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MAMMOTH TRUMPET

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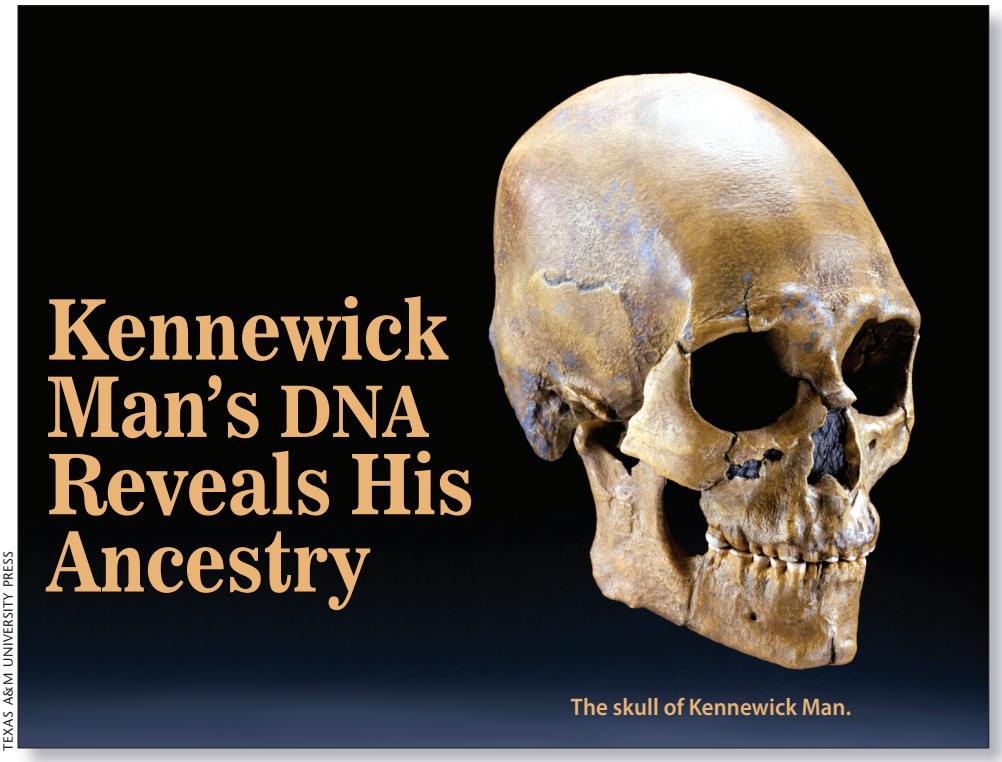
Kennewick Man's DNA Reveals His Ancestry



The skull of Kennewick Man.

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IN HER RECENTLY PUBLISHED memoir, *Dancing Fish and Ammonites,* British novelist Penelope Lively writes, "Bones are intriguing, illuminating—this extraordinary surviving evidence of a life, for those who know how to read it." Eske Willerslev and his colleagues at the Centre for GeoGenetics at the Natural History Museum of Denmark have shown they know how to read the stories hidden in bone in unprecedented detail (**MT 29-2,** "Ancient Siberian boy reveals complex origins of First Americans" and "Clovis child answers fundamental questions about the First Americans"). Now they have turned their attention to Kennewick Man, the most famous and well-studied Paleoamerican skeleton ever discovered (**MT 30-1,** "Kennewick Man: Ambassador from our ancient past"). Willerslev and his team of 18 scientists from 11 institutions in 4 countries have succeeded in recovering and analyzing Kennewick Man's genome from a fragment of a finger bone. They presented their results in June in a report published online in the journal *Nature.*

INSIDE

6 Exactly what is a Plainview point?
Details about this Texas bison-butchering site are elusive, and so is the definition of the Plainview toolkit. Archaeologist Ruthann Knudson analyzes the post-Folsom Plainview lithics industry in this first of her 2-part series.

11 Engaging First Americans studies on a broad front
From his post of Henderson-Morrison Professor of Prehistory at SMU, anthropologist David Meltzer weighs in on contentious theories—pre-Clovis, overkill, the Solutrean migration—that shake the timbers of the Peopling of the Americas model.

14 Archaeologists get first crack at a virgin lithics cache
At the Cooper's Ferry site in Idaho, OSU anthropologist Loren Davis and his team have excavated from a 3-m-deep pit Clovis-age points, flakes, blades, cores, and hammerstone . . . but these lithic artifacts belong to the Western Stemmed Tradition family.

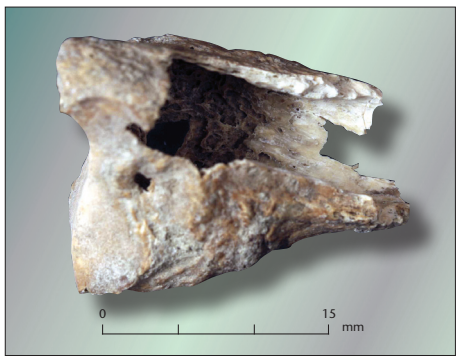
The discovery of Kennewick Man

The skeleton of Kennewick Man washed out of the bank of the Colum-

bia River in Washington in 1996. His is the most complete and best-preserved skeleton of a Paleoamerican ever discovered. His remains consist of 300 bone elements comprising about 90% of his skeleton.

His skull was of particular interest because it appeared to be distinctly different from the skulls of recent American Indians. Indeed, when first discovered he was thought to be a historic European American. It wasn't until the forensic team obtained a radiocarbon date of more than 8,000 years before present that he was shown to be an ancient American.

It was at this point that a coalition of five American Indian tribes from the region requested that Kennewick Man, or the Ancient One as they preferred to call him, be turned over to them for reburial under the terms of the Native American Graves Protection and Repatriation Act (NAGPRA) (**MT 30-1,** "Setting precedents: A legal odyssey"). The U.S. Army Corps of Engineers agreed to do just that, whereupon a group of scientists filed a lawsuit to prevent the transfer of the remains to the tribes. The scientists, including the late Robson Bonnichsen, founder and former director of the Center for the Study of the First Americans, argued that Kennewick Man was so ancient that he couldn't be affiliated with any modern tribes. Moreover, because the remains were so ancient, they offered an important window on many questions about the peopling of the Americas.



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Fragment of proximal, left third metacarpal of Kennewick Man used for AMS ^{14}C dating. A small fragment was also used for DNA analysis.

The presiding judge ruled in favor of the scientists, agreeing that Kennewick Man was too ancient to be considered a "Native American" as narrowly defined by NAGPRA (**MT 18-1,** "Judge rules scientists can study Kennewick Man"), and that decision was subsequently upheld by the U.S. Court of Appeals for the 9th Circuit (**MT 19-2,** "Kennewick Man decision upheld by Court of Appeals"). The scientists could study his remains.

The results of these studies were published last year in *Kennewick Man: The Scientific Investigation of an Ancient American Skeleton,* edited by Douglas Owsley and Richard Jantz. Even having completed these initial studies, Owsley, curator of Physical Anthropology at the Smithsonian Institution, acknowledged that there was still much to learn from the bones of Kennewick Man. He told CBS News, "I feel like the skeleton is just beginning to talk to us and we need to carry on that conversation."

MAMMOTH TRUMPET

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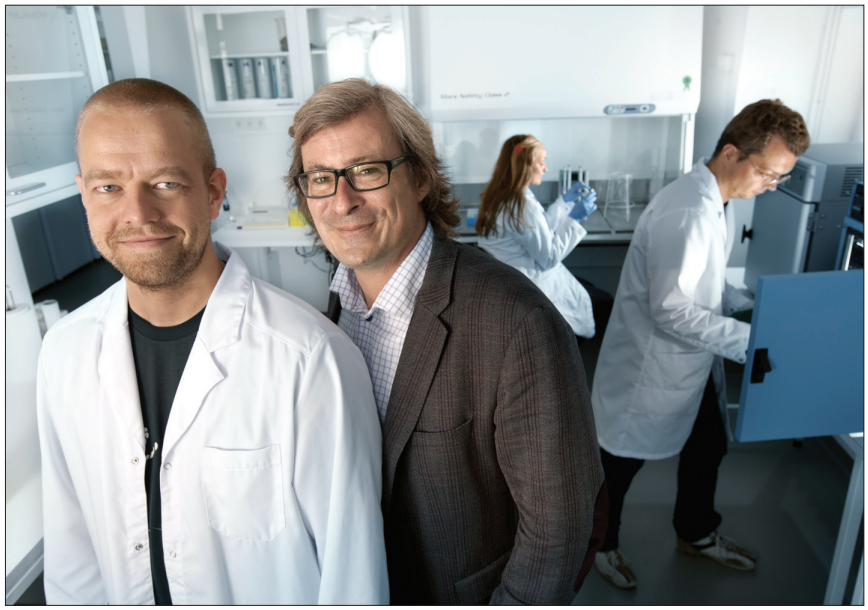
–Michael R. Waters, Director



MIKAL SCHLOSSER

Geneticists Morten Rasmussen *(left)* and Eske Willerslev in the Centre for GeoGenetics lab.

Recovering ancient DNA from Kennewick Man

The answers to many of the most important questions we have about Kennewick Man are written in his DNA. Previous researchers had tried to recover intact DNA from his bones, but were unable to do so. Just in the past few years, however, our technological capabilities for recovering and analyzing ancient DNA, even from poorly preserved bone, have improved tremendously.

Willerslev, whose teams have successfully recovered DNA from the poorly preserved skeletal remains of a 24,000-year-old Siberian boy (**MT 29-2,** "Ancient Siberian boy reveals complex origins of First Americans") and from the fragmentary remains of the 13,000-year-old Anzick child (**MT 29-2,** "Clovis child answers fundamental questions about the First Americans"), took up the challenge of Kennewick Man.

Willerslev and his team contacted the Burke Museum, which stores the remains of Kennewick Man on behalf of the Army Corps, and obtained a sample of bone weighing about 200 mg—about the weight of a raindrop. From this small sample they successfully extracted DNA, but it was relatively poorly preserved. Morten Rasmussen, a scientist with the Centre for GeoGenetics, says that "although the exterior preservation of the skeleton was pristine, the DNA in the sample was highly degraded and dominated by DNA from soil bacteria and other environmental sources. With the little material we had available, we applied the newest methods to squeeze every piece of information out of the bone."

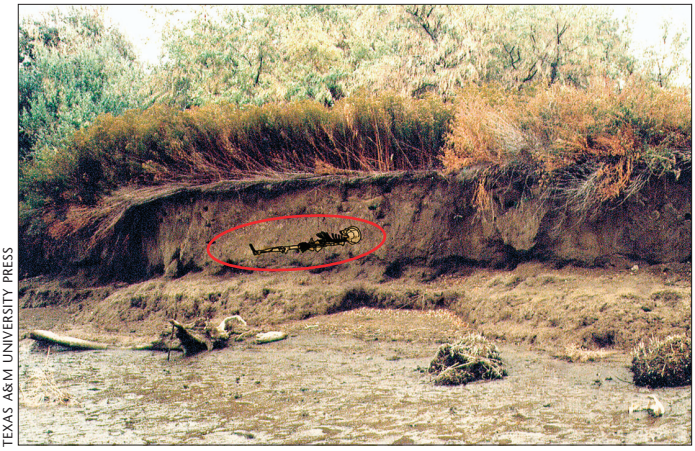
Ultimately, the team was able to obtain about 1X coverage of the genome, which means they sequenced each segment of Kennewick Man's genome an average of only once. So they may have sequenced some segments multiple times and others not at all. Ideally you would hope for 15X or even 50X coverage; 1X coverage is adequate for making generalizations about Kennewick Man's ancestry, but not for making confident pronouncements about any particular gene on a chromosome.

Willerslev and his team recovered both mitochondrial DNA (mtDNA) and nuclear DNA. Mitochondrial DNA is from the mitochondria, which are organelles that inhabit the cytoplasm of cells. Mitochondrial DNA is passed only from mother to child, so this DNA provides valuable information about the maternal line of descent. Nuclear DNA, on the other hand, the DNA in the nucleus of the cell, contains genetic contributions from both the mother and father.

Mitochondrial DNA is much more common and therefore easier to recover in ancient bone samples. As a result, the team was able to obtain about 71X coverage, which is excellent and means the data for this portion of Kennewick Man's genome are highly reliable.

Secrets of Kennewick Man's genome

Kennewick Man belongs to mitochondrial haplogroup X2a, one of the five founding lineages of North and South American Indians. The X haplogroup is particularly interesting because proponents of the idea that the first Americans were Paleolithic Europeans of the Solutrean culture have used the distribution of the X haplogroup as evidence for their theory. Since X had been found only in the Americas and Europe, they suggested it confirmed an early European connection to American prehistory (**MT 28-2,** "Do Clovis origins lie in Paleolithic Spain?").



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How the skeleton of Kennewick Man originally lay on the bank of the Columbia River before its discovery.

Finding that Kennewick Man belongs to the X haplogroup might appear to support the Solutrean theory. The particular X2a haplogroup, however, is known only from North America and not from Europe. Moreover, it appears to have a distribution that closely matches the C4c haplogroup, which is definitely an Asian lineage. This suggests that X2a and C4c are closely related subgroups of the Asian population that crossed the Bering Land Bridge together into America (**MT 28-3,** "Alternative views of the Solutrean theory").

Deborah Bolnick, a biological anthropologist at the Univer-

U.S. Army Corps: Kennewick Man is Native American

On April 27, the U.S. Army Corps of Engineers Northwestern Division announced its "initial determination regarding the set of human remains known as Kennewick Man." Based largely on Eske Willerslev's team's analysis of Kennewick Man's DNA, the press release issued by the Corps concluded that "there is substantial evidence to determine that Kennewick Man is related to modern Native Americans from the United States. Therefore, the human remains are Native American under the Native American Graves Protection and Repatriation Act (NAGPRA)." This means that "the remains are now subject to the processes and procedures outlined in NAGPRA." In other words, Native American tribes who believe they are culturally affiliated with Kennewick Man may now request that his remains be repatriated to them.

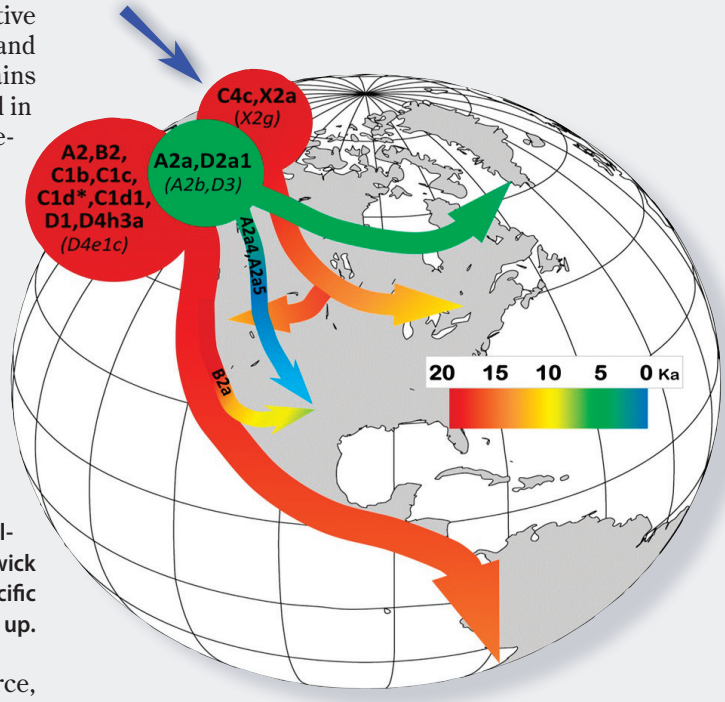
A headline in the May 2 issue of *Indian Country Today* declared that Kennewick Man "Will Return Home." Chuck Sams, a representative of the Confederated Tribes of the Colville Reservation told the NW News Network that the same coalition of tribes that originally sought to claim Kennewick Man's remains, the Umatilla, Nez Perce, Yakama, Colville, and Wanapum tribes, now are moving forward with a repatriation request. "We hope," says Sams, "that this will finally come to a 20-year end so that we may be able to put our relative back in the ground."

A couple of issues, however, may stand in the way of such a resolution. First of all, the determination by the Corps ignores the fact that NAGPRA, in defining "Native American," requires that human remains considered Native American in a technical, legal sense must bear a special relationship to a particular "tribe, people, or culture that is indigenous to the United States" (**MT 18-1,** "Judge rules scientists can study Kennewick Man"). As a recent editorial in the journal *Nature* points out, the Confederated Tribes of the Colville Reservation, the only members of the coalition to have their DNA tested, "were found to share a relatively close connection to Kennewick Man, but no more so than some other groups from North and South America." Therefore, it would be hard to argue that Kennewick Man had a demonstrable, special relationship to any particular modern tribe. That relationship appears to be shared by many widespread groups.

In addition, the courts specifically ruled that a coalition of tribes is not a proper claimant under NAGPRA. Valid claims could only be made by the singular "tribe, people, or culture" most closely culturally affiliated to the remains. Based on the available genetic data, it appears that no such tribe exists. So a repatriation claim submitted by the same coalition would not be valid.

For a variety of reasons, the Kennewick Man's legal odyssey may be far from over. And, as the editorial in *Nature* recommends, "the US government should use its broad-brush insights cautiously as it considers the fate of remains."

–Brad Lepper



AFTER ALESSANDRO ACHILLI

Kennewick Man's DNA identifies him as a member of haplogroup X2a (*arrow*). The team of geneticist Alesandro Achilli believes the haplogroup may have been carried by a Beringian population that entered North America by way of the Ice-Free Corridor at the same time other colonizers were traveling down the Pacific Coast or perhaps some time later. Kennewick Man's ancestors evidently made their way to the northwest Pacific coast, since the evidence suggests that is where he grew up.

Suggested Readings

Banse, T. 2016 Army Corps Decides Kennewick Man Should Be Turned over to Tribes. NW News Network, April 27, 2016; http://nwnewsnetwork.org/post/army-corps-decides-kennewick-man-should-be-turned-over-tribes

Editorial 2016 Lessons from the Ancient One. *Nature,* vol. 533, page 7; http://www.nature.com/news/lessons-from-the-ancient-one-1.19843

U.S. Army Corps of Engineers 2016 Corps determines Kennewick Man is Native American. Release No. 20160427-001: http://www.nwd.usace.army.mil/Media/NewsReleases/tabid/1989/Article/742935/corps-determines-kennewick-man-is-native-american.aspx

Walker, R. 2016 Army Corps Finally Agrees the Ancient One is Native American, Will Return Home. *Indian Country Today*: http://indiancountrytodaymedianetwork.com/2016/05/02/army-corps-finally-agrees-ancient-one-native-american-will-return-home-164319

sity of Texas at Austin, tells us that haplogroup X is not as restricted in its distribution as had been thought: "It is also found in the Near East, North Africa, West Asia, and southern Siberia, although it is most common in the Near East and Europe. The form of haplogroup X found in southern Siberia (in the Altai) today is quite different from the form of X found in the Americas (X2a), and is thought to have moved there only in the last few thousand years. Whatever forms of haplogroup X may have been present in Siberia in the more distant past have either been lost due to genetic drift, or are found today only in populations that have not yet been sampled."

Since Kennewick Man is a male, he has a Y chromosome, which provides information on his paternal lineage that complements the maternal line tracked by his mtDNA. His Y haplogroup is Q-M3, which is a lineage only found in American Indians and northeastern Siberians.

The rest of Kennewick Man's nuclear genome also confirms his American Indian and more distant Asian ancestry. Willerslev and his team consulted a database of American Indian genetic profiles, which they compared with Kennewick Man's genome and the genetic signatures of various contemporary tribes. They also collected new DNA samples to include in their study from the Confederated Tribes of the Colville Reservation, one of the tribes that sought to have Kennewick Man's remains turned over to them for reburial.

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The skull of Kennewick Man (*left*) and a male Native American from California, showing differences in cranial features between the ancient and more recent skulls.

Willerslev's team also compared Kennewick Man's DNA with a "worldwide panel of populations," which included Polynesians and Ainu, two groups with which Kennewick Man was thought to be affiliated based on the shape of his skull. Finally, they compared his DNA with the genome of the Anzick child, Anzick-1, the most ancient American skeleton to have its genome sequenced.

Who was Kennewick Man?

Willerslev and his coauthors conclude that "Kennewick Man is most closely related to "Northern Native Americans . . . especially the Colville, Ojibwa, and Algonquin" groups. They concede, however, that it is "not possible at this time" to identify which particular modern Native American groups "are most closely related to Kennewick Man." Nevertheless, "his autosomal DNA, mitochondrial DNA and Y chromosome data all consistently show that Kennewick Man is directly related to contemporary Native Americans, and thus show genetic continuity with the Americas over at least the past 8 thousand years." But when you compare the Anzick-1 infant with Kennewick Man and contemporary Native Americans, an interesting pattern emerges: "Anzick-1 and Kennewick Man have dissimilar genetic affinities to contemporary Native Americans. In particular, Anzick-1 is more closely related to Central/Southern Native Americans than is Kennewick Man." But it's more complicated than that.

Kennewick Man, though not as closely related to the Central/South Americans as Anzick-1, is more closely related to those groups than are many modern North American tribes. This suggests that there was "an additional Northern lineage that diverged from the common ancestral population of Anzick-1 and Southern Native Americans," which included Kennewick Man and his relations as well as "both Colville and other tribes of the Pacific Northwest."

Finally, Willerslev's team also found evidence for "additional

continued on page 19

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The Plainview Site

DRAWING COURTESY OF HISTORIC RESOURCES BRANCH, MANITOBA CULTURE HERITAGE AND TOURISM

A Bison-Butchering Site Shrouded in Mystery, Part I

by Ruthann Knudson

FOR HUNTER-GATHERERS of the Texas High Plains, environmental conditions in the terminal Pleistocene made their life a challenge of adapting to changing conditions. The increasingly warmer and drier climate was radically altering the composition of paleovegetation and in turn the numbers and varieties of prey animals. Mammoths on the way to extinction disappeared from the landscape. At the Plainview site (41HA1) north of Lubbock Lake, a group of Paleoamericans, like the Folsom people who preceded them, fashioned subsistence strategies that exploited the single available megamammal, the enormous *Bison antiquus*.

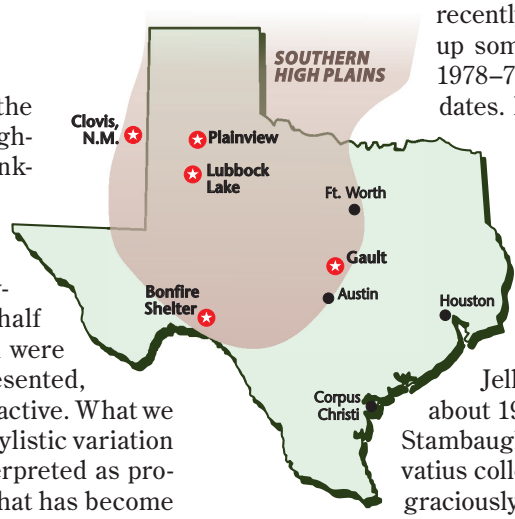
Today the site is a rock quarry, created in the 20th century by the Texas Department of Highways. In the late Pleistocene it was an embankment of Running Water Creek, over which bison apparently stampeded. Hunters then killed and butchered crippled animals where they lay. That much we know. The details, however, have been baffling archaeologists for half a century. We aren't certain how many bison were butchered, or how many kill events are represented, or precisely when or for how long the site was active. What we have firmly in hand is a toolkit that, despite stylistic variation among the points, has traditionally been interpreted as projecting a strong image of a single tool shape that has become one of the icons, even if the least understood, of Paleoamerican point types.

A site revisited many times

Local collectors may have known of the site early in the 20th century. It was identified as an archaeological site within a rock quarry by Glen Evans and Grayson Meade in 1944 while they were studying Southern High Plains Pleistocene geology. In 1945 the Texas Memorial Museum excavated the Plainview site in the classic Quaternary study of its time. Exhaustively described were the geologic conditions and sediments into which the bison had been deposited and associated late-Pleistocene faunal remains. Stratigraphic, cultural, geologic, and paleontologic conditions of Plainview were compared with the Clovis (Blackwater Draw), Folsom, Sandia, Lindenmeier, and Alaskan Fairbanks deposits.

The study also included a description of the Plainview site stone-tool assemblage written by Alex Krieger, then a prominent lithics analyst. At the time not much was known about archaeological deposits with fossil remains of now-extinct species or how to interpret point forms that hadn't been seen before. Although there are a variety of point forms within the assemblage, Krieger described a single idealized point form (consistent with mental models of the time), which has stuck as the contemporary model of the Plainview bifacial point. I'll discuss typological certainty/uncertainty in the next episode of this series.

The caliche rock quarry surrounding the Plainview site was worked until the 1960s. Today the site is essentially gone. Sellards briefly excavated the site in 1949, but there are no records of his work. C. Vance Haynes, Jr. and James J. Hester investigated the site in 1962, Eddie J. Guffee in 1976–77. I studied the artifact assemblage in the early 1970s, again in 1980, and most recently in 2014. Roberta D. Speer opened up some plaster blocks from the site in 1978–79 and acquired new radiocarbon dates. Eileen Johnson studied the faunal remains. In the 1980s Vance Holliday investigated a remnant of the site stratigraphy and got new dates. In 2009 Matthew E. Hill studied faunal tooth eruptions to estimate the season of mortality of butchered bison. The site dump yielded a point to Edward Jelks in 1950 and one to Gordon Creel about 1959. Avocational collectors Carson Stambaugh, Everett Bryan, and James Servatius collected a few tools from the site and graciously made them available to me during my analyses.



Over the years a lot of people have looked at the Plainview

site, its plaster blocks, faunal remains, and artifacts—but the picture still isn't clear and probably never will be.

Bison death events—how many and when?

When Sellards initially described the site he thought there were too many *Bison antiquus* remains to represent a single death or kill-site event, but the site was nevertheless accepted as a butchering site with a single cultural component. Eileen Johnson later analyzed site bone taphonomy and concluded that the site contained the remains of two bison-death events. Matthew E. Hill subsequently concurred in her analysis. Vance Holliday and C. Vance Haynes, Jr. recently established the presence of at least three bison death or kill areas at the site, but they are unable to relate those data to the archaeological assemblage from the site.

RUTHANN KNUDSON

The Plainview site as photographed by Alex Krieger in 1955.

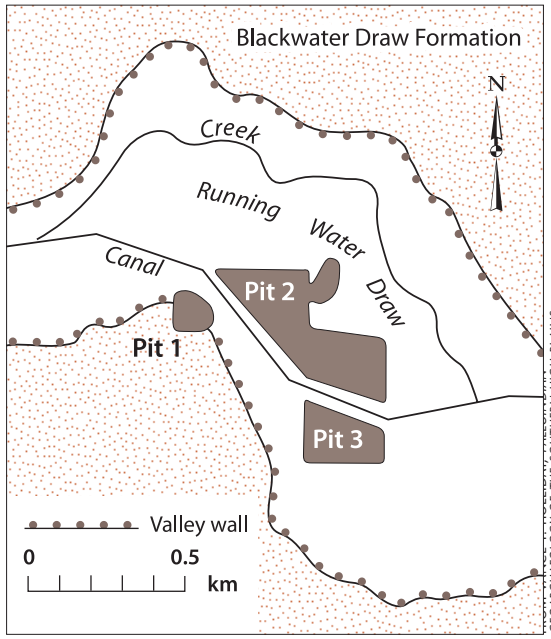
Seven conventional dates have been collected for the Plainview site on bone organics and apatite, humates, and shell, along with seven AMS dates on tooth and bone gelatin from the Plainview bone bed. The dates range from 11,440 to 8380 RCYBP (13,200–9400 CALYBP). Site investigators are most comfortable with an age for the site of 10,000 RCYBP (11,650 CALYBP)—regardless of how faunal death events and cultural components fit into the picture.

The elusive artifacts

We know of 43 flaked-stone artifacts excavated or collected from the Plainview site. Of these, one collected by Boy Scouts in 1984 has never been documented. Of the remaining 42 pieces, 7 privately held have been documented and are illustrated in the forthcoming volume on Plainview (*Plainview: The Enigmatic Artifact Style of the Great Plains,* "Suggested Readings"). One point remains in the collections of Texas Tech University, and a piece of debitage from the 1976–77 excavations is held by the Llano Estacado Museum in Plainview.

The remaining 32 points or worked unifacial tools are held by the Texas Memorial Museum.

When I analyzed the collection in the 1970s, I treated the site as a single component as described by Alex Krieger in the Sellards et al. 1947 publication and following conversations with Krieger himself. Then I noticed a remarkable uniformity in toolstone and flaking technique across the assemblage, which suggested that only one knapper or at most a few created the entire collection. Tool form varies significantly, partially as a result of tool reworking or their use as butchering tools, but one of the remarkable features of the points in the assemblage is their ordinariness: They tend to be parallel sided, and most of them aren't obliquely or parallel collaterally flaked, they aren't stemmed or notched, and their basal concavities vary in shape. This ordinariness has contributed to many shapes and forms being thrown into the "Plainview" type.



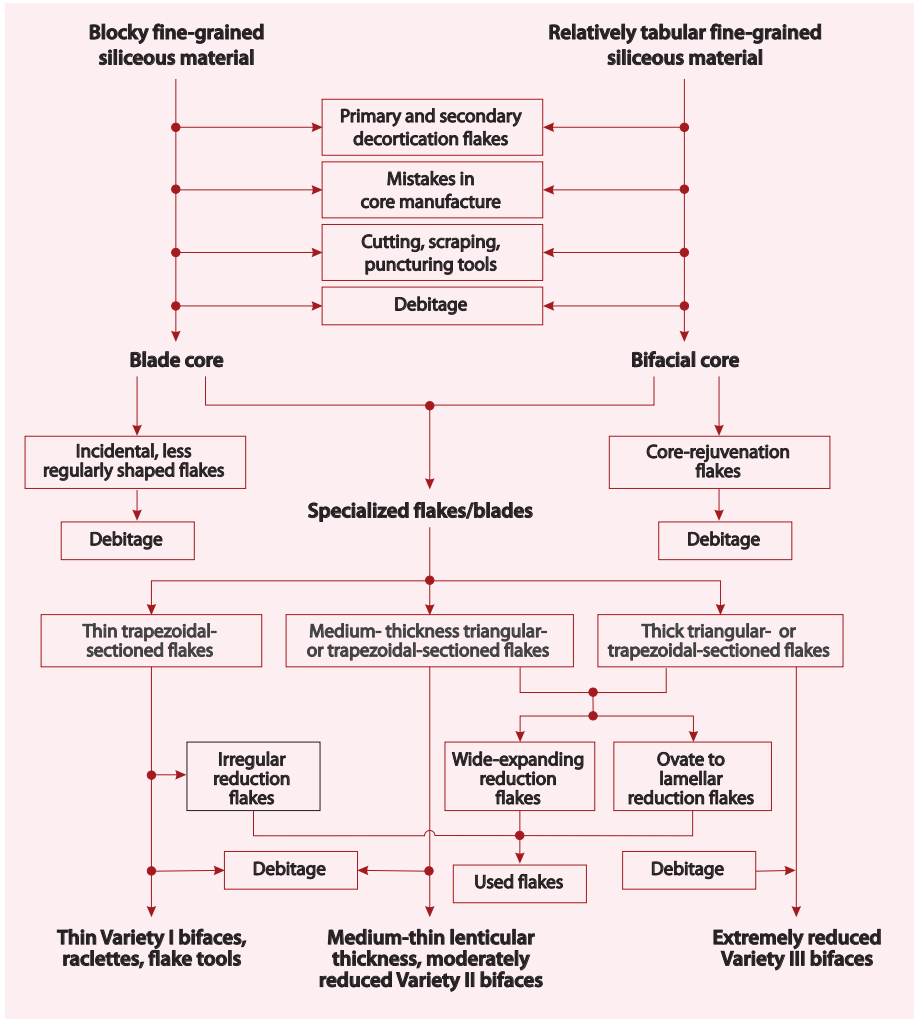
Map of the Plainview site in Running Water Draw.

I have sorted Plainview bifacial points into three technological varieties:

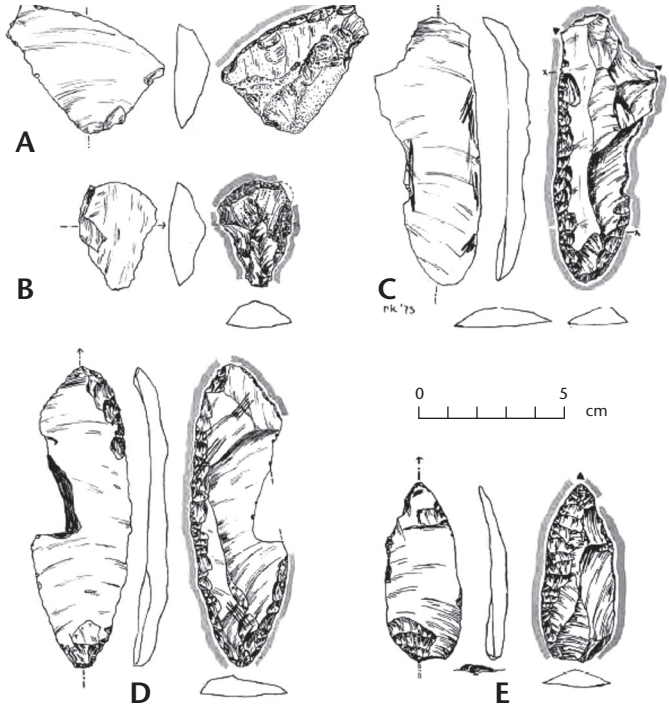
- **Variety I** Short, thin, relatively wide pseudofluted points;
- **Variety II** Medium-thick points, triangular or trapezoidal sectioned, with original flake blank surface or early bifacial thinning scars often left on the final tool faces; and
- **Variety III** Extremely reduced relatively thick points, sometimes with almost needle-nosed distal tips.

When complete, these range in length from 50.5 mm (Variety I) to 74 mm (Variety III), and the shorter points are wider that the highly reduced forms. Most are pragmatically thinned to produce a lateral cutting edge, though a few Variety III forms have narrow, tight parallel collateral flaking. The Variety I pseudofluted forms are minimally thinned around the edges and may have been reworked. There is no one "ideal" form within the assemblage. Consequently a general description of medium-length, parallel-sided, concave-based points has resulted in "Plainview" points being found across the continent.

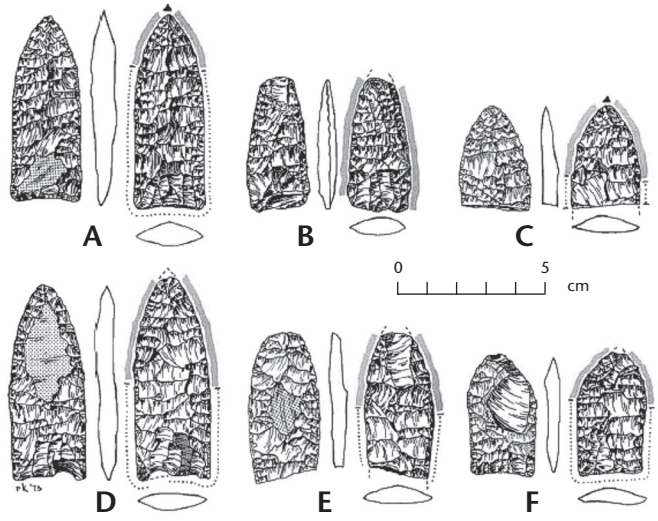
All three varieties of Plainview assemblage points could have been made from either bifacial or blade cores. Bifacial cores have been first shaped with two opposing multi-flaked faces, and then the core edges are used as platforms to remove additional flakes of varying sizes and shapes. Most Folsom assemblages reflect a bifacial core reduction technology. Blade cores have a single striking platform with flakes (often blades) removed from the platform and are frequently associated with Clovis points and technology, though Clovis points are made on both bifacial and blade cores.



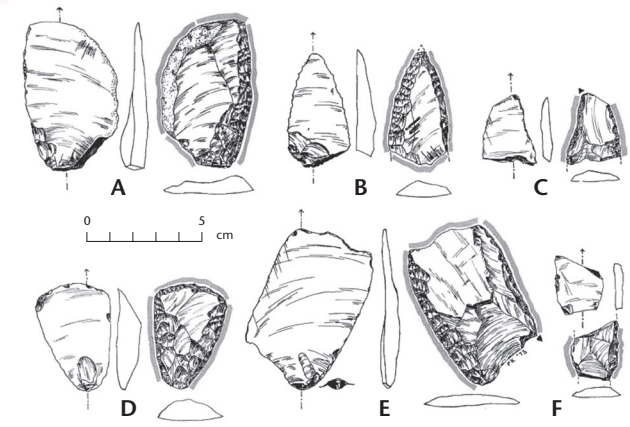
inferred lithic-production system for Plainview assemblage using either blocky or tabular fine-grained siliceous materials.



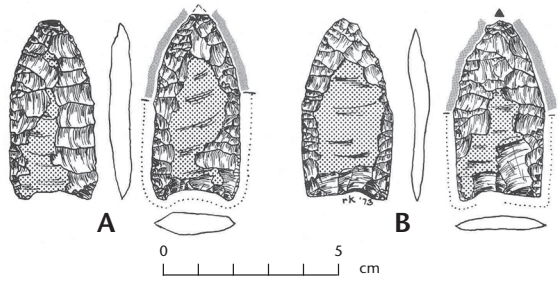
Plainview site unifacial split pebble and blade tools. A, TMM 725-21; B, TMM 733; C, TMM 725-30; D, TMM 725-17; E, CS-2.



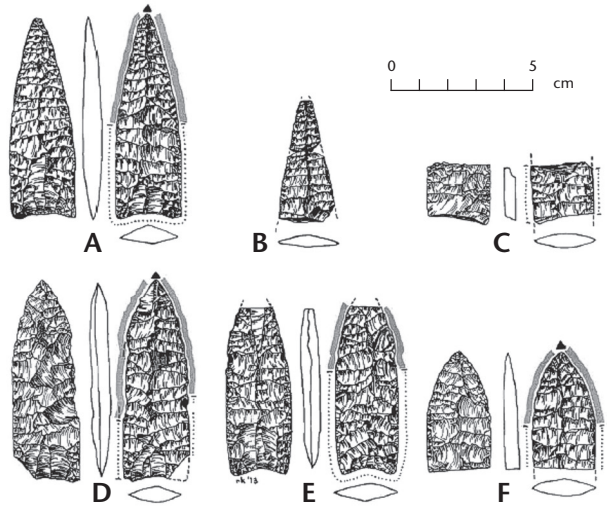
Plainview site Variety II bifacial points. A, TMM 725-23; B, C5-3; C, TMM 725-6; D, TMM 725-12, E, TMM 725-18; F, TMM 725-19. Shaded areas are original flake blank surfaces.



Plainview site unifacial flake tools. A, TMM 725-22; B, TMM 725-24; C, JS-6; D, TMM 725-15; E, JS-7; F, JS-8.



Plainview site Variety I pseudo-fluted points. A, TMM 725-1; B, TMM 725-9.

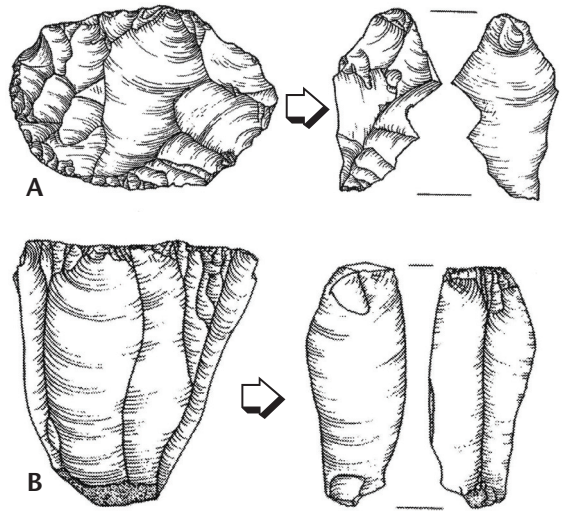


Plainview site Variety III bifacial points. A, TMM-725-4; B, TMM 725-7; C, TMM 725-25; D, TMM 725-8; E, EB-4; F, TMM 725-11.

Complementing the bifacial points are 2 split-pebble scrapers, one used bifacial thinning flake, and 10 cutting or scraping tools that could be from either bifacial or blade core reduction. One of these flake tools is of Edwards chert, another is of Alibates silicified dolomite; the rest are of variously colored dark cherts of no identifiable source. Four of the points are of Edwards chert, seven are probably of Alibates silicified dolomite, four are of a black chert, three are of silicified wood, three are of chalcedony, and the rest are of speckled, banded, or generally yellowish to brown to dark brown presumably regional cherts. All are of very high quality knappable toolstone.

Most of the points are moderately ground on their proximal concave edges and 3–4 cm up the lateral edges, though a couple are ground nearly 5 cm up the edge. Several of the tools show marked edge battering, as if from butchering use, and several

are broken in the presumed vicinity of the top of a haft. Several of the point tips have impact fractures, and a few may have been reworked as butchering tools. The assemblage gives the impression of a toolkit made to kill and butcher large, muscular prey. Most of the tools appear to be exhausted; perhaps more complete ones were lost in carcasses. Bruce Bradley has suggested that a complete very pointed tool found at the Mill Iron site, a bison kill site in Montana similar to Plainview, may be a special style of point that was intentionally placed in the kill area as a ritual offering.



FROM *LITHICS: MACROSCOPIC APPROACHES TO ANALYSIS* BY WILLIAM ANDREFSKY, CAMBRIDGE UNIVERSITY PRESS, 2005. REPRINTED WITH THE PERMISSION OF CAMBRIDGE UNIVERSITY PRESS.

Lithic cores: A, bifacial core with detached flake; B, blade core with detached blade.

Drawing conclusions from scant data

Krieger told me that no stone chips were found among the bones, though one small Alibates debitage piece was found by Guffee in the 1970s. None was found when a few of the 1947 site blocks were excavated. There is no evidence of a campsite at Plainview. Plainview is the remains of a working butchering site.

Given the lack of a modern site to reinvestigate, the complexity of the stratigraphy and circumstances surrounding faunal deaths, and the variation among dates, there is no way to be sure the site comprises a single component or multiple components. I'm most comfortable interpreting the site as a single cultural event at a time when toolmakers were probably still using knapping techniques from then-traditional regional Clovis and Folsom technologies.

Anticipatory mobility, the term Frédéric Sellet uses to describe toolmakers' planning when to replace weapons in the future, could account for tools found at Plainview made at different times and from a variety of toolstones—even made by only a few toolmakers.

No help from comparative sites

There aren't a lot of known assemblages that compare with the remains at Plainview—none, exactly. The most similar site appears to be the Ryan's site cache found in Lubbock County, and there is a small component at Lubbock Lake that has been identified as Plainview. There are also similarities with materials from Bonfire Shelter. Of course the pseudofluted Plainview tools are reminiscent of Folsom and Midland tools from around the Southern Plains, and the blade tools are reminiscent of Clovis blades. The climate of the Southern Plains was changing when knappers, hunters, and butchers left tools at the Plainview site, and the tools appear to reflect changes in toolkit design, toolstone procurement affected by modified seasonal rounds, and perhaps individual preferences and skills. We'll probably never know much more about the people who used this site, and we're left with a lot of ambiguity in interpreting the artifact collection. MT

–Ruthann Knudson

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About the author Ruthann Knudson has focused on Paleoindian archaeology, geomorphology, and ecology of western North America for the past half-century, amidst a variety of paying jobs. Dr. Knudson holds a Ph.D. (1973) in anthropology/Quaternary Studies from Washington State University and since 1974 has owned her own illustration, stationery, and cultural resource management firm, Knudson Associates. She lives in Great Falls, Montana, with the Northwest Plains and Plateau regions as a research playground.

Suggested Readings

Andrefsky, W., Jr. 2005 *Lithics: Macroscopic Approaches to Analysis,* 2nd ed. Cambridge University Press, New York.

Bradley, B. A., M. B. Collins, and A. Hemmings, with contributions by M. Shoberg and J. C. Lohse 2010 Clovis technology. Archaeological Series 17. *International Monographs in Prehistory,* Ann Arbor, MI.

Holliday, V. T., C. V. Haynes, Jr., and R. Knudson In press The Plainview Site: 1962 Discoveries. *PaleoAmerica* 2(1).

Holliday, V. T., R. Knudson, and E. Johnson, editors In press *Plainview: The Enigmatic Artifact Style of the Great Plains*. University of Utah Press, Salt Lake City.

Knudson, R. 1983 Organizational variability in Late Paleo-Indian assemblages. *Reports of Investigation,* No. 60, Washington State University, Laboratory of Anthropology.

Sellards, E. H., G. L. Evans, and G. E. Meade, with Alex D. Krieger 1947 Fossil bison and associated artifacts from Plainview, Texas. *Geological Society of America Bulletin* 58:927–64.

Ranging Widely in Search of the First Americans

David J. Meltzer

Meltzer at the Mountaineer site in Colorado, 2010.

ANDREW BOEHM

DAVID MELTZER has cast his net far and wide in search of answers to questions about the origins, antiquity, and adaptations of the first humans to colonize North America at the end of the Pleistocene. When Meltzer, currently the Henderson-Morrison Professor of Prehistory at Southern Methodist University, was 15 years old, his mother arranged for him to spend the summer excavating at the Thunderbird Paleoindian site in Virginia. That introduction to First Americans archaeology launched his career.

Meltzer's undergraduate work at the University of Maryland (B.A. 1977) led to graduate studies on the other side of the country, where he completed his M.A. (1979) and Ph.D. (1984) in Anthropology/Archaeology at the University of Washington in Seattle. SMU hired him fresh out of graduate school as Assistant Professor in Anthropology. He remains there today.

"I know of no one who has produced such a substantive record of publication on Paleoindian archaeology," says Vance Holliday of the University of Arizona. "Besides a solid record of field research, including a full volume devoted to his work at the Folsom (NM) type site, no one has written more about the history and the method and theory of the peopling of the New World. His book *First Peoples in a New World* is the only current single-author summary of the topic and is both accessible and useful to professionals and the public alike."

Research interests spread wide

Although Meltzer's research focuses on ways the First Americans met the challenges of populating a vast, ecologically diverse landscape during a time of significant climate change, the path of his research has diverged in several directions. He seeks to understand late-Pleistocene and Holocene climates and environments, the demographics and population histories of colonizing peoples, and the challenges they faced in learning the landscape of what was then truly a new world. The way these processes might play out over centuries and be visible archaeologically are among the themes he explores in depth in *First Peoples in a New World*. That book explores what we know about the First Americans and how we know it, and provides an interdisciplinary look at how a variety of scientific fields are contributing to our understanding. "Archaeologists, physical anthropologists, geologists, linguists, and geneticists all have a place at the table," Meltzer says, "but no one gets a free pass. The results of research in one area are not inherently superior to another, nor can we simply pick results we like."

The possible role of Clovis groups in Pleistocene faunal extinctions is another area of particular interest and the subject of several papers written with Donald Grayson. They question the idea of "overkill," that Clovis hunters drove 37 genera of large mammals to extinction at the end of the Pleistocene. "Of the scores of North American sites claimed to provide evidence of human hunting of now-extinct Pleistocene mammals," Meltzer tells us, "just over a dozen have compelling evidence of such predation. In all instances, only a handful of mammals—mammoth and mastodon among them—were demonstrably prey. If we're to believe overkill, we'll require more proof than is currently available." Meltzer and Grayson don't believe human hunters are to blame for extinctions, a conclusion Meltzer followed up by analyzing with Michael Cannon just which species actually were on the Clovis menu.

Home is the archaeology and paleoecology of the High Plains and Rocky Mountains

From arctic Alaska to west Texas, Meltzer's fieldwork has focused on late-Pleistocene hunter-gatherer archaeology and paleoecology on the High Plains and Rocky Mountains. His investigations include the Mustang Springs and Midland sites in Texas, and since the late 1990s has involved Folsom-age sites including the Folsom type site in New Mexico, Bonfire Rockshelter and the Hot Tubb sites in Texas, and most recently several high-elevation sites in the Gunnison Basin of Colorado, most notably the Mountaineer site, where he worked in collaboration with Mark Stiger.

Human responses to climate changes, now and in the past

Meltzer has a long-standing interest in how humans respond to climate change, particularly the Younger Dryas (ca. 12,900–11,700 CALYBP), a period of cooler temperatures when the First Americans were spreading across the continent. In the 2010 issue of *Journal of World Prehistory* Meltzer and Holliday ask a key question, "Would North American Paleoindians have noticed Younger Dryas–age climate changes?" They think not. The Younger Dryas in North America was not as cold or abrupt as often assumed. Besides, they say, adapting to changing climate and environments was nothing new to the First Americans: They'd been doing so since their ancestors left Siberia. From that, he and Holliday turned to the claim that a comet impact triggered the Younger Dryas, killed off the Pleistocene fauna, and brought an end to the Clovis culture. (*Mammoth Trumpet* readers are familiar with our series of articles that expound the arguments, sometimes heated, voiced by proponents and opponents of the Clovis Comet theory.) Meltzer and Holliday are deeply skeptical that an impact occurred, or produced the claimed effects. As for Clovis, it disappeared gradually through cultural evolution.

JOAN WALKER

Meltzer, 15, excavating at the Thunderbird site in Virginia.

Calling the Solutrean theory into question

The theory that the First Americans were people that made their way across the icy North Atlantic by boat from Europe rather than from Siberia is the brainchild of archaeologists Dennis Stanford and Bruce Bradley. The Solutreans, an Old World culture that predates Clovis by some 6,000 years, practiced a stone-tool technology that was similar enough to Clovis to appear to qualify as an ancestor. Meltzer and colleagues question this theory, pointing out that Stanford and Bradley only chose data that showed similarities between Clovis and Solutrean and ignored the many differences, not to mention the lack of genetic evidence of a European ancestry in either ancient or modern Native Americans.

Meltzer has helped contribute to that evidence, working with geneticist Eske Willerslev at the GeoGenetics Centre at the University of Copenhagen, Denmark, where Meltzer is also an Affiliate Professor in Prehistory, Climate and Environment. Their article in *Nature* (2015) on the DNA of the Kennewick Man skeleton showed definitively that he is ancestral Native American (the article was named one of *Science* magazine's "significant scientific achievements of 2015"). For Meltzer, DNA is a game-changer: "There are a great many things we can learn from archaeology, but human population history is not one of them. With ancient DNA, we are poised to learn far more about the nuances of the peopling process than we could have ever imagined."

Let's not forget archaeology's past

"Controversy over the origins and antiquity of the First Americans is nothing new," Meltzer says, and he has spent considerable time (metaphorically) in the late 19th and early 20th century to understand how definitive knowledge that the First Americans were here by the end of the Pleistocene was built at a time when archaeology, geology and vertebrate paleontology were still in their infancy and lacked such basic tools as radiocarbon dating. It's also easier, he adds, to study controversy over the First Americans from the comfort and perspective of a century away, compared with debates surrounding recent purported pre-Clovis discoveries, where the dust and the rhetoric haven't yet settled and where one is personally involved. Meltzer's efforts to understand the history of that earlier dispute over human antiquity in the Americas, which involved extensive archival research throughout the United States, culminated in his newest book, *The Great Paleolithic War: How Science Forged an Understanding of America's Ice Age Past.*

A cautious but not unwilling buyer of pre-Clovis claims

We know that people inhabited southern South America (Monte Verde in Chile) 12,500 years ago. "In the wake of Monte Verde," Meltzer says, "a flurry of additional pre-Clovis contenders have appeared. So far, however, not all these sites have been fully accepted by the archaeological community in North America, which, I think rightly, still maintains a healthy skepticism toward pre-Clovis claims." Meltzer, who has been active in examining such contenders, co-organized with Tom Dillehay and C. Vance Haynes the 1997 visit to Monte Verde. Meltzer is not averse to a pre-Clovis presence: "After all, there is compelling

genetic evidence that puts the split between ancestral Asian and Native American groups at 23,000 years ago. The First Americans could have left Siberia any time thereafter—early enough to arrive at Monte Verde 'on time.'" But that raises the question of how Clovis and pre-Clovis groups are related, an interesting but still unanswered question.

Back to Folsom

The Folsom site in New Mexico was so important to American archaeology it lent its name to a Paleoindian culture. Excavations there by the Colorado Museum of Natural History in 1926–1927 culminated in the discovery of a fluted point between the ribs of an extinct *Bison antiquus,* a find that showed humans were contemporaries of the Pleistocene animal. Additional excavations took place there in 1928, but little significant work was subsequently done, for it seemed these excavations had removed the entire bison bone bed. Meltzer, based on his archival research, suspected otherwise. With the support of the Quest Archaeological Research Fund, one of the endowments generously established by Joseph and Ruth Cramer to further studies of the First Americans, Meltzer began a multiyear project at Folsom in 1997. He and his colleagues indeed discovered intact deposits, and analyzed their finds along with the thousands of bison bones and the artifacts recovered 70 years before. The archaeology, geology, and paleoenvironmental context of the site was examined in depth in Meltzer's book *Folsom: New Archaeological Investigations of a Classic Paleoindian Bison Kill*, which he dedicated to the Cramers.

In his newest book, Meltzer describes the decades-long controversy over when people first came to the Americas. Contentions between conflicting theories began in the late 19th century and were finally resolved at Folsom in 1927.

The faunal remains and artifacts found at the Folsom site tell a compelling story. Hunters, likely coming out of the Texas Panhandle and aiming for a mountain pass through this region, spied a herd of bison in an arroyo, cut off their escape, and killed some 32 cows and calves. Their stay was short, only long enough to butcher the animals and prepare the meat for transport. "Ironically, however fleeting, ordinary, or even inconsequential this episode may have been in the lives of the Paleoindian hunters who killed those bison some 10,500 years ago," Meltzer says, "their actions had enormous and lasting impact on American archaeology."

Accolades aplenty

David Meltzer is a member of the National Academy of Sciences and the American Academy of Arts and Sciences, and is a Fellow of the American Association for the Advancement of Science. He teaches a mix of graduate and undergraduate courses at SMU and serves on the editorial board of *Quaternary Research*.

"Dave is a remarkably versatile archaeologist," says colleague Vance Holliday. "He has learned (often by teaching himself) whatever he needs to know to better understand the issue of the peopling of the New World. In college and graduate school he took courses in soils and geology, among a range of other disciplines. He is now a very good field geoarchaeologist." Of course, no archaeologists can master all the different fields that contribute to modern archaeology, but it is important nonetheless to know the right questions to ask of specialists in other disciplines, and to be able to assess and understand the answers they provide. Holliday recalls that "as DNA research first became part of understanding the history of the First Americans in the early 1990s, for example, Dave began to delve into this complex topic and is now one of the leading archaeologists enmeshed in applying genetics to understand the early peopling and colonization of the New World."

Says Don Grayson of the University of Washington, "The depth of Dave Meltzer's empirical knowledge and conceptual understanding of issues relating to the early peoples of the Americas is unparalleled, and he is one of the few people in our discipline with the ability to bring all this to a wide audience in such a readable, and enjoyable, way. Working with Meltzer has been a complete joy, and the only flaw I see in his approach to life is that he does not have a dog." MT

–Martha Deeringer

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Suggested Readings

Eren, M. I., R. J. Patten, M. J. O'Brien, and D. J. Meltzer 2013 Refuting the technological cornerstone of the Ice-Age Atlantic crossing hypothesis. *Journal of Archaeological Science* 40:2934–41.

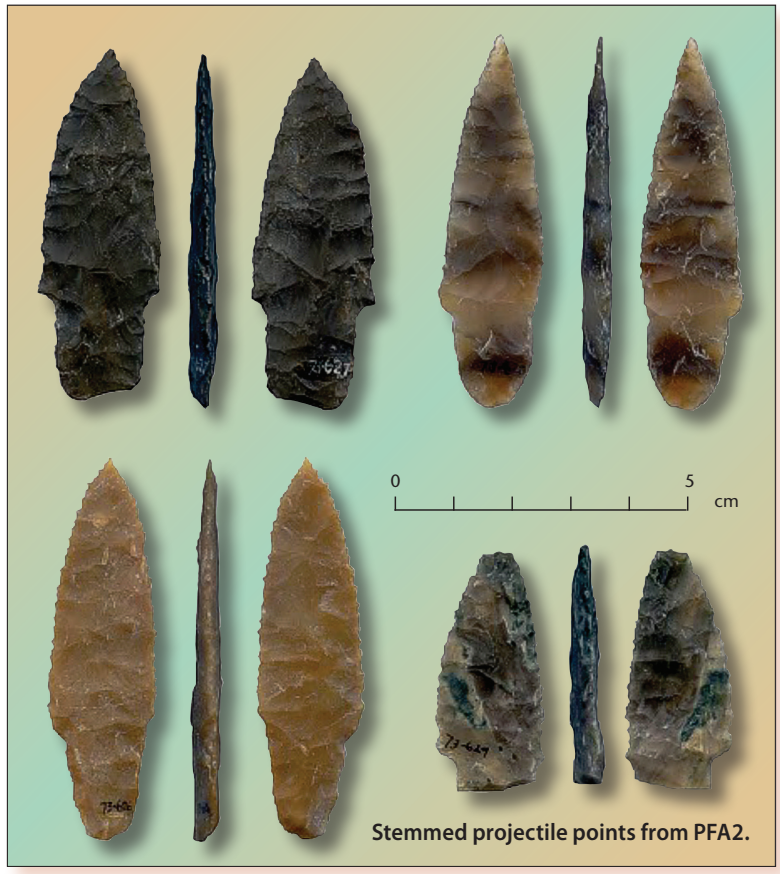
Grayson, D. K., and D. J. Meltzer 2015 Revisiting Paleoindian exploitation of extinct North American mammals. *Journal of Archaeological Science* 56:177–93.

Meltzer, D. J. 2009 *First Peoples in a New World: Colonizing Ice Age America.* University of California Press.

——— 2015 Kennewick Man: Coming to closure. *Antiquity* 89: 1485–93.

——— 2015 Pleistocene overkill and North American mammalian extinctions. *Annual Review of Anthropology* 44:33–53.

The Dirt on Cooper's Ferry

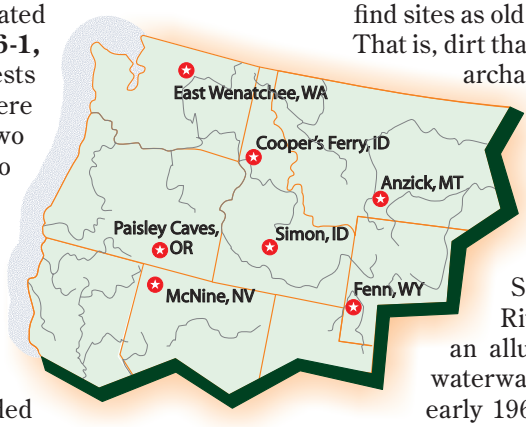


Stemmed projectile points from PFA2.

UNLESS NOTED, ALL PHOTOS ARE COURTESY LOREN DAVIS

CLOVIS? PRE-CLOVIS? They're like race horses jockeying for position to be the first chapter in American archaeology. Currently the other Paleo toolmaking traditions line up behind Clovis. There's one, however, that simply doesn't fall in line and evolve out of the others. The Western Stemmed Tradition (WST) is the odd duck of the Paleo family.

Disconnected is probably a good word to describe it. Found primarily in the Far West region (the Great Basin to the Pacific Coast), this toolmaking tradition is typified by fluteless points with distinctive stemmed bases. This tool type was thought to be a product of the Holocene until a sagebrush twig found in association with a stemmed-point base in Paisley Cave, Oregon, was dated to 11,070 RCYBP (**MT 25-4, 26-1,** "Paisley Caves"). Its age suggests that the people of the WST were Clovis contemporaries. The two toolmaking technologies are so dissimilar, however, that they appear unrelated. So is the Western Stemmed Tradition really that old? And if it is, how does it fit into the bigger Paleo picture? That's what Loren Davis of Oregon State University wants to know. More WST sites are needed to test the claim of the Western Stemmed Tradition antiquity, and Dr. Davis has found a doozy.



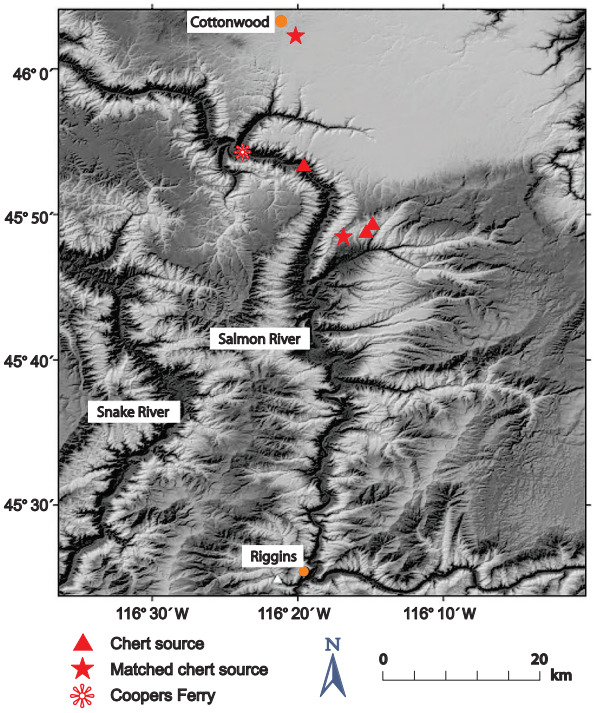
The Cooper's Ferry site in western Idaho, south of the town of Cottonwood, has yielded not only stemmed points, but a stemmed-point cache. Clovis caches dot the map, but this is a different animal. Unlike many other caches that are unearthed by locals and brought to the attention of archaeologists only after the fact, this rare find was discovered and excavated by archaeologists. The cache and site are thus a tailor-made window into the story of stemmed points.

You've got to know where to dig

When it comes to locating Paleo-age sites Davis considers geoarchaeology one of the handiest tools on his belt. If you want to find sites as old as dirt, then you have to find . . . well, old dirt. That is, dirt that's just the right age. That's where Davis's geoarchaeologic know-how comes into play. After all, if you're not searching soils of the appropriate age, then you're digging in the wrong place. One of the right places to dig for stemmed points happens to be at Cooper's Ferry.

The site sits at the confluence of Rock Creek and the lower Salmon River. The Salmon River has cut deep into the Columbia River Basalt Formation, and the site rests on an alluvial terrace elevated about 10 m above the waterways. The site was originally excavated in the early 1960s by B. Robert Butler, who uncovered four stemmed points in stratigraphic sequence. Though none of the points was radiocarbon dated, Butler's work made Cooper's Ferry a prime candidate for Davis's research because it demonstrated that the site contained WST artifacts and, of paramount importance, that the stratigraphy was undisturbed. In 1997 Davis excavated a 2-by-2-m test unit (Unit A), which revealed considerable prehistoric activity.

When examining the profile of this 4-m^2 unit, Davis found that the separate layers, or lithostratigraphic units (LUs), were similar to the stratigraphy described by Butler—a good sign. LU1, the lowest and oldest of Davis's excavated layers, contained gravels. The layers above were numbered LU2, LU3 and so forth, and represent younger sediments as each new layer was laid down. LU8b was the youngest layer, excluding the layer of recent fill that capped everything. On a site with intact stratigraphy, individual layers are distinguishable by the types of soil (clay, sand, silt), their color, and other differences. LU2 is a layer of sand, LU3 contrasts as a sandy loam, LU4 as an eolian sandy loam, and so on. Each layer reads like a history book for geoarchaeologist Davis, who knows the language. It's much easier to understand a stratigraphic profile when someone has drawn you a nice picture. From a worm's-eye view, though, when digging down it takes careful attention to detail and experience to note subtle changes in sediments and dig accordingly.



The location of Cooper's Ferry and lithic sources of artifacts found within pit feature PFA2.

Unexpected cobbles are a red flag

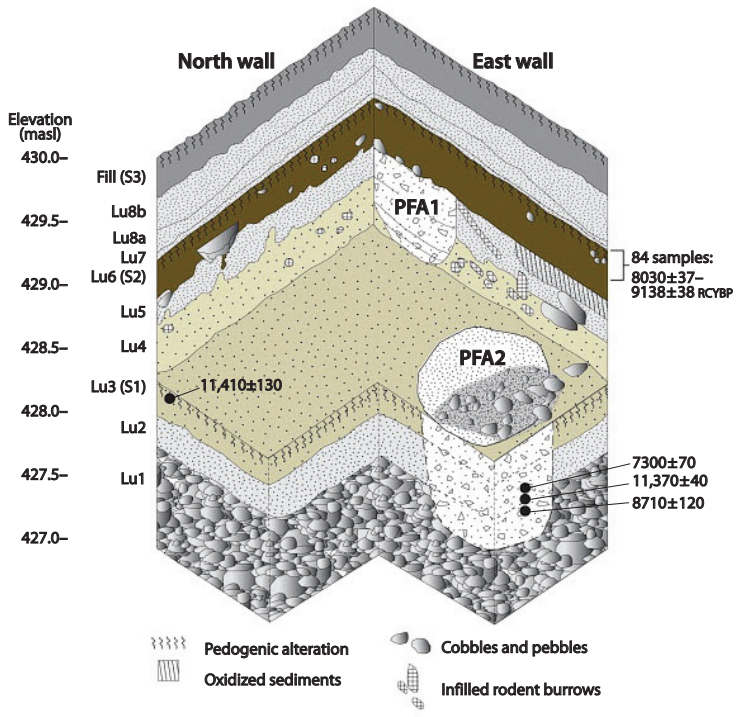
In LU4 and LU3 (both eolian sandy loams) a localized area of cobbles and pebbles was uncovered. Cobbles like these weren't present anywhere else in the layer. This was a tip off, but to what? To find the answer required more careful digging.

Below the noticeably out-of-place cobbles was a patch of darker sediments that continued to contrast with surrounding dirt as the archaeologists excavated deeper. This piqued their interest. The soils within this patch appeared to be a jumble of sediment types and colors. Was it a pit? And was the concentration of cobbles on top of it a cairn? Caches aren't known to be capped with cairns, but, then again, archaeologists rarely get the chance to excavate them. Anyone except an archaeologist who unearths a cache might disregard a pile of rocks on top.

As the pit descended through the natural stratigraphic layers, and now it indeed appeared to be a pit, it contrasted sharply with the surrounding LUs. Could this be because the original excavators of the pit refilled it with the muddled mixture of the various LUs? The feature sank all the way into LU1, the natural layer of gravels.

Human hands, it was now apparent, had created this pit and deposited in it a cache of artifacts, not intended for, but happily received by, future archaeologists. In addition to 9 tools found outside the pit, the cache contained 13 lithic tools, 724 pieces of debitage, and numerous fragments of faunal remains including mammal bone and freshwater mussel shells. As they excavated, Davis's crew discovered 5 concentrations of artifacts within the pit, which was dubbed PFA2. The first concentration was a quantity of debitage that contained a single modified flake. Below that was more assured proof that this was the work of human hands: a concentration containing a blade, hammerstone, and core. The following 2 concentrations contained, first, debitage, faunal bone, a blade and a core; and second, debitage, faunal bone, a blade, a uniface, and a modified flake.

Nearest the bottom lay the mother lode, 4 stemmed points sitting atop an artiodactyl bone fragment with cutmarks. *Eureka!*



The stratigraphy of 2-by-2-m Unit A and pit feature PFA2. Stratigraphic layers (LUs) are labeled on the left.

The pit and the pendulum

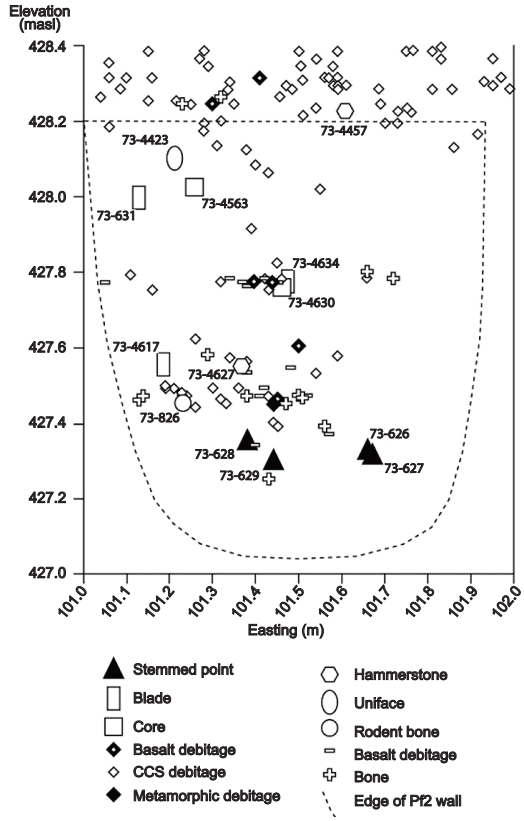
The next question that pops into many minds is, How old? Dates taken from the site ranged from late Pleistocene to early Holocene. Capricious luck unfortunately made the artiodactyl bone

undatable. Archaeology giveth . . . and archaeology taketh away.

Wood charcoal from the pit returned radiocarbon dates of 7300±70, 11,370±40, and 8710±120 RCYBP. Burnt wood from outside the pit, from the layer (LU3) walked on by those who created the pit, dated to 11,410±130 RCYBP. This is where it gets tricky.

The three dates from within the pit came from samples lying close together. The 11,370±40 RCYBP date was from charcoal sandwiched by the younger two. Davis believes this older date to be the most likely. After all, it correlates with the 11,410±130 RCYBP date taken from what appears to be the ground surface when the pit was created. This oldest date also correlates with the soil composition of LU3. Elsewhere in the lower Salmon River canyon are similar eolian loess deposits known to match these older dates.

These results have spawned three hypotheses.



A backplot of the distribution of all provenienced artifacts from pit feature PFA2.

Hypothesis 1 The 7300±70 and 8710±120 RCYBP radiocarbon dates accurately date the pit to the Holocene. The pit was excavated out of a Holocene-age surface. The pit, however, was originally deeper. It has been argued that early-Holocene deposits that once were atop LU3 were whipped away. Those who argue this point interpret the lack of radiocarbon ages between LU6 and LU3 as an unconformity created by an erosional boundary. If this were the case, LU3 could have been a surface layer during the Holocene, explaining the Holocene-age radiocarbon dates in the pit feature.

Davis's geoarchaeological expertise urges him to reject the erosional boundary and this hypothesis. The unconformity, says Davis, represents a period of surficial stability when no new sediments were added to this part of the site. In support of this claim, he points out that the top of LU3 demonstrates a "slight increase in oxidation," possibly caused by soil carbonate and organic material, such as leaves and other natural debris, collected over a long period of time. The presence of this oxidation found at the top of LU3 confirms that for a long time it was a stable surface, layers, and that erosion wasn't a factor. He says LU4 and LU5 also took quite some time to lay down.

Hypothesis 2 The 11,410±130 and 11,370±40 RCYBP dates correctly signify that the pit was created in the Pleistocene. The LU3 deposits, which form the surface around the mouth of the pit, are loess deposits. Other deposits of this kind in the Lower Salmon River canyon area didn't accumulate in the canyon after the Pleistocene. If this is the surface the creators stood on when they dug the pit, then the pit must date to the interval between the times LU3 and LU4 were laid down. (Davis has recently acquired datable material from LU4, and the dating results are forthcoming.) Dates taken

from the site located on the surface of LU3 should match those within the pit. The dates from the charcoal fragments within the feature and on the LU3 surface support this hypothesis.

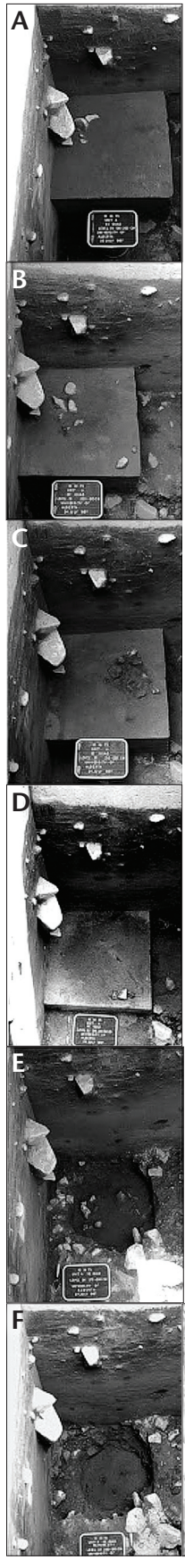
Hypothesis 3 The 11,410±130 and 11,370±40 RCYBP dates from charcoal fragments found within PFA2 and from the LU3 surface of the pit are from burnt fossil wood, older than the pit, that was present in LU2 and LU3 before humans appeared on the spot. The charcoal was incorporated into the pit feature when it was created, but its age is unrelated to it. Think of a child in 2015 dropping into a piggy bank a penny made in 1985: The piggy bank and the child don't both date to 1985.

Hypothesis 1 isn't a contender for Davis. Hypotheses 2 and 3 lie within the realm of possibility, though he leans toward the older date for the site. A great many dates were taken from the younger LU6. These ranged from 8030±37 to 9138±38 RCYBP, with most of the dates falling in the range of 8500–8900 RCYBP. It's worth noting that the 11,370±40 and 11,410±130 RCYBP dates can overlap, but the 7300±70 and 8710±120 RCYBP dates (found so close together) cannot.

WST vs. Clovis

These two lithic technologies weren't necessarily at odds with each other. In fact, they apparently coexisted. Comparing Clovis caches with WST caches is difficult because, through unhappy circumstances, more often than not Clovis caches weren't excavated by archaeologists. This is particularly true for finds in the Far West. With only stone tools (and often only those that caught an amateur's eye), we can't know the characteristics of the pit or what else might have been left inside. PFA2 contained, besides many stone tools, a great deal of debitage and faunal remains. This totality of materials gives a much broader view of the people responsible for the WST than stone tools alone.

As for the tools, stemmed points from Cooper's Ferry are remarkably thin. Those from the cache are only 4.5–5.3 mm thick. (The eraser on the end of your pencil is about 5 mm wide.) Clovis points on the other hand, known for their slightness, are 15.4–20 mm thick. Davis isn't surprised that Clovis points are typically thicker than stemmed points from Cooper's Ferry. The reason, he says, is that "the stemmed points found at Cooper's Ferry are different from Paleoindian points because they appear to be made by pressure flaking thin, linear flakes, not by using percussion flaking to reduce larger bifaces into smaller, refined bifacial projectile points."



A–G, series of photos showing the progress as pit feature PFA2 was excavated.

Davis in his lab at OSU, 2013.

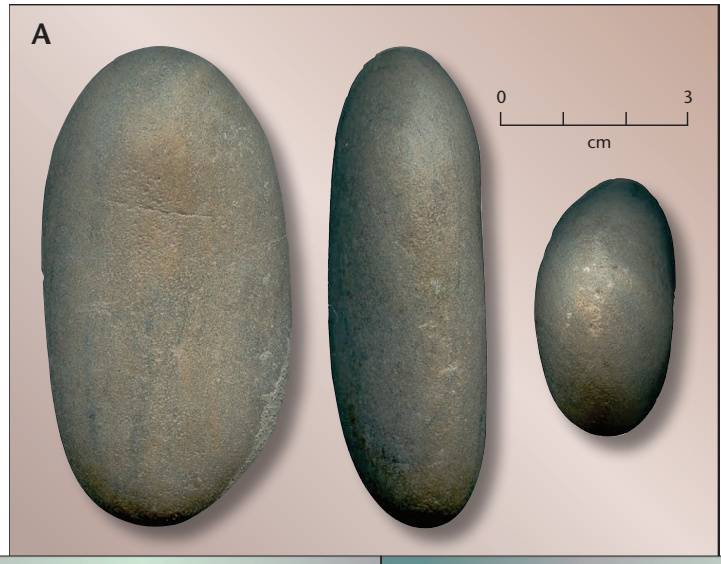
OREGON STATE UNIVERSITY

Work continues at Cooper's Ferry

Though that small Unit A yielded a wealth of information, Cooper's Ferry has far from exhausted its store of archaeological information. Today that 2-by-2-m unit has been dwarfed. Area A has swelled into a 6-by-10-m excavation, and a second area, Area B, that measures 12-by-12 m has been opened. Davis says continuing excavation has helped bring the site into focus and manifested recurring patterns. The stratigraphy in Area A mirrors Unit A, and Area B has a broader range of

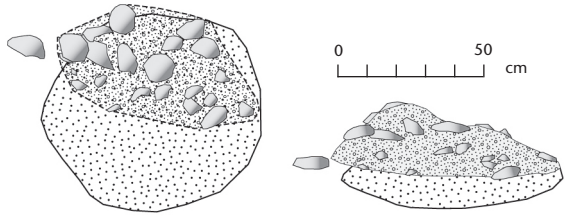
stratigraphic layers owing to its location near ancient alluvial channels dating from the late Pleistocene to early Holocene.

Besides clarifying the nature and scope of the site, digging has also uncovered



A, three views of a hammerstone made of metamorphic rock found in pit feature PFA2; **B,** blades found in pit feature PFA2; **C,** a linear macroflake found in pit feature PFA2 (Davis believes this is a preform used to make stemmed points at Cooper's Ferry).

exciting finds. More WST tools, cultural features such as hearths, and yes, caches have been found! Davis is currently writing about these new findings, but he doesn't mind dropping a few tantalizing details. The new pit features also appear to be capped by cairns. Like PFA2, they contain debitage, bone fragments, stone tools, and of course, stemmed points. Davis also found what he describes as "amorphous concentrations of dark brown sediments" that he believes could be decayed organic matter. Fire-cracked rock was also found in the new pits. Davis reveals that one of the youngest pits had a different twist: Sediments at the top of this pit were an oxidized orange color, the result of a fire burning on the surface of the feature. Whether with rocks or contrasting colors, those who made the caches took creative effort to mark their deposits conspicuously. And yet they never came back for them.



Plan (*left*) and oblique view of the cairn atop PFA2.

To be continued?

There's more to come from the Cooper's Ferry site. It has demonstrated repeated occupations. If the dates on charcoal of 11,370–11,410 RCYBP are confirmed, the site promises to push the Western Stemmed Tradition even further back into the Pleistocene, where it can run with a more ancient crowd. On top of this, the site has yielded caches that archaeologists are systematically excavating. Along with hallmark stemmed points, these deposits have provided faunal material and possible remnants of other cached organic material. And Davis isn't done with Cooper's Ferry yet. Excavation will continue at the site with Oregon State University 2016 field school. Davis forecasts three or four years of digs to get literally to the bottom of Cooper's Ferry. This site, Davis sums up, "holds a rich record of artifacts and cultural features, which are showing us technological, economic, logistical and even perhaps ideological aspects of the WST not seen in other sites."

So why stop now?

–K. Hill

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Kennewick Man's DNA

continued from page 5

gene flow into the Pacific Northwest related to Asian populations," which they suggest occurred long after the time of Kennewick Man—possibly through contact with paleo-Eskimos or Inuit ancestors sometime during the last 5 thousand years, or it might even have occurred in relatively recent times.

Willerslev and his team performed a variety of statistical tests comparing the genomes of two members of the Colville tribe, two northern Athapascan individuals from Canada, and two Karitiana individuals from Brazil. They sought to determine whether the Colville were directly descended from the population to which Kennewick Man belonged and, if so, whether that relationship had been diluted by subsequent gene flow from other populations. Although their statistical tests refuted the hypothesis of direct descent with no subsequent gene flow, the results did confirm a close genetic relationship.

The team offered three possible explanations for their data. First, the Colville individuals might be "direct descendants of the population to which Kennewick Man belonged, but subsequently received some relatively minor gene flow from other American populations" within the last 8 or 9 thousand years. Second, the Colville individuals might be descended from a population that around 8 or 9 thousand years ago "was slightly diverged from the population which Kennewick Man belonged to." And third, some combination of these alternatives.

Willerslev's team's study is hampered because many American Indian populations from the continental United States have never participated in genetic studies. Therefore it isn't possible to specify with any degree of confidence which groups of contemporary American Indians are most closely related to Kennewick Man. Willerslev and his team have shown, however, that the Colville individuals are closely related to him, and that of the Canadian First Nations and United States tribes that have participated in genetic studies, the Colville are among the most closely related.

Much of the media coverage of the recovery and analysis of Kennewick Man's DNA speculates that the Confederated Tribes of the Colville Reservation and other tribes of the original coalition that attempted to claim the remains of Kennewick Man for reburial can now submit a new NAGPRA claim for the skeleton, using these new data to support their repatriation request. Willerslev and his coauthors maintain, however, that it is "not possible at this time" to identify which particular modern Native American groups "are most closely related to Kennewick Man."

Was Kennewick Man a Polynesian?

Kennewick Man's genome clearly shows that he isn't closely related to modern Polynesians, in spite of his having a similarly large and long skull. But then Owsley and his team never said he was Polynesian. Jantz and Katherine Spradley, in their chapter in Owsley and Jantz's Kennewick Man book, point out that the similarity of Kennewick Man to Polynesians "obviously does not suggest a direct connection." "Rather it suggests that early Americans and Polynesians have roots in the same Asian populations, probably those inhabiting coastal areas and using watercraft to exploit marine resources."

Two members of the Willerslev team, Marcia S. Ponce de Leon and Christoph P. E. Zolikofer, compared the skull of Kennewick Man with a database of skull measurements that included indigenous Americans, Polynesians, and Ainu. They confirmed that although "Kennewick is more similar to circumpacific than modern Amerind populations," his measurements don't fall outside the range of variability in modern American Indian skulls. In fact, "various Arikara individuals" in the database also exhibited "a pattern of Polynesian affiliation that is similar to Kennewick." They argue that these similarities likely don't argue for "close common ancestry of Amerind populations and Polynesians/Ainu," but instead simply reflect the natural range of variability in American Indian skull shapes or possibly similarities in diet or ways of life that produced similar skull shapes. They conclude that it's very difficult to assess the biological relationships of an isolated human skull because there is so much variability within populations.

Of course Kennewick Man is not the only Paleoamerican skeleton that exhibits similarities to Polynesians. Jantz and Spradley included 14 other early-Holocene skulls from North America in their analysis. They concluded that 11 of these were more similar to Polynesian or Ainu skulls than to the modern American Indian sample. Jantz and Spradley showed that Kennewick Man is not an isolated example of a Polynesian-like skull that may simply be an outlier in the sample of early North Americans. Most of the skulls known for this period have "similarities to circumpacific populations, especially Polynesians."

Ponce de Leon and Zolikofer show, in a supplementary note to the *Nature* paper, that Kennewick Man's skull is not "an outlier compared to modern Amerinds; rather he forms part of male Amerind craniometric variation." Yet they also acknowledge that "the craniometric mean of Paleoamerican populations differs from that of modern Amerind populations," which would appear to corroborate the conclusions of Jantz and Spradley.

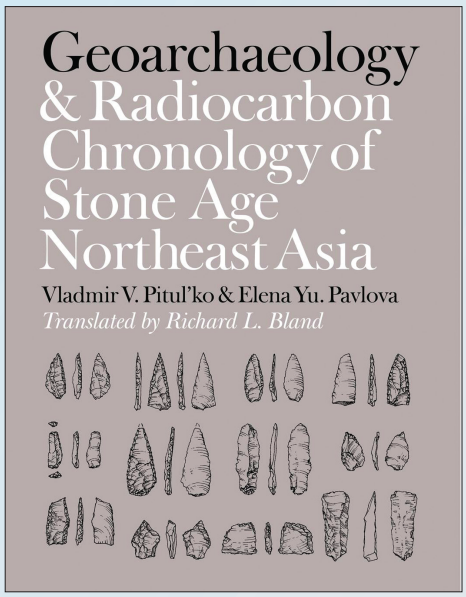
Regardless, Willerslev and this team argue that craniometric measurements aren't a reliable means to determine "the biological population affinities of Kennewick Man"—certainly not as reliable as reading his DNA.

Reaching out to American Indian tribes

After preliminary results indicated that Kennewick Man was biologically more closely related to contemporary American Indian groups than to any other population in the world, Willerslev reached out to several tribes of the coalition that had attempted to claim Kennewick Man for reburial. He presented his team's preliminary conclusions to them and offered to sequence the genomes of tribal members to see how closely related they might be to Kennewick Man. Only the Confederated Tribes of the Colville Reservation agreed to participate. DNA analysis of saliva from 24 individuals confirmed that the Colville were indeed closely related to Kennewick Man. James Boyd, chairman of the governing board of the Confederated Tribes of the Colville Reservation, states that "this is a happy time for us. We have maintained

LACKING ACCURATE MEANS of dating artifacts and faunal remains, scientists who explored the Asian Far North for two centuries drew conclusions about site formation and early human occupation that have proved doubtful and sometimes wholly inaccurate. Following the discovery in the Yana basin of a foreshaft made of woolly rhinoceros horn, for instance, Russian archaeologists declared that the site wasn't permanently occupied before the middle Holocene. Likewise, human hunting was once inferred as a major contributor to the enormous aggregation of mammoth remains at Berelekh, "the mammoth cemetery."

Vladimir Pitul'ko and Elena Pavlova, authors of ***Geoarcheology and Radiocarbon Chronology of Stone Age North East Asia,*** using C-14 dating and up-to-date geoarchaeological methods, now conclusively correlate artifacts and faunal remains with geologic events and human occupation. In this book we find convincing evidence of mammoth hunting in the Siberian Arctic between 29,000 and 27,000 RCYBP, and the absence of overlap between human presence and the deposit of mammoth remains at Berelekh. This definitive volume establishes beyond dispute human habitation of eastern Siberia north of the Arctic Circle during the last interglacial.



Geoarcheology and Radiocarbon Chronology of Stone Age North East Asia was published in Russian in 2010. This English version is translated by Richard L. Bland.

To order your copy, see the back cover of this issue.

About the authors:
Vladimir V. Pitul'ko is an archaeologist at the Russian Academy of Science Institute for Material Culture History in St. Petersburg.

Elena Yu. Pavlova is a Quaternary geologist with the Arctic and Antarctic Research Institute in St. Petersburg.

About the translator:
Richard L. Bland is a research archaeologist with the University of Oregon Museum of Natural and Cultural History.

throughout that the Ancient One is a relative of ours, so these findings are wonderful for us." He also expressed interest in pursuing a new repatriation claim for Kennewick Man. "We would like to see him buried very respectfully," he says.

What we can learn from Kennewick Man matters!

Willerslev was interviewed for the public television documentary "First Peoples: Americas," which aired shortly after the online publication of the *Nature* paper. He said, "As a scientist, it's super exciting if there is a controversy because that means that the result—if that can solve that controversy—the result matters, right? It means something. It's important."

Determining the ancestry and affiliations of Kennewick Man has been one of the most controversial problems in American archaeology, and the results obtained by Willerslev's team certainly are an important contribution to our understanding of who Kennewick Man was and how he and his people fit into the story of the peopling of the Americas.

Confirming that Kennewick Man belongs to the X2a mitochondrial haplogroup counters the idea that he is a descendant of Solutrean folk from Paleolithic Spain. Finding the X2a haplogroup in such an ancient skeleton also undermines the more outrageous notion put forward by supporters of pre-Columbian contacts between America and the Old World that the X haplogroup was introduced into America only around 2,000 years ago by wayfaring Israelites from Galilee.

Willerslev's team's finding that Kennewick Man isn't closely related to Polynesians or the Ainu is interesting but not disappointing to Jantz and Spradley, who never claimed that the similarity of Kennewick Man to Polynesians suggested any "direct connection."

Owsley is right when he says, "I feel like the skeleton is just beginning to talk to us and we need to carry on that conversation." We now have a reasonably complete draft of Kennewick Man's genome, but our tools and techniques for gleaning information from ancient bone are constantly improving. Someday researchers may be able to recover DNA from Kennewick Man's bones that reveals his genome in much greater detail. MT

–Brad Lepper

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Suggested Readings

Bolnick, D. A., K. L. Feder, B. T. Lepper, and T. A. Barnhart 2011 Civilizations lost and found: Fabricating history. Part Three: Real messages in DNA. *Skeptical Inquirer* 35(5):48–51.

Owsley, D. W., and R. L. Jantz, editors 2014 *Kennewick Man: The Scientific Investigation of an Ancient American Skeleton.* Texas A&M University Press, College Station.

Rasmussen, M., M. Sikora, A. Albrechtsen, T. S. Korneliussen, J. V. Moreno-Mayar, G. D. Poznik, C. P. E. Zollikofer, M. S. Ponce de Leon, M. E. Allentoft, I. Moltke, H. Jonsson, C. Valdiosera, R. S. Malhi, L. Orlando, C. D. Bustamante, T. W. Stafford, Jr., D. J. Meltzer, R. Nielsen, and E. Willerslev 2015 The ancestry and affiliations of Kennewick Man. *Nature*, published online at http://www.nature.com/nature/journal/vnfv/ncurrent/full/nature14625.html.

University of Copenhagen 2014 Kennewick Man: Solving a scientific controversy. Press release, 18 June; http://news.ku.dk/all_news/2015/06/kennewick-man-solving-a-scientific-controversy/

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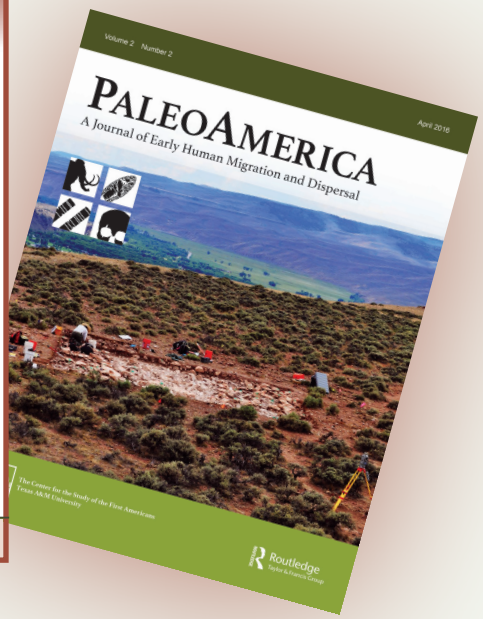

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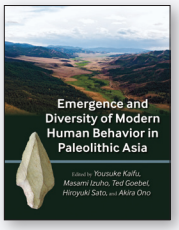

Emergence and Diversity of Modern Human Behavior in Paleolithic Asia, Yousuke Kaifu, Masami Izuho, Ted Goebel, Hiroyuki Sato, and Akira Ono. 2014. 230 pages/ Hardback (ISBN 978-1-62349-276-2).
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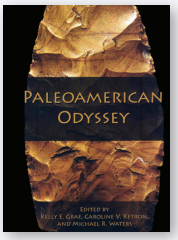

Paleoamerican Odyssey, Kelly E. Graf, Caroline V. Ketron, and Michael R. Waters, editors. 2014. 584 pages. Paperback (ISBN 978-1-62349-192-5)
Reg. price $45.00
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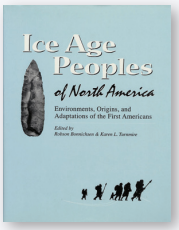

Ice Age Peoples of North America: Environments, Origins, and Adaptations of the First Americans, Robson Bonnichsen and Karen L. Turnmire, editors. 2005. 565 pages. Hardback (ISBN 978-1-585443-68-0).
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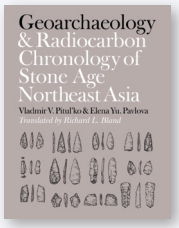

Geoarchaeology and Radiocarbon Chronology of Stone Age North East Asia, Vladimir V. Pitul'ko and Elena Yu. Pavlova; Richard L. Bland, trans. 2016. 256 pages. Hardback (ISBN 978-1-62349-330-1).
Reg. price $60.00
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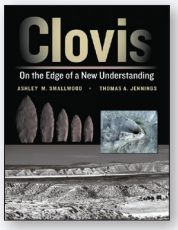

Clovis: On the Edge of a New Understanding, Ashley M. Smallwood and Thomas A. Jennings, editors. 2014. 376 pages. Hardback or e-book (ISBN 978-1-62349-201-4).
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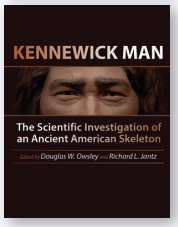

Kennewick Man: The Scientific Investigation of an Ancient American Skeleton, Douglas W. Owsley and Richard L. Jantz, editors. 2014. 600 pages. Hardback (ISBN 978-1-62349-200-7).
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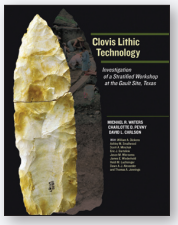

Clovis Lithic Technology: Investigation of a Stratified Workshop at the Gault Site, Texas, Michael R. Waters, Charlotte D. Pevny, and David L. Carlson. 2011. 224 pages. Hardback or e-book (ISBN 978-1-60344-278-7).
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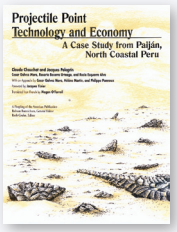

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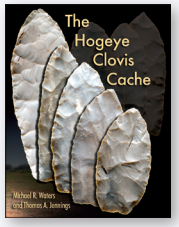

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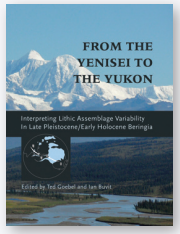

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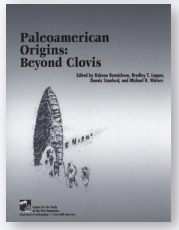

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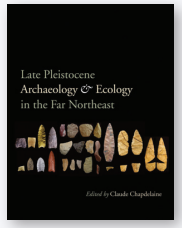

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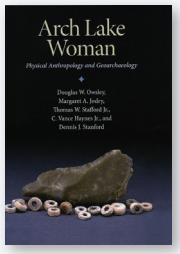

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