods. They may have also gathered nuts in the patches of hardwood forest that existed during the late Pleistocene. For processing tools they may have used glacially deposited igneous rocks that would have been abundant on the surface of the ground. These sites would likely be archaeologically undetectable.

Acquiring high-quality chert would have been an important part of Paleoamerican life. Darke County Paleoamericans traveled many miles to quarries and outcrops, and they possibly even traded for fine exotic cherts. Many of these materials have yet to be identified.

The study of the Paleoamerican occupation of Darke County is an ongoing project. Although the many facets of Paleo-

*continued on page 19*

# Smith Symposium II

## The Hiscock Site: Late Pleistocene and Holocene Paleoecology and Archaeology of Western New York State

**Sunday, October 14 & Monday, October 15, 2001**
**Buffalo Museum of Science**

**Session I: The Setting and Nature of the Hiscock Site**
Sunday, 8:30 A.M.–noon

1. Regional geology of the Hiscock Site: Ernest H. Muller, Parker E. Calkin, Keith J. Tinkler
2. Late Quaternary vegetation, lake-level, and climate changes in the Northeast: Thompson Webb III, Bryan Shuman, Paige Newby
3. Site structure, stratigraphy and chronology of the Hiscock Site: Richard S. Laub
4. Microstratigraphic and chronometric aspects of the Hiscock Site: Thomas W. Strafford, Jr.
5. Sedimentary analysis of the Hiscock Site: Donald W. Owens
6. Paleoecological studies of marl fen and *Thuja* stand development at the Byron-Bergen Swamp, Genesee Co., New York: Norton G. Miller, Richard P. Futyma

Discussant: Michael R. Waters

**Session II: New Data on the Hiscock Fauna**
Sunday, 2:00-5:30 P.M.

7. Pleistocene fauna of the Hiscock Site, with emphasis on the mastodon remains: Richard S. Laub
8. Season-of-death and terminal growth histories of Hiscock mastodons: Daniel C. Fisher
9. Were there mastodon die-offs at the Hiscock Site? Gary Haynes
10. Long-term change and continuity in the Holocene bird community of western New York State: David W. Steadman
11. New non-avian, non-*Mammut* remains from the Hiscock Site: Clare Flemming, Carl Mehling, Ross D. E. MacPhee
12. Mid-Holocene canid remains from the Hiscock Site: Stephen Cox Thomas

Discussants: C. S. Churcher, Jeffrey J. Saunders

**Session III: Miscellaneous Studies**
Monday, 8:30 A.M.–noon

13. *Mammut* hyoid elements from the Hiscock Site: descriptions and implications: Jeheskel Shoshani
14. Hyper-disease at the Hiscock Site: fact and theory: Bruce M. Rothschild
15. Taphonomy of Holocene cervid bones from the Hiscock Site: T. Cregg Madrigal
16. Early Holocene fossil oribatid mite biofacies as paleohabitat proxies at the Hiscock Site, Byron, New York: J. Mark Erickson, R. B. Platt, Jr., D. H. Jennings
17. Plant fossils from the Hiscock Site: environment and chronology: John H. McAndrews
18. The feasibility of preserving an impression in mud: study of soil samples from the Hiscock Site: Judith A. Logan, Malcolm Bilz, Jane Sirois

Discussants: Jim I. Mead, Thomas W. Stafford, Jr.

**Session IV: The Archaeological Record and Context of the Hiscock Site**
Monday, 2:00-5:30 P.M.

19. Typology, use and sourcing of the Late Pleistocene lithic artifacts from the Hiscock Site: Christopher J. Ellis, John Tomenchuk, John D. Holland
20. Analysis of Pleistocene bone artifacts from the Hiscock Site: John Tomenchuk
21. Human activities at Hiscock during the Pleistocene based on artifacts, distributions, and physiography: Richard S. Laub
22. Perishable technology from Hiscock: James M. Adovasio, Richard S. Laub, David C. Hyland, John H. McAndrews, Jeffrey S. Illingworth
23. The Hiscock Site and the archaeological record of the upper Spring Creek basin, Genesee County, New York: Kevin P. Smith
24. From text to context: Hiscock in the Paleoindian world: Peter L. Storck, Ronald Williamson, John D. Holland, Kevin P. Smith

Discussants: David G. Anderson, Kenneth B. Tankersley, Henry T. Wright

***Presentations and speakers are subject to change without notice.***

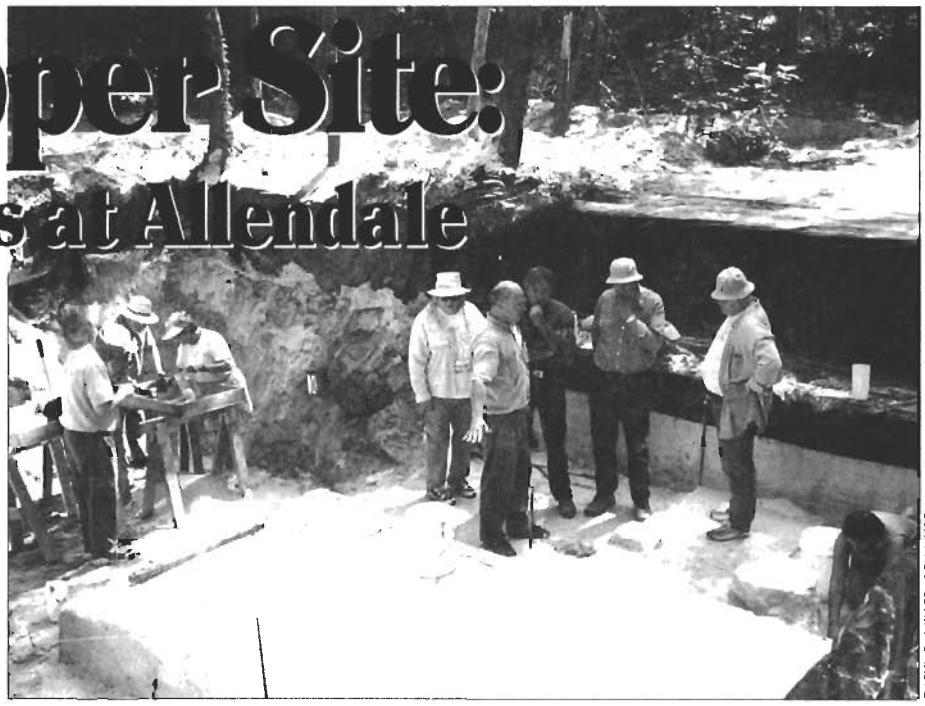
**General information**

- Reception Sunday, 8:00–10:00 P.M., at the Buffalo Museum of Science.
- Symposium check-in at Museum: Sunday, 7:00 A.M–5:30 P.M.; Monday, 7:00–10:00 A.M. Registrants will receive programs and abstracts at check-in.
- The Pillars Hotel (877-633-4667) and the Hyatt Regency Buffalo (800-233-1234) are offering reduced rates to Symposium registrants for a limited number of rooms. Shuttle buses will provide transportation between the Museum and these hotels.
- Registration fee is $65. Seating is limited. For registration materials and more information contact Michelle Rudnicki (**716-896-5200,** ext. 312). (In **Mammoth Trumpet 16-3** we gave the number incorrectly as 716-898-5200. We apologize for our error.)

BUFFALO MUSEUM of SCIENCE

**1020 Humboldt Parkway**
**Buffalo, New York 14211**

# The Topper Site: Beyond Clovis at Allendale



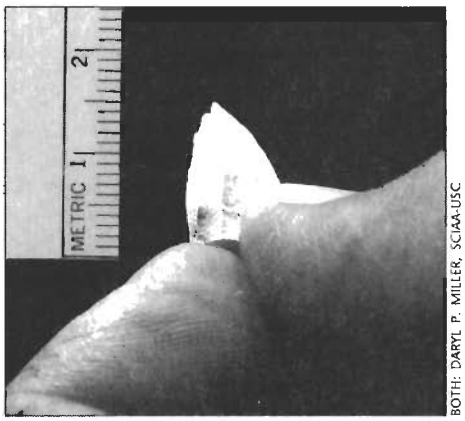
DARYL P. MILLER, SCIAA-USC

Experts of an interdisciplinary team inspect pre-Clovis evidence at the Topper site in May 2001:


**B**, Rob Bonnichsen, **CSFA** director; **M**, Lucinda McWeeney, Yale University paleobotanist; **G**, Al Goodyear, director of the Allendale Paleoindian Expedition; **S**, Tom Stafford of Stafford Research Laboratories, a radiocarbon-dating facility in Boulder, Colo.; **W**, Mike Waters, Texas A&M University geoarchaeologist; **K**, Marvin Kay, University of Arkansas microwear analyst.

***For nearly 20 years Al Goodyear has been unearthing Archaic and Clovis-age artifacts along the Savannah River—that's rare enough for the Southeast. Now he's into pre-Clovis levels—and he's excited!***

EXACTLY HOW OLD are the soils at the Topper site? Al Goodyear isn't sure yet. Materials recovered from the top of the pre-Clovis level date to 15,000–16,000 calendar years old—and there appear to be artifacts a meter below that! "We may be able to add a few thousand years to that," says Dr. Goodyear with obvious restraint, "since there are artifact-bearing sediments below the 16,000-year-old zone."




BOTH: DARYL P. MILLER, SCIAA-USC

**Al Goodyear** (*left*) **screening,** (*above*) **pinching an Ice Age microtool about 15,000 calendar years old.**

In the pre-Clovis level he has recovered stone flakes and what appear to be tools. According to one expert in microscopy, they show signs of use wear. And they definitely aren't Clovis. As far as Goodyear and his colleagues can tell, they're pre-Clovis and they're man-made.

These are heady times for Goodyear, founder and director of the Allendale Paleoindian Expedition, a research program of the South Carolina Institute of Archaeology and Anthropology, based at the University of South Carolina. For more than 20 years he has been studying sites in the central Savannah River Valley of Allendale County, S.C., searching for evidence of human inhabitants at the time of the Pleistocene-Holocene transition between 13,000 and 10,000 calendar years ago.

By any standards he has been successful. He has received grants from such varied sources as the National Park Service, the National Geographic Society, the Elizabeth Stringfellow Endowment Fund, Sandoz Chemical Corporation, and Clariant Corporation, the present owner

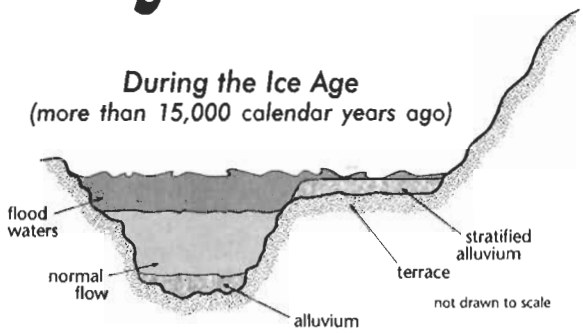
# The stratigraphy story at the Topper site

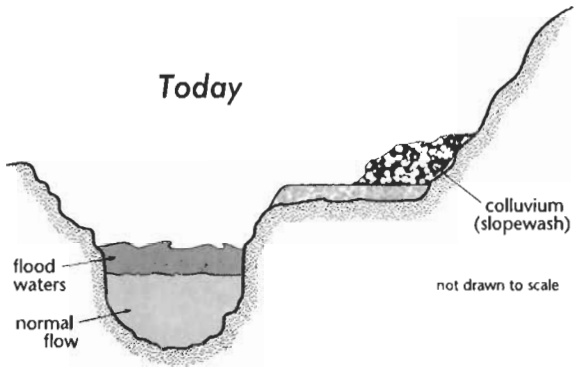
IN 1998 when we first found evidence of possible human activity in the deeper levels at the Topper site, soil morphologist John Foss and I thought the entire 2-meter-deep deposit of sand had probably washed off the hillside and slowly covered the artifacts on the terrace below. Today when it rains you can see sands washing down the hill. The upper 2 m of sediment is virtually all quartz sand (like that found on the hilltop today), with little change in color or texture to allow detection of discrete depositional layers. Furthermore, there was no evidence of pedogenesis, or soil formation, within the sands even though thousands of years were indicated by the archaeology. To complicate things further, in the lowest meter there was no macroscopically visible charcoal or other organic matter to radiocarbon-date. In an effort to find charcoal, I window-screened the sands and recovered tiny pieces of charcoal suitable for AMS C-14 dating. Four samples yielded dates of less than 2900 RCYBP. Given the complete Holocene archaeological sequence lying above them, the dates represented small specks of charcoal that had blown in or fallen in from nearby surface layers. Although disappointing, the dates showed there was essentially no old charcoal in situ available for dating.

In order to document and date the stratigraphy, we turned to outside experts. Rob Bonnichsen urged me to contact Dr. Tom Stafford of Stafford Research Laboratories to come and collect radiocarbon samples. Dr. Mike Waters, geoarchaeologist at Texas A&M, offered his services, as did his colleague Dr. Steve Forman, a geochronologist and OSL-dating specialist at the University of Illinois–Chicago. In June 2000 these scientists, along with Dr. John Foss, project soil morphologist from the University of Tennessee, joined our team for an intensive geological study of the Topper site and nearby floodplains.

With the benefit of several deep backhoe trenches, they found clear evidence of fluvial activity in the lower portion of the sands. Small chute channels with gravels were found paralleling the Savannah River, indicating river activity. These earth scientists learned that the approximate upper meter of sand was formed by slopewash, while the lower meter was formed or modified by river floods. Since the upper sands were colluvial in origin, they realized that OSL dating might work. An OSL date from the base of the colluvium came back 13,000–14,000 calendar years ago, which was in perfect agreement with the presence of Clovis-related bifaces also situated in that zone. (The Clovis culture dates from about 13,000 to 13,500 calendar years ago.) A few centimeters below that date another OSL date on the transition from colluvium to alluvium came back 15,000–16,000 calendar years ago. The majority of the pre-Clovis artifacts lie below that date and thus are older.

This geochronological finding is in agreement with the paleoclimate and Pleistocene river behavior in the Southeast. Prior to 16,000 calendar years ago, the climate was drier and cooler and rivers flowed at higher elevations owing to sediment-choked floodplains. As the earth warmed at the end of the Last Glacial Maximum around 15,000–16,000 calendar years ago, greatly increased precipitation in the South caused the major rivers to scour and incise their floodplains, lowering them to their present elevations. The Savannah River was thus no longer capable of flooding at the Topper site elevation; only slopewash gradually contributed sands to the terrace below. By the time Clovis people arrived to quarry chert at Topper, only the colluvial system was operative.



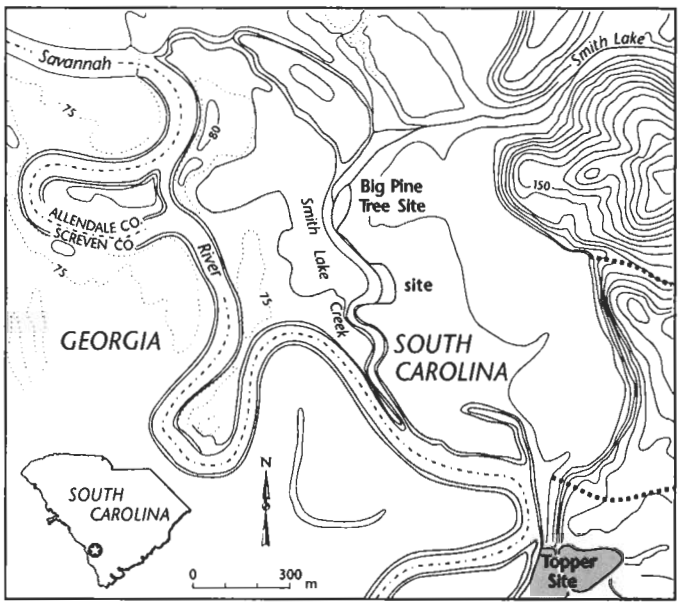




Clovis people and all subsequent prehistoric groups at Topper always utilized chert from river-smoothed cobbles available today in the modern Savannah River floodplain. But river-cobble chert and the large quartz-cobble hammerstones present in the river bottom today are absent from the pre-Clovis zone at Topper. These sources of fine-quality chert apparently were not available for human use prior to the great scouring of the Pleistocene.

Thus the plain sands at Topper finally told their story. The upper sands housed the Clovis through Mississippian cultures who lived in the Savannah River valley as we see it today. Underneath them were the stone tools of much earlier peoples who camped in and adjacent to the Ice Age Savannah River floodplain. Their secret remained hidden for over 16,000 years until in 1998, because of finds in Chile and Virginia, archaeologists dug a little deeper.

*–Albert C. Goodyear*

of the sites. Over the years his exhaustive explorations of chert quarry sites in the Allendale area have yielded numerous artifacts from the Paleoamerican through the Archaic periods. In 1996 we reported his startling discovery of Clovis-age biface blanks, preforms, and fragments of blades and microblades at the Big Pine Tree site, which lies about a mile upriver from Topper on a lower terrace (**Mammoth Trumpet** 11-1, "Site near Savannah River Yields Clues to Paleoindians").



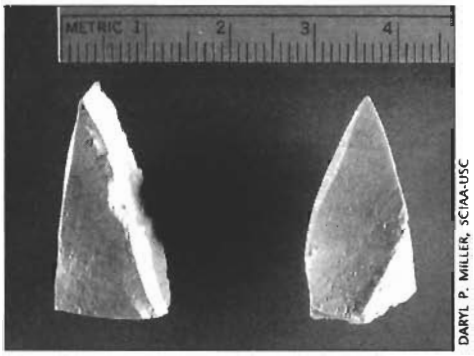

**We first printed this map in January 1996 (Mammoth Trumpet 11-1) when we reported on the Big Pine Tree site, an Allendale chert quarry site that was yielding Clovis-age blades, microblades, and cores. (The other two sites shown on the map were unlabeled at the time.) There are seven or eight known chert quarries in the Allendale area; the material from all of them is known as Allendale chert.**

Nothing attracts like success. Every spring volunteers eagerly make a donation to the University for the privilege of taking part in the Allendale Paleoindian Expedition. This year's hard-working volunteer force numbered more than 100, its members drawn from as far away as Florida and North Dakota.

## The Topper story: Confession of a converted nonbeliever

Goodyear is quick to admit that the apparent success of the Topper site is an unexpected boon, like winning a million-dollar lottery.

His success certainly wasn't altogether unearned. Topper is one of several Allendale chert quarry sites he started investigating in the early 1980s when a local informant named David Topper showed him the site. It fit the search formula that has worked well for other Paleoamerican archaeologists in the East. "Find a good cryptocrystalline chert source," he says, "and you almost always find evidence of Paleoamericans. It works like a charm in the Savannah River area." Goodyear thought the site ought to be worth exploring because it had the earmarks of a good site, a comfortable bench, or terrace, fronting the Savannah River with a chert outcrop on the hillside. After testing it in 1983–84, he nominated the Topper site, along with several other chert quarries, to the National Register of Historic Places. He also had a petrology study done of chert from the site, which was included in his 1984 survey report.




**These burin-like tools, found in the Topper pre-Clovis occupation, were made by the bend-break method, a far simpler technology than Clovis fluted-point knapping. Goodyear and his colleagues are studying the bend-break technique.**

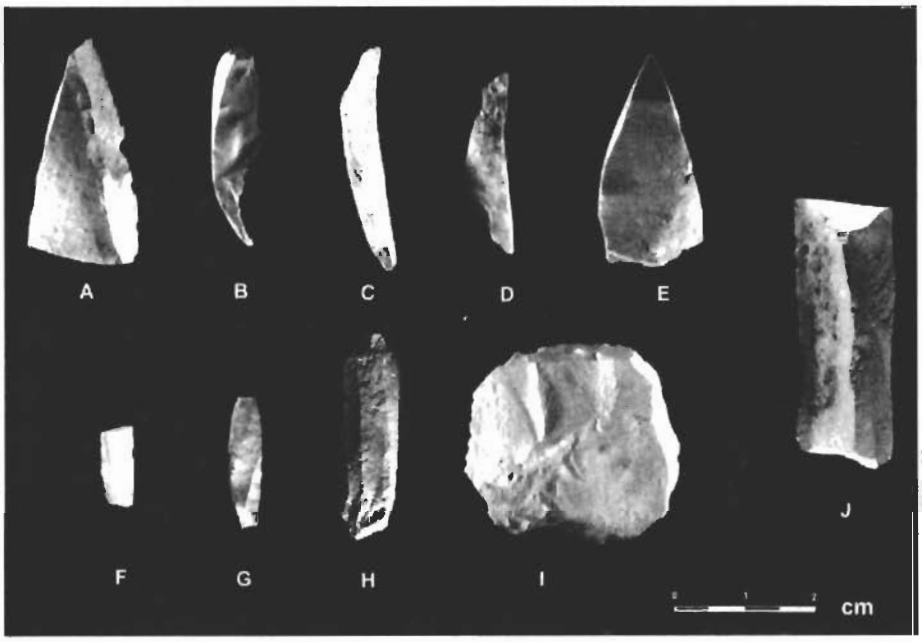
In 1986 Goodyear, thinking there was probably about 1 m (about 39 in) of stratigraphy at the site, conducted further excavations in a project funded by the National Geographic Society. It was a worthwhile effort; at 70–80 cm (about 28–32 in) below surface he found early-Archaic side-notched points, dated elsewhere by radiocarbon at 11,000–12,000 calendar years old. Then, he remembers, "after about a meter everything went away." He thought he had plumbed the depths of the Topper site.

## Cactus Hill and Monte Verde change the picture

By his own admission Goodyear is a classically trained Paleoamerican archaeologist with 25 years' experience. Classical training taught archaeologists that the first humans arrived in the Americas on foot by way of the Bering Land Bridge. However, huge ice sheets covering present-day Canada until about 14,000 years ago probably prevented people from entering the temperate areas now occupied by the United States. The Clovis culture, which began suddenly soon after the ice sheets melted, appeared to be the first prehistoric culture in America. Although he doesn't admit to being a victim of mind set, nonetheless he says frankly, "You don't look for what you don't believe in." To him it was pointless—and irresponsible—to waste time and project money trying to find evidence of pre-Clovis cultures, which he didn't believe was there.

Then in 1996 he read with great interest the article in **Mammoth Trumpet** about the Cactus Hill site in Virginia (**MT** 11-4, "Simple Tools, Hearth Found beneath Clovis Horizon"), where Joseph McAvoy's Nottoway River Survey found stone tools and evidence of *two* periods of occupation beneath a well-documented Clovis layer. Charcoal dated the find at 15,070 ± 70 RCYBP (about 18,000–19,000 calendar years old). Goodyear, after reading McAvoy's detailed report of his findings published in 1997, concluded the Cactus Hill site had anything a skeptical archaeologist could demand: archaeological stratigraphy, undoubted artifacts, change in raw materials (core blades found in the pre-Clovis levels were made of local quartzite instead of fine-quality chert used by Clovis knappers), and radiocarbon dates that place the find well before Clovis times.

For Goodyear the turning point was 1997, when a number of prominent Paleoamerican authorities published an article in *American Antiquity* about University of Kentucky archaeologist Tom Dillehay's discovery at Monte Verde in Chile. Having inspected the site in person, they stated their belief that the Monte Verde site was a true archaeological site and that it was 14,500 calendar years old—fully 1,000 years older than the Clovis culture in North America. Like many of his peers, Goodyear wondered, If there were people down in South




DARYL P. MILLER, SCIAA-USC

**Microlithic tools from the Topper pre-Clovis occupation include burins and spalls (A–E), microblades (F–G), a possible microcore (H), scraper (I), and blade-like tool (J).**

America 14,500 years ago, what was going on up here? If they were down there, he reasoned, mustn't they have been here, too?

## Serendipity takes charge

Pasteur said that chance favors the prepared mind. The truth of that was confirmed by Goodyear in spring of 1998.

From 1996 to 1997 the Allendale Paleoindian Expedition had dug on the modern terrace of the Savannah River at the Big Pine Tree site. In May 1998 the volunteer force was ready to resume work there, but the river was so swollen with winter rain it was impossible to dig. Flooded out of the Big Pine Tree site, Goodyear turned his thoughts to higher ground and the Topper site. Since there was a ready supply of chert and the river nearby, he reasoned, this might be a place where early humans would stop. *If* pre-Clovis people were in North America and *if* they stopped here and *if* they left anything behind, then there might be something down below—where he had traditionally never bothered to look. Now he decided to look.

After two weeks of digging the upper meter at Topper and discussing with his volunteers the possible existence of a pre-Clovis culture in the Western Hemisphere, Goodyear asked his team, "Who wants to go deeper?" They were, he says, "wild-eyed and enthusiastic." He put a test square as close as possible to the base of the hillside in order to tap into the maximum amount of colluvium (slopewash that had accumulated at the base). After digging 30–50 cm (about 12–20 in) below the expected Clovis level, they found small flakes and small flaked tools.

Was he surprised?

"I was in shock," he confesses.

After digging down about 1.8 m (about 6 ft), the team found what appeared to be a rock feature, several rocks piled together as though by human hands.

For 48 hours Goodyear was, he says, in a state of mental turmoil. Try as he might, he couldn't explain away evidence he had seen with his own eyes. The Expedition dug two other squares at Topper—and found similar evidence. Excitement ran so high Goodyear claims, perhaps with only slight exaggeration, "we could hardly sleep at night."

What draws volunteers to Goodyear's program year after year is more than the opportunity to witness scientific discovery; it's the chance to work with a leader who they know will keep them informed. For the benefit of all the volunteers who had worked for weeks, many on the upper-Holocene deposits, he wrote his usual letter report bringing everyone up to date. His carefully worded summary told his workers they weren't going to believe it, but the Expedition had dug

**◀ Taking a sediment sample from an ancient river bed near the Topper site with the Vibracore. A gasoline engine–powered actuator vibrates a 4-inch-diameter pipe and worries it (instead of pounding it or drilling it) into the soil, cutting a clean core.**

**Paul Gayes** *(left, standing)* **▶ and Tom Stafford** *(center, standing)* **examine a sediment sample taken with the Vibracore. The core has been split open to reveal strata.**

BOTH: DARYL P. MILLER, SCIAA-USC

deeper than ever before . . . and they seemed to have found artifacts.

It was a secret that couldn't be kept. A volunteer faxed the letter to James Adovasio, director of the Mercyhurst Archaeological Institute at Mercyhurst College in Erie, Pa., and discoverer of the Meadowcroft rockshelter in western Pennsylvania. At the time Dr. Adovasio happened to be working with Tom Pettit, reporter for *U.S. News and World Report,* who quickly picked up on the news from the Topper site. In April 1998 *USNWR* included the brand-new discovery at the Topper site in its lengthy article on the controversial issue of when the Western Hemisphere was first peopled. In October 1998 *Newsweek* followed suit, featuring the Topper site in its treatment. Both articles were cover stories.

## Step by careful step

Nobody had to warn Goodyear that every detail of his find at the Topper site was going to be scrutinized in coming months and years by skeptical archaeologists. Later in May 2000, after opening up 80 square meters of the pre-Clovis level, he sought help from key scientists: geoarchaeologist Mike Waters; Steve Forman of the University of Illinois–Chicago, a geologist who specializes in chronology; and radiocarbon-dating expert Tom Stafford. They complemented the talents of John Foss, soil morphologist for the Allendale Paleoindian Expedition, who had been at the Topper site at the initial discovery of pre-Clovis levels in the 1998 season.

The soil conditions at the Topper site make it difficult to date materials in the pre-Clovis levels. Acidic sands have destroyed most organic materials, including charcoal. Fortunately Dr. Forman was able to use a new technique called OSL (optically stimulated luminescence). Many sediments contain small amounts of radioactive elements like uranium, thorium, and potassium, which bombard surrounding sediment with electrons as they decay. Some of these electrons become trapped in quartz crystals; the amount of trapped energy is a measure of how long the material has been buried. The TL (thermoluminescence) technique, which has been in use for some years, measures trapped energy released in the form of luminescence when the material is exposed to heat. In the new OSL technique, exposure to light instead of heat releases the trapped energy. In TL and OSL, the intensity of the luminescence indicates how long the sample has been buried.

For a confidence check of the OSL dating technique, Forman and Waters tested materials from the Archaic level at Topper. The result was right on the button at 7,700 years old. (Unlike radiocarbon dating, whose result must be converted to the corresponding calendar year by applying a correction factor, OSL dating gives the calendar year directly.)

At the base of the colluvium (accumulated slopewash), which Goodyear believes is Clovis age, the sands dated to 13,000–14,000 calendar years old. That's in perfect agreement with other Clovis site dates. Goodyear isn't the least perturbed that he isn't finding Clovis points. "Even though we don't have Clovis points," he notes puckishly, "we have Clovis-age dirt."

OSL tests of materials taken a few centimeters below the Clovis level, at the transition from colluvial to alluvial deposits, give dates of 15,000–16,000 years old. These dates correspond to 12,700–13,300 RCYBP. That's older than Monte Verde. And this is just the *top* of the pre-Clovis level at Topper.

The pre-Clovis materials lie in sands on top of a Pleistocene terrace 2 m thick. Naturally Goodyear and his colleagues wanted to know what lies *under* the terrace. In 1999 Stafford radiocarbon dated humic acids in two sediment samples taken from under the terrace and got results of 19,000–20,000 RCYBP, or about 23,000 calendar years old. These dates are being cross-checked by radiocarbon dating more reliable materials.

## The Allendale–Topper Site Conference

### An Archaeological Conference for the Public

January 25–26, 2002
The Capstone Conference Center
University of South Carolina
Columbia, South Carolina

**Program**

Friday, Jan. 25 1:00–5:00 P.M.
Open house with Allendale artifact display at the S.C. Institute of Archaeology and Anthropology, University of South Carolina. Friday evening reception to meet the scientists.

Saturday, Jan. 26 8:30 A.M.–5:00 P.M.
Presentations by Topper site scientists, including:

- Dr. Steve Forman, OSL Dating
- Dr. John Foss, Soils
- Dr. Albert C. Goodyear, Topper Artifacts
- Dr. Marvin Kay, Stone Tool Microscopy
- Dr. Lucinda McWeeney, Paleobotany
- Dr. Thomas Stafford, C-14 and Chronostratigraphy
- Dr. Dennis Stanford, the Eastern Seaboard and Europe
- Dr. Michael Waters, Geoarchaeology of Topper.

Saturday evening 5:30–9:00 Cash bar reception, banquet, and presentation.

**Registration**

Contact Dr. Al Goodyear, SC Institute of Archaeology and Anthropology, University of South Carolina, 1321 Pendleton St., Columbia, SC 29208; (803) 777-8170; e-mail goodyear@sc.edu Registration fee of $125 includes banquet ($100 is tax deductible). Make checks payable to USC Ed. Foundation, Allendale.

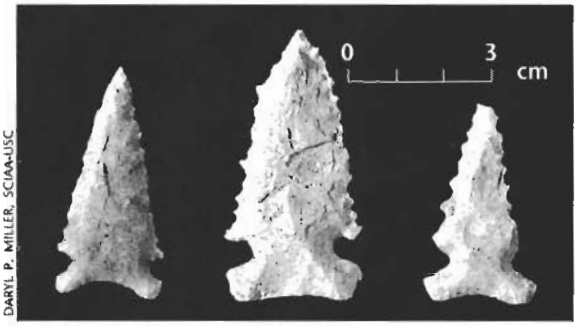
**Hotel Reservations**

Rooms are reserved at the Clarion Townhouse Hotel, 1615 Gervais St., Columbia, SC 29201. Call (800) 277-8711 and ask for reservations for Allendale Archaeology.

## Enter more experts

Finding possible evidence of the earliest human activity yet found in North America isn't like finding a vein of gold. Far from secretly hiding it from prying eyes, Goodyear welcomes examination. The more scientists that see his discovery and evaluate his findings, the better. That's why in May 2001 he invited a high-powered team of experts to visit the Topper site (see photo at start of article). Each brought special expertise to bear. Drs. Waters and Stafford's contributions in geoarchaeology and radiocarbon dating have already been mentioned. Dr. Rob Bonnichsen shed valuable insight into pre-Clovis flake-tool

technology. Paleobotanist Dr. Lucinda McWeeney analyzed sediment samples from Topper for phytoliths and took sediment samples from a nearby Pleistocene river bed. The microwear analysis of microscopy specialist Dr. Marvin Kay was critical to the archaeological assessment of the Topper lithic assemblage; the results of his analysis determined how the artifacts were interpreted. It was Kay who analyzed materials from the Monte Verde site and pronounced them artifacts, based on evidence of microwear. His diagnosis of Topper artifacts? Three flaked stone objects recovered from pre-Clovis levels show definite signs of use wear. In other words, in his opinion Goodyear has found tools in the pre-Clovis zone.




**These beautiful Taylor side-notched points found at the Topper site date to the early-Archaic period, about 11,000–12,000 calendar years ago.**

### Different technology and raw materials from Clovis

In sands at the base of the upper meter—at the transition from alluvium to colluvium, believed to be the Clovis level—Goodyear found broken fluted preforms, which experts have judged diagnostic of Clovis bifaces. Artifacts found below that, however, don't look at all like Clovis. There is no evidence of bifaces. Most objects are microlithic artifacts, predominately burin-like tools made by a technique called bend-break, a simpler technology than the sophisticated method used by Clovis knappers.

The pre-Clovis knappers used different raw materials, too. Denied the high-quality material in river-bed cherts and quartz cobbles that were available to Clovis knappers, pre-Clovis toolmakers apparently gathered weathered cobbles from the hillside and worked them on site; Goodyear has found numerous chunks and pieces of the local cobbles that were apparently smashed to get at the chert inside. Even the hammerstones they used weren't of the large size you find today in the Savannah River; they used whatever they found on the hillside.

### The elusive Clovis connection

Today Goodyear is starting to feel comfortable. He has stratigraphy, he has dating, and it appears he has artifacts.

The transition to Clovis is a mystery, though. Unlike lithic artifacts from the Cactus Hill site and Meadowcroft rockshelter, which show obvious biface technology, pre-Clovis artifacts found at Topper show no evidence of bifaces. "It's easy to see Clovis evolve from Cactus Hill and Meadowcroft," he notes, "but not from Topper." That's the beauty of archaeology, of course, and the aggravation: an answer opens up a whole new set of questions. MT

*–JMC*

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## Kennewick Man

*continued from page 2*

case that did not involve a "final judgement." Apparently, like Humpty Dumpty in Wonderland, when the DOI uses a word, "it means what they choose it to mean."

Although Jelderks indicated he would take several weeks to make his decision, the scientists and their attorneys have every reason to be optimistic about the outcome. Jelderks stated at the June hearing that he had "very serious concerns" about Secretary Babbit's decision to give the 9,000-year-old skeleton to the coalition of Indian tribes. But if Jelderks rules in favor of the scientists, it may be only a temporary reprieve for American archaeology. Alan Schneider, one of the attorneys for the scientists, said that whoever loses will likely appeal the decision. The case may eventually end up before the Supreme Court.

On June 18, the day before the federal court proceedings, the scientists met with their attorneys and a few supporters to discuss what to expect in court. The meeting was upbeat. The attorneys were well prepared and cautiously enthusiastic. The scientists were hopeful that finally, after five years of litigation, a reasonably definitive conclusion would be reached. However, Douglas Owsely, a physical anthropologist with the Smithsonian Institution, offered a sobering thought. He pondered that if the judge found for the scientists and if his decision were based on one or more of the big issues, such as the definition of "Native American," and not just on a legal technicality, supporters of wholesale repatriation would almost certainly attempt to amend NAGPRA so that it would allow truly ancient human remains be given to Native Americans for reburial. Owsely fears that even if scientists win this battle, they could lose the war.

Owsley's fear is well founded, but this bitter controversy has raised the consciousness of all concerned. And scientists as well as members of the general public are becoming more aware of just what is at stake in this debate. Antone Minthorn, the Chairman of the Board of Trustees of the Confederated Tribes of the Umatilla Indian Reservation, claims that the Kennewick Man case "is not science versus religion, . . . it is science versus the law." Minthorn is wrong. It is about U.S. government administrators overinterpreting the law to advance a social and religious agenda. Ancient human remains have much to teach us.

NAGPRA was never intended to silence what Dorothy Lippert calls their "voice made of bone."

Jelderks's decision, whatever it proves to be, will have far-reaching consequences for the future of American archaeology. Either scientists will be permitted to listen to the stories these ancient ones can tell us, or their bones and their stories will be surrendered to the oblivion of reburial. Some people will regard that oblivion as a victory for their religion; others will see it as a tragic loss to science. So maybe, after all, this is about science versus religion—or at least science versus the dogma of a particular religion. Seen in that light, maybe Jelderks's decision won't be that difficult and the sword of the American judicial system can make short work of this Gordian knot—or not.

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# What Is the Meaning of Native American?

*by Alan L. Schneider*

ONE OF THE ISSUES argued in the Kennewick Man case is the meaning of the term "Native American" as used in NAGPRA. The statute defines it as "of, or relating to, a tribe, people or culture that is indigenous to the United States." 25 U.S.C. §3001(9). Two vastly different interpretations of this definition were offered at the June 2001 hearing and in the parties' prehearing briefs. One interpretation (the scientists') views the statute's definition as having a limited meaning that might not include some human remains or other objects found on federal or tribal land. The other interpretation (the government's) would give the definition a broad meaning that would apply without exception to all pre-Columbian indigenous remains and many nonindigenous remains as well.

**The Competing Interpretations**

***Scientists' Interpretation.*** The scientists argue that Congress intended NAGPRA to apply to only those remains and objects that are related to existing indigenous peoples (i.e., American Indians, Native Hawaiians or Alaska Natives). They contend that the statute should be interpreted as if it contains the word "now" (i.e., as if it reads "of, or relating to, a tribe, people or culture that is *now* indigenous to the United States"). Under this interpretation, the existence of a relationship to present-day indigenous peoples is a critical threshold issue. If such a relationship does not exist in a particular situation, NAGPRA is inapplicable and does not control the disposition of the remains or object in question.

***The Government's Interpretation.*** The government argues that the statute does not require a relationship to present-day indigenous peoples. They would interpret its definition of Native American as meaning "human remains and cultural items relating to tribes, peoples, or cultures that resided within the area now encompassed by the United States prior to the historically documented arrival of European explorers, irrespective of whether some or all of these groups were or were not culturally affiliated or biologically related to present-day Indian tribes." McManamon Opinion Letter, December 23, 1997. Under this interpretation, all remains and objects that predate documented European exploration (which defendants equate to the first voyage of Columbus) would automatically be classified as Native American and thus would be subject to disposition under NAGPRA.

***The Amici's Position.*** Both the tribal amici (i.e., the Colville, Nez Perce, Umatilla and Yakama) and the National Congress of American Indians endorsed the government's interpretation. The Society for American Archaeology also supported the government's position at least in general, but may disagree with it as to some secondary details. For example, it was not clear from the briefs and oral arguments whether SAA agrees that residence is an appropriate test to use for determining whether something is or is not Native American.

**Interpretative Tests**

If the court reaches the substantive issues raised by these two competing interpretations (see "Court Options" below), two of the questions it is likely to ask are:

***Which interpretation is most consistent with the words of the statute?*** When construing the meaning of a statute, courts (and government agencies) are required to give appropriate effect to all of the words used in the provision in question. The dispute here is over the significance of the phrase "that is" in the statutory definition. The scientists argue that the word "is" must be read in the present tense, and that therefore the measuring standard in the definition is present-day indigenous peoples. The government and the amici, on the other hand, argue that "is" can be interpreted as "is or was" since people sometimes use "is" and "was" interchangeably. However, all standard dictionaries define "is" as the present indicative of the verb "to be." There is no evidence that Congress was unaware of, or deliberately chose to ignore, the rules of grammar when it enacted NAGPRA. During the June 2001 hearing, the court commented that it could accept the government's interpretation more easily if the statute had used the word "was."

***Which interpretation is most consistent with the purpose of the statute?*** The government and the amici assert that NAGPRA was adopted so Native Americans could claim the remains and cultural items of their ancestors. If that is so, the scientists argue, then use of a relationship test is clearly appropriate. Items that are unrelated biologically or culturally to modern indigenous peoples are not ancestral and thus should not be subject to claims under NAGPRA. The government's interpretation of the term Native American, on the other hand, would permit items to be claimed even in the absence of a demonstrated relationship to living Native Americans. Such an expansive interpretation is said to be necessary because it would be difficult or impossible to prove a relationship in many situations. The scientists believe that these asserted problems of proof are exaggerated, and do not justify "repatriating" all remains that happen to predate Columbus. For most historic and

recent prehistoric items there is usually ample biological, genetic or artifactual evidence to demonstrate the requisite relationship. Problems of proof would be more pronounced for ancient and other older items, but they represent a small percentage of the situations likely to be encountered. Furthermore, there is no evidence Congress had such older remains and objects in mind when it adopted NAGPRA.

**Potential Implications**

The outcome of this dispute over interpretation of the statutory definition could have important consequences for how repatriation claims will be decided and for scientific investigation of American prehistory. Some of the potential consequences are:

***Nonindigenous Remains.*** The government has stated that it would apply its interpretation to exclude from NAGPRA those pre-Columbian remains that are shown to be European in origin (e.g., Viking remains that might be found in the U.S.). However, no exception would be made for remains from other groups that are not presently indigenous to the U.S. Possible examples of these include Japanese and Chinese explorers, and groups that are now indigenous to Canada, Central America, the Caribbean or Siberia. Under the government's interpretation, their remains would be deemed Native American and could be given to U.S. tribal claimants. Under the scientists' interpretation, on the other hand, there would be no presumption that all prehistoric remains are Native

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American. The status of each item would be resolved on a case-by-case basis. Remains from groups not indigenous to the United States would be excluded from NAGRPA treatment unless there is evidence to indicate that they are related biologically or culturally related to present-day Native Americans.

***Extinct Groups.*** The government's interpretation would include remains from groups that became extinct prior to 1492 even though these groups have no ascertainable living descendants. The scientists' interpretation would exclude such remains since they are not ancestral to present-day Native Americans.

***Relevant Data.*** Under the government's interpretation, the only data that would be used to determine the status of an item is information relating to its chronological age. The scientists' interpretation would permit the use of all potential lines of evidence (e.g., biological, genetic, archaeological, biochemical) to determine whether the item is, or is not, Native American for NAGPRA purposes.

***Repatriation Standards.*** An item classified as Native American can be "repatriated" in some situations without any showing of cultural affiliation. This can occur, for example, if the item is found on land that has been judicially determined to have been aboriginally occupied by the tribe claiming it. Such determinations of aboriginal occupation (which merely require exclusive use of an area for a generation or two) have been made for large portions of the western United States. In addition, future regulations could provide for the disposition of all culturally unidentifiable human remains regardless of their antiquity or scientific importance. The government's interpretation would place no limits on the remains subject to such treatment. The scientists' interpretation would limit repatriations to only those remains that can meet the relationship test.

***Prospects for Study.*** The government has argued in the Kennewick Man case that NAGPRA prohibits all scientific study of new discoveries except those limited studies needed to determine an item's disposition under the statute. The tribal amici have taken an even more extreme position that would bar all studies not approved in advance by tribal claimants. If either of these theories were to prevail, the meaning given to the term Native American will determine whether any room will be allowed for study of new discoveries for general scientific purposes. Under the scientists' interpretation, at least those remains not related to present-day Native Americans would still be available for study since they would not be subject to control under NAGPRA.

**Other Issues**

One question that has received little attention thus far in the case is the scope of the phrase "relating to" in the statutory definition. What type of connection is necessary to qualify an item as something that "relates to" a present-day indigenous tribe, people or culture? Must the connection be direct and substantial? Or would more remote connections be sufficient? If the court does opt to adopt a relationship test, further hearings could be needed to resolve these (or other related) issues.

**Alan Schneider (*far right*), at the 1999 Clovis and Beyond Conference in Santa Fe, with plaintiffs in the Kennewick Man case: (*left-right*) Robson Bonnichsen, George Gill, Richard Jantz, D. Gentry Steele, Dennis Stanford, C. Vance Haynes, Douglas Owsley. Not present is C. Loring Brace.**

**Court Options**

The options available to the court are not limited to a simple choice between the two interpretations argued by the parties and the amici. The court could decide the case on other grounds without resolving the question of what is meant by the term Native American. For example, it could decide that the government's interpretation is invalid because it was not adopted in the proper manner. Even if the court does reach the substantive merits of this issue, it could choose to craft its own interpretation of the statutory definition. In any event, a final resolution of what is meant by the term Native American could still be several years away. As noted above, further hearings could be held. Moreover, it would be surprising if the court's decision, whatever it might be, is not tested by at least one round of appeals.

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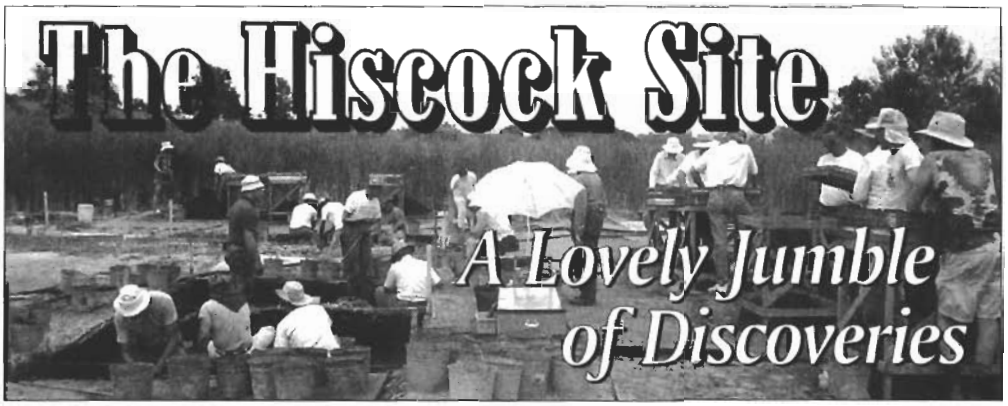
Attorney Alan Schneider wrote this article, which clarifies issues in dispute in the Kennewick Man court case, for posting on **www.friendsofpast.org**, the Web site of Friends of America's Past. You can contact him by fax at (503) 274-8445 or by mail at 1437 S.W. Columbia, Suite 200, Portland, OR 97201.

# The Hiscock Site

## A Lovely Jumble of Discoveries



BUFFALO MUSEUM OF SCIENCE

**Some veteran volunteers have been digging the Hiscock site for more than a decade and are highly skilled. The site was discovered in 1959. The Hiscock family donated 10 acres to the Museum in 1989, and the Smith Foundation of Buffalo later purchased 42 acres. "It is a rare instance," Dick Laub reflects, "of an important site in the possession of a public institution."**

WHAT IS THE HISCOCK SITE? Dick Laub of the Buffalo Museum of Science will tell you what it *isn't*. "It's not just a mastodon site," he says, "not just an archaeology site and not just a paleontology site." It's all these things, and much more. Its geological structure and sediments are a permanent record of environmental events like droughts and wildfires. They also have much to tell us about the nature and degree of climatic change in the Great Lakes region during the Pleistocene-Holocene transition.


### Soggy origins

The sediments of the Hiscock site are archives of animal remains. The bones of many individuals are worn and broken and mixed together, as Dr. Laub puts it, "like pick-up sticks on a table." The richness of the skeletal remains and the confused state in which they are found are the result of its location, close to present Lake Ontario. When bones started accumulating at the end of the Ice Age, the Laurentide Ice Sheet had retreated scarcely 200 miles north, leaving behind lush periglacial woodlands rich in caribou and other boreal animals now associated with central Canada. According to Laub, a natural geographical barrier of ponds and wetlands ran east-west for 90 miles, from within the present Ontario peninsula nearly to where Rochester sits today. A 2-mile-wide corridor that penetrated the barrier became a natural migratory route that appears to have attracted animals—and the people that followed them. The geology and paleogeography of the region added to its appeal; the bedrock may have contributed minerals to the sediment that drew animals. Happily, the Hiscock site lay on the margin of the corridor.

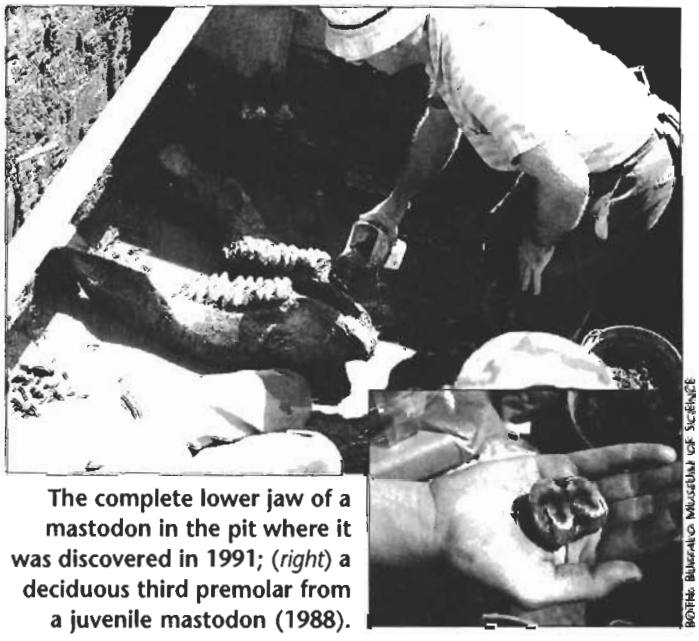
Since the Museum started systematic excavation in 1983, the bones of more than 60 animal species have been identified. Although there is reliable stratigraphy in some parts of the 52-acre site, there is evidence of much mixing—literally—especially in the Pleistocene horizon. There were a number of spring-fed pools. "Bones presumably settled vertically to the lower layer of the soupy mixture," says Laub, "and were mixed by trampling, water movement, scavenging, and human manipulation." Bones from the Pleistocene and Holocene horizons are rarely found articulated; radiocarbon dating is a big help in disentangling the jumbled remains. Today Laub has more than 60 C-14 dates; the oldest is 11,450 ± 50 RCYBP on a caribou antler.

The Hiscock site is also a storehouse of fossil plants and pollen, from which scientists can infer the change in vegetation cover over time. Preserved environmental information is a permanent record of droughts, changing water tables, fire, and varying erosion rates.

### Bones are the majority of the finds

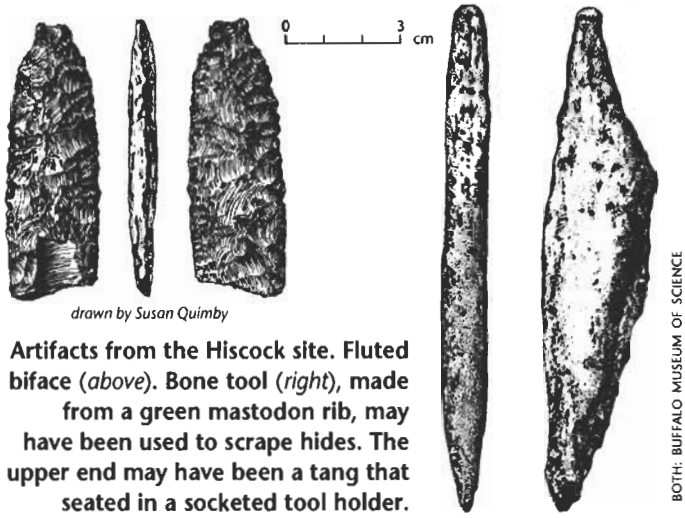
By far the most abundant fossil remains of Pleistocene fauna recovered at the Hiscock site are those of mastodon. The Museum can account for at least 10 mastodons, juvenile and mature, male and female. The site has produced 13 complete tusks. Research done at the Museum has added considerably to our knowledge of these megafauna. Examination of their gastrointestinal and fecal contents reveals that their diet included conifer twigs, especially spruce. Reconstruction of their jaw structure and musculature tells us how they chewed—not, as you might think, like an elephant, but like a cow or sheep, from side to side.

Among the animal species identified by their remains are the



PHOTOS: BUFFALO MUSEUM OF SCIENCE

**The complete lower jaw of a mastodon in the pit where it was discovered in 1991; (*right*) a deciduous third premolar from a juvenile mastodon (1988).**




drawn by Susan Quimby

drawn by William L. Parsons

BOTH: BUFFALO MUSEUM OF SCIENCE

**Artifacts from the Hiscock site. Fluted biface (*above*). Bone tool (*right*), made from a green mastodon rib, may have been used to scrape hides. The upper end may have been a tang that seated in a socketed tool holder.**

varieties familiar to every paleontologist, including stag-moose and giant beaver (only a tooth so far). There was a surprise, too. In 1984, while recovering bones from an ancient spring at the Hiscock site, Laub first thought one was from a cervid (deer-like) animal because of its size. Examination of its structure in the lab revealed it was from a bird, perhaps a large vulture. He sent it to David Steadman, then with the New York State Museum, who identified it as the humerus of a California condor. Both men were excited by the discovery, since fossil condor remains had previously been found only along the Gulf Coast and along the Pacific Coast into northern California. Two additional bones found in the next two years confirmed the presence of the condor in Ice Age New York. The condor, we now know, was a very tough bird that was adapted to a wider range of climates than previously thought. The article on the occurrence of the condor at the Hiscock site by Dr. Steadman and co-author Dr. Norton Miller that appeared in *Quaternary Research* (vol. 28, 1987) states that its reduced range (today it is found only in the Sierra Nevada mountains of California), rather than being the result of climate change, may be due instead to the diminished supply of large carcasses at the end of the Ice Age.

### Human evidence

The Clovis culture left its signature at the Hiscock site: five fluted bifaces and a fragment of a trianguloid endscraper. Interestingly, one of the bifaces bears traces of bovid blood. Since no bovid remains have been identified at the site, this suggests the tool might have been used to butcher a musk ox or bison elsewhere in the migration of the band. Excavations have also turned up an Ice Age bead made of gray sandstone, pierced first on one side, then on the other to complete the lumen, and classic examples of early-Archaic projectile points from the Holocene horizon.

Even more interesting than stone artifacts are bone tools that have been found in the Pleistocene and Holocene horizons. The most noteworthy example, found during a dig in 1991, is a worked mastodon bone. It lay within a radius of 13 m (about 42½ ft) of two fluted artifacts and a broken endscraper in the same sedimentary layer. Laub's suspicion that it was a bone tool was confirmed by John Tomenchuk of the Royal Ontario Museum in Toronto, a specialist in use-wear analysis. Dr. Tomenchuk had even better news. Not only had the tool been shaped by human hands, it had been fashioned from the rib bone of a mastodon—green bone, which suggests that the bone had only recently been removed from the animal's body, or perhaps that conditions at the site retarded bone decomposition. AMS dating of the bone put its age at 10,990 ± 100 RCYBP. We now have convincing evidence that humans were contemporaneous with mastodons in the Great Lakes area and that they exploited the animals for materials and possibly for food.

### Much greater depth in Smith Symposium II

This overview barely hints of the immensity of the discoveries at the Hiscock site. At the Smith Symposium II, which will be hosted by the Buffalo Museum of Science October 14 and 15, authorities in many fields will interpret the significance of the finds viewed through their particular lenses. (Smith Symposium I was held at the Museum in 1986; the proceedings were published in 1988.) Look for the agenda of the Symposium in this issue.

*–JMC*

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## Survey of Fluted Points in Darke County

*continued from page 9*

american life have yet to be determined, whatever can be extrapolated must begin with the fluted point. Similar surveys from other localities would provide a comprehensive picture of the Paleoamerican period in Ohio.

### Acknowledgments

A special thanks goes to the following people: Marvin Gilley, Jason Traxler, Jon Anspaugh, Marie Brewer, Nancy Stump, Dave Cox, Frank Myers, Tony DeRegnaucourt, Larry Landis, Ron Helman, Ron Thiebeau, Bob Converse, Jim Stephan, Doug Drieling, and Garry Mumaw. Without their enthusiasm, knowledge, and generosity, the Paleoamerican period in the Darke County area would have remained speculative.

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# Hoofs Open Window on the Past

*Third and final article in a series on Pegi Jodry's research into the Paleoenvironment of the High Plains and Rocky Mountains.*

EARLY IN THE 1970S, cattle milling in a fence corner in the San Luis Valley in Alamosa County, Colorado, exposed the soil to wind erosion. In the trampled ground a local artifact hunter found the base of a Folsom projectile point, which in 1977 was shown to Smithsonian Institution archaeologist Dennis Stanford. In his initial look at the site, Dr. Stanford found Folsom and Archaic artifacts and bison tooth enamel, but the site was so badly deflated he didn't undertake archaeological testing. Then, after an exceptionally windy period early in 1981 exposed more Folsom artifacts, Stanford detailed a Smithsonian–Colorado Archaeological Society crew to test the site that fall.

Initial excavation of the most deflated portion of the site found a Folsom level 25 to 30 cm below the surface. Articulated bison bones indicated that the buried deposits were relatively intact.

The site officially became 5AL101. Dubbed Stewart's Cattle Guard, it is on the eastern side of a broad intermontane basin 7,800 ft above sea level, within an area of sand dunes in a grassland corridor between the Sangre de Cristo foothills to the east and a wetland area to the west. Expanses of grazing land to the north and south make the area a natural funnel that channeled and concentrated the movements of large animals. Continuing research started by Pegi Jodry, Stanford and colleagues have confirmed that the area presented optimal conditions for bison hunting during the Younger Dryas period. There are seven other Folsom localities within 10 km of Cattle Guard, two of which are bison kills.

Bison bones at Cattle Guard generally aren't well preserved, being partially mineralized and brittle. The lower sides of the bones, however, are sound enough to reveal cut marks. Some of the discarded bones show evidence of scavenging by large canids, possibly domestic dogs, and smaller animals. Although the stone tools became buried soon after the Folsom hunting party left, it may have taken windblown sand a few years to cover the tallest bison bones. The uppermost portions of the largest bones, those that protruded the most, are the most weathered. All were probably covered within five years of the kill, and most remained buried until archaeologists uncovered them.

Because the site represents a single short-term occupation, it is an ideal opportunity to analyze lithic artifacts and to investigate social, spatial, and technological aspects of bison hunting and processing.

Continued excavation of test units and small blocks uncovered entire clusters of bison bones and tools, making possible a spatial analysis of the site. After 12 field seasons, an area of 1,438 square meters has been excavated, yielding about 3,500 bison bones and fragments, more than a thousand tools or fragments, more than 38,000 pieces of flaking debris, and much knowledge about the lives of early American hunter-gatherers. Dr. Jodry expects to conduct more field research at the site sometime in the future. Meanwhile she is investigating Folsom occupations in the high mountains (above 10,000 ft elevation) surrounding the San Luis Valley.

*–Don Alan Hall*

PEGI JODRY

CHIP CLARK

**Excavated bison bone at Stewart's Cattle Guard site; (*inset*) nearly completed Folsom preform from the site, length 68.88 mm (about 2¾ in).**

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