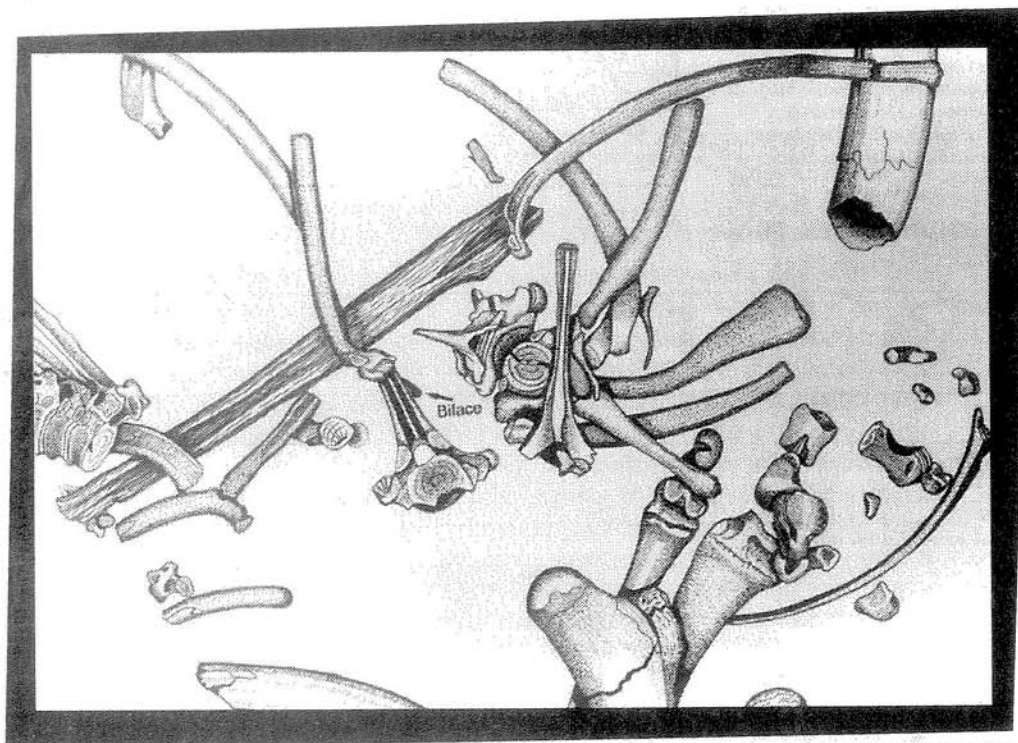




MAMMOTH TRUMPET

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

Stone tool found with mammoth bones



Detail from a plan view of the Hebior Mammoth site in Kenosha County, Wis., depicts a biface stone tool beneath the bones of a disarticulated bull mammoth. (Article on page 5.)

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

MAMMOTH TRUMPET



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PRE-GLACIAL SITE IN ALBERTA SUGGESTS EARLY HUMAN PRESENCE

Investigators Agree on Need for Confirming Evidence

Archaeologists and geologists from the University of Alberta in Edmonton are examining evidence that people were in southwestern Alberta more than 20,000 years ago. Although initial results are regarded as promising, investigators concede that further work must be done at the sites to confirm preliminary results because the evidence bears directly on the highly controversial question concerning the antiquity of the peopling of the Americas.

The evidence consists of presumably artifactually flaked quartzite and hard limy siltstone cobbles found deeply buried in late-Pleistocene geological contexts at two locations in the upper Bow River Valley on the western edge of the city of Calgary. The recovery of possible artifacts—flakes, cores and pebble tools, some found in situ below more than 20 meters of sediments of an Ice Age lake called Glacial Lake Calgary—strongly suggests early human activity there, says Jiri Chlachula, a researcher in Quaternary geology at the University of Alberta and principal investigator for the project he initiated.

At Varsity Estates or Site 1, investigations carried on since 1990 have yielded approximately 40 artifacts from an excavation of 15 square meters. About two kilome-

ters upstream on the north side of the river valley, a second site, called Silver Springs, has yielded an assemblage of more numerous flakes. Artifacts are distributed there, mostly in a secondary position, at the base of till deposited by a valley glacier from the Rocky Mountains, presumably during the early portion of the late-Wisconsin glacial stage. The stratigraphic position of the Silver Springs archaeological site indicates that people inhabited the area before the glacial advance that eventually overrode and severely disturbed the site. Although no

radiocarbon dates are available, Dr. Chlachula said in a recent telephone interview that the glacial advance is assumed to have occurred between 25,000 and 21,000 years ago.

He explained that after the Cordilleran glacier had retreated, the valley floor was reoccupied at Varsity Estates, as evidenced by the artifact assemblage excavated from the top of the till. This more recent occupation episode was disrupted during the maximum late-Wisconsin glaciation by a southerly advance of the Laurentide ice sheet that dammed the Bow River and flooded the Varsity Estates site under the glacial lake.

Chlachula noted that work published last year by Alberta researchers provides a

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*"It would not be
doubted as an artifact
at Holocene-age sites."*

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MONTANA'S BIG SKY COUNTRY SITE OF 1995 EXPEDITION

This year's First Americans Expedition will be near the Crazy Mountains in south-central Montana at the Cremer site, which offers the potential of yielding much information about early human habitation in North America. Director Robson Bonnicksen of the **Center for the Study of the First Americans** recently announced dates for the Earthwatch-sponsored expedition, which will involve three teams of volunteers and a multi-disciplinary team of scientists. Volunteers will assist with mapping, excavating, screen washing and use of flotation methods to recover ancient inorganic and organic materials.

Initially, the 1995 expedition had been planned for the Mammoth Meadow site in the Beaverhead Mountains in southwest Montana, but the CSFA could not be certain that continuing permit-requirement questions, which greatly limited field work there the past two seasons, would be completely resolved in time to assure a full field season. The beautiful Cremer site promises to reveal a similarly deep record of human activities.

The new site, discovered by rancher George Cremer in the 1950s, was the location of scientific investigations in 1979 and 1980 that exposed cultural deposits a meter and a half deep. These, dating back about 5,500 years, included many flaked-stone artifacts and faunal remains, as well as slab hearths and other indications of dwellings. That field work was halted by a lack of time and money although researchers did not reach the bottom of cultural deposits. In 1987 Bonnicksen and Cremer conducted auger tests that revealed artifacts a full

meter deeper. Sediments collected from the site last year from about a meter and half below surface were analyzed in the CSFA lab and found to contain 104 ancient hairs that have yet to be identified.


The Cremer site lies near a freshwater spring at the outlet of a late-Pleistocene lake at the margin of the Great Plains near the Crazy Mountains, about 30 miles from Big Timber, Mont. The goal of the expedition's environmental-archaeological team is to recover data that will provide a better understanding of regional settlement and subsistence patterns as well as information on the initial colonization of the region.

Bonnicksen listed these specific objectives:

- Use standard geoarchaeological techniques to expand the understanding of local and regional landforms and site-formation processes;

- Use standard archaeological procedures to gain more information of late-Pleistocene and Holocene prehistory;
- Gather paleoenvironmental information to help reconstruct human subsistence and settlement patterns;
- Employ geochronological procedures to produce a better knowledge of the site's history.

Teams will be at the site June 18–July 2, July 5–19, and July 21–Aug. 4. Rendezvous site for volunteers will be at the Town Pump in Big Timber, a town about 30 miles from the site and 80 miles west of Billings. Volunteers will camp beneath Montana's big starry sky and eat meals prepared in the Far Away Café, the expedition's well-equipped chuck wagon-dining shelter.

To join in the investigation of this exciting new First Americans site on the beautiful Cremer ranch, phone the **Center for the Study of the First Americans**, 503-737-4595, for information about costs and reservations. Earthwatch members can receive information from Earthwatch Expeditions. 



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Pre-Glacial Site

continued from page 1

means for extrapolating a probable geological date for human occupation at the Varsity Estates site. The work by Robert R. Young of University of Calgary's Department of Geography, James A. Burns, paleontologist at the Alberta Provincial Museum, and three colleagues (See **Suggested Readings**) about 160 miles north of Calgary in central Alberta, has yielded radiocarbon dates ranging from 42,910 years B.P. to 21,330 years B.P. The researchers tested more than 30 samples of fossil mammal bones and wood from deposits beneath Laurentide glacial deposits. Chlachula said that another suite of nearly 40 radiocarbon dates on fossil bones from early postglacial deposits range from 11,600 to 9,000 years B.P. "The hiatus apparently dates the time when the first and only Laurentide ice-mass covered central Alberta and probably extended over parts of southwestern Alberta to dam the Bow River about 21,000 years ago and flood the Varsity Estates site," he told the **Mammoth Trumpet**.

Chlachula remains cautious but confident about the archaeological discoveries, agreeing that it would be good to have supporting dates from deposits that contain the artifacts. Such evidence could convince colleagues who may accept the archaeological evidence, as well as the geological context, but who still resist the idea that people were in the New World before 11,500 years ago—the conventionally accepted date for the entry of people from Asia into North America by way of the Bering land bridge.

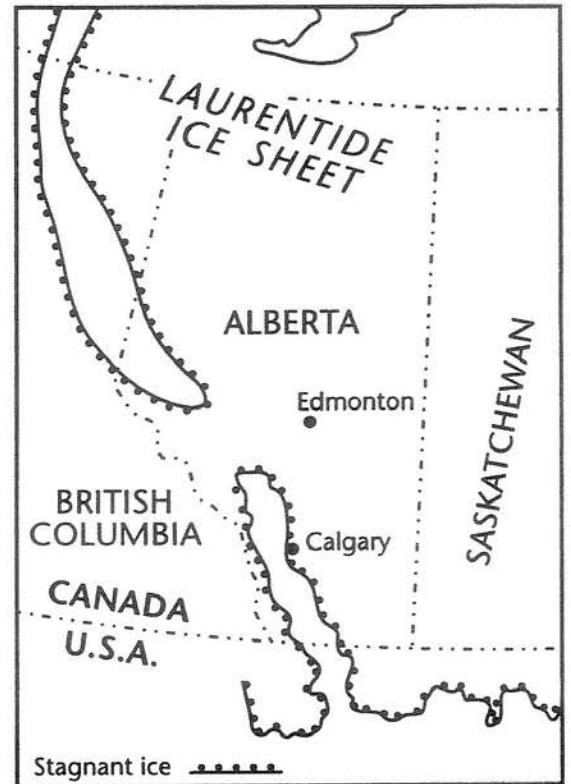
Last year, Chlachula focused research on a third site with stone artifacts eroding from gravel deposits in a disturbed slope face. The researchers dug two pits through silts and gravel beds to try to establish a correlation with the two previous sites. "The geological context as well as the age of this site is not quite clear yet," Chlachula said of the third location. "So far, we are attempting to date indirectly only from the geological context. The results are very preliminary, and quite a lot of work is needed," he added. "Right now I'm hesitant to report on the latest site. More research is necessary to decide if there is some relation with the

artifacts found in more definite geological contexts at the previous two sites. Some flakes and percussion-flaked pebbles have been found, but their approximate age has not been determined yet. Optically stimulated luminescence dating of samples we had taken last May may provide some clues." (See **Mammoth Trumpet** 9:3 "Measuring Energy Stored in Trapped Electrons")

There have been no discoveries of skeletal remains at any site, although spruce, pine and sedge pollen was recorded at Site 1 in the archaeological horizon. "I intend to expand the sections at Site 1 and Site 3 this summer," said Chlachula, who was born in Moravia in the former Czechoslovakia, and received his first doctorate in 1985 from Brno University in European archaeology, and a second doctorate in 1994 from the University of Calgary in archaeology. Research for his second Ph.D. was based on the study of the Calgary sites; he is now completing his Ph.D. in Quaternary geology at the University of Alberta focusing on Pleistocene environments in southern Siberia.

Nat Rutter, Professor of Quaternary Geology at the University of Alberta and Chlachula's supervisor, says that if both the archaeology and the geology are correct, it is a spectacular discovery. "I see nothing wrong with the interpretation of the geology," Dr. Rutter said in a telephone interview. He explained that the stratigraphic sequence is typical of western Canada. How old are the sites? Rutter said that there can be different interpretations of how the glacial till got over the top of the gravels that contain the artifacts. The sites may be as recent as 12,000–15,000 years old if till slumped off nearby melting ice during deglaciation. However, if the glacier advanced over the artifacts and the till was deposited off the bottom of the ice, it would mean the sites are much older, perhaps 21,000 years.

Though he leaves interpretation of the discoveries to archaeologists, Rutter supports the geology. "If those are artifacts, he's got a major find."



Possible maximum ice limits 21,000–19,000 years ago.

Jack Ives, Alberta's provincial archaeologist and assistant director at the Alberta Provincial Museum, has examined the artifacts and has seen other archaeologists react to them. He told the **Mammoth Trumpet** that many of the so-called artifacts are controversial, with some shown to have been created through natural forces working in a dynamic, high-energy glacial and river environment, and through modern fracturing of rock by earth-moving machinery.

But Chlachula's archaeological experience in Europe and Siberia leaves him certain that some of them—unifaces as well as bifaces—are definitely prehistoric artifacts with traits similar to those produced on accepted stone tools of the late-Pleistocene Paleolithic of northern Eurasia. Six flakes, found in a stratigraphically well-documented position below 24 meters of glaciolacustrine sediments, actually can be refitted onto one cobble biface, Chlachula said.

Dr. Ives believes it's better to remain skeptical until all the data are in. "The specimens collected from the sites certainly raise significant issues about how to tell natural from cultural breakage of



stone, and many of the specimens could be natural," he said. But he agrees that one granular quartzite artifact Chlachula found at the Varsity Estates site is a bifacially created tool. "The specimen unquestionably looks like a biface—it has eight or nine alternating flakes creating good edge sinuosity along one side of the cobble. It would not be doubted as an artifact at Holocene-aged sites in Alberta." Ives noted that it is improbable that such an article was created naturally. "I can't feature this being a coincidence. It's very difficult to look at that biface and say 'that is not an artifact.'" But Ives pointed out that during the Pleistocene billions, if not trillions, of cobbles were being jostled and broken in the high-energy environments of the Bow River Valley, and naturally created "artifacts" or "eoliths" are not inconceivable. Apart from that biface, Ives said, many of the lithics are less convincing. He said he has seen a number of people react to Chlachula's assemblage and noted that some are willing to dismiss it because the raw material, granular quartzite, is almost like sandstone. Others, Ives added, are really happy with the raw material because it is friable enough that it couldn't stand any natural transport or banging around "without really coming unglued."

Alwynne Beaudoin, a paleoenvironmental research officer with the Provincial Museum of Alberta's Archaeological Survey, remains skeptical because during a short visit to the site she didn't notice a significant amount of evidence for soil development on the largely gravelled surface. It is a surface that Ives called "a very inhospitable spot" for people to have been living.

"There was an absence of any evidence of any land surface or soil development, or indications of weathering," Dr. Beaudoin said in a telephone interview. That situation is difficult to account for, she said. "If it was a stable surface one would have expected to have found soil development of some kind and it is curious that we didn't notice any. It is one thing that needs to be explored a little further."

Despite criticism, Chlachula remains undaunted in his research. He believes that many of his critics wear blinders built by a narrow Clovis-first approach to Paleolithic archaeology. "I'm investigat-

ing and reporting on those sites as I would at any Pleistocene site in Eurasia," he said. "I know that some consider my work controversial, but that's not my problem—I don't. I realize that my claims on the early settlement of Alberta do not fit the established culture-historical scenario. Critics I have met so far tend to selectively use their arguments taken out of context against the Calgary sites by ignoring other lines of evidence." He says some of the objections show a lack of geological background and/or experience in early lithic technologies. Critics, he adds, often "try to operate with unfounded assumptions of natural glacial-fluvial flaking at the sites." Chlachula said he is quite familiar with the issues and that he dealt with them in detail in his dissertation.

"Overall, I do not think I have to be preoccupied with the 'Early Man' debate, which, in fact, I'm little interested in. Instead of simply talking and speculating about when and how prehistoric people came to America, I would rather do the basic field work. Once you have enough data, you can start putting together theories, but not vice-versa.

"As far as the ice-free corridor is concerned, it is not relevant for the work I'm doing," he said. "The corridor hypothesis relates to a traditional, conservative model of New World colonization at the very end of the Pleistocene by the Clovis culture. The archaeological data from the Bow Valley sites suggest that a settlement here in Alberta was earlier, established before the ice-free corridor existed."


Ives takes issue with Chlachula and others who see no relevance to the ice-free corridor. "Geologists debate the degree of Laurentide-Cordilleran ice coalescence at the height of the Wisconsinan," he said. "Even so, the eastern slopes region, as well as central Alberta, was humanly hospitable in mid-Wisconsinan times, and likely remained so until the late-Wisconsinan glacial advance." Ives said part of the eastern slopes were either unglaciated, asynchronously glaciated or weakly glaciated, making it about the only part of southern Canada where one might look for a human presence dating to more than 20,000 years ago. "Whether or not much coalescence took place, there seems little doubt that the length of

the corridor was utterly uninhabitable at the height of the late Wisconsinan, say from 15,000 to 20,000 years ago." (See **Mammoth Trumpet** 7:2 "Paleoecologist Finds Corridor Ice-Free but Forbidding.") "Yet, as deglaciation occurred, it would have been the corridor region that was first available. I think the corridor region is of intrinsic interest in these respects, and that link would be all the more significant if the Calgary deposits turn out to be on the order of 12,000 to 15,000 years of age," said Ives.

Chlachula offers this advice for anyone wishing to find early evidence of humans in the Americas: "Archaeologists who want to find early American sites must have some knowledge of Quaternary geology and Paleolithic archaeology, and—most of all—must search in deeply buried geological contexts. You are unlikely to find a really early site on, or close to, the present surface."

He also suggests the need for an open mind regarding lithic artifacts: "Looking for sophisticated bifacial flaking patterns is not the right approach to take. That is a narrow view where you are confined by 'Clovis-first' assumptions and the related professional training."

Rutter gives his interpretation of Chlachula's approach: "He's not looking for the oldest early man in North America, he's just looking at the evidence because he's trained that way."

 George Wisner

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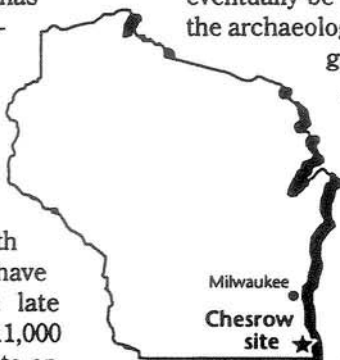
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ICE-AGE WISCONSIN PEOPLE LEFT UNIQUE CULTURAL RECORD

Complex Utilized Elephants, Caribou, Muskox

Investigations accomplished during the last few years have identified a distinct Paleoindian complex on the west side of Lake Michigan. After excavating two revealing sites near Kenosha, Wis., and studying lithic materials from more than 35 other sites nearby, Milwaukee archaeologist David F. Overstreet has proposed the name Chesrow Complex for a cluster of Paleoindian sites that are neither stylistically nor typologically related to Clovis or Folsom. Chesrow, named for a well-studied site at the south edge of Kenosha, seems to have been contemporary with late Clovis and Folsom about 11,000 years ago, although absolute antiquity remains uncertain.



Chesrow-complex sites occur on landscapes of the Lake Michigan lobe of the retreating glacial ice, while Paleoindian complexes related to Clovis and Folsom have been identified a short distance west on landscapes of the Green Bay glacial lobe. Chesrow complex does not contain exotic materials and the bifacially finished tools are highly variable, so much so that Dr. Overstreet initially thought he was seeing evidence of sequential occupations. "But I don't believe that anymore," he said in a recent telephone interview. He believes Chesrow was a relatively short-term occupation. The lithic materials, locally available glacial cobbles, were heat treated. By contrast, Clovis assemblages typically include lithics from distant sources.

The 1994 field season was important for confirming that the Chesrow complex is associated with remains of extinct animals. Overstreet and his colleagues excavated the well-preserved bones of a disarticulated mammoth in direct contact with two stone tools. "The tools are certainly not Clovis. They're much more akin to Chesrow—small bifacial knives made on glacial cobbles—purely local material," says Overstreet, who is president of Great Lakes Archaeological Re-

search Center, a cultural-resource management firm.

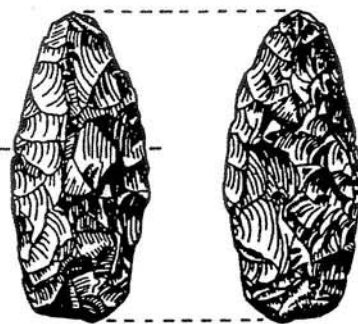
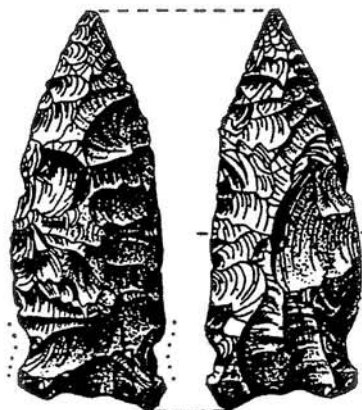
Though excavation of a butchered mammoth site and the delineation of a unique Paleoindian cultural record might seem exciting enough, Overstreet believes that environmental data might eventually be the greatest contribution of the archaeological sites near Lake Michigan in southeast Wisconsin.

Analysis of evidence available or already gathered may eventually shed light on lingering questions about the human role in extinction of mammoths and mastodons.

However, a more basic question, the antiquity of the complex, remains to be settled. "I need to establish a very rigorous program of dating both the faunal remains and the site contexts," he explained, noting that there is little charcoal around in such old sites. Further, radiocarbon dating of bone collagen has been regarded with skepticism. But bone preservation from the sites is excellent and he expects to get several specimens dated by Thomas Stafford at the University of Colorado's Institute of Arctic and Alpine Research. "I've pulled together 14 well-documented specimens of mammoth, mastodon, caribou and muskox, and hopefully I'll get him to date all of it with his protocol," Overstreet said.

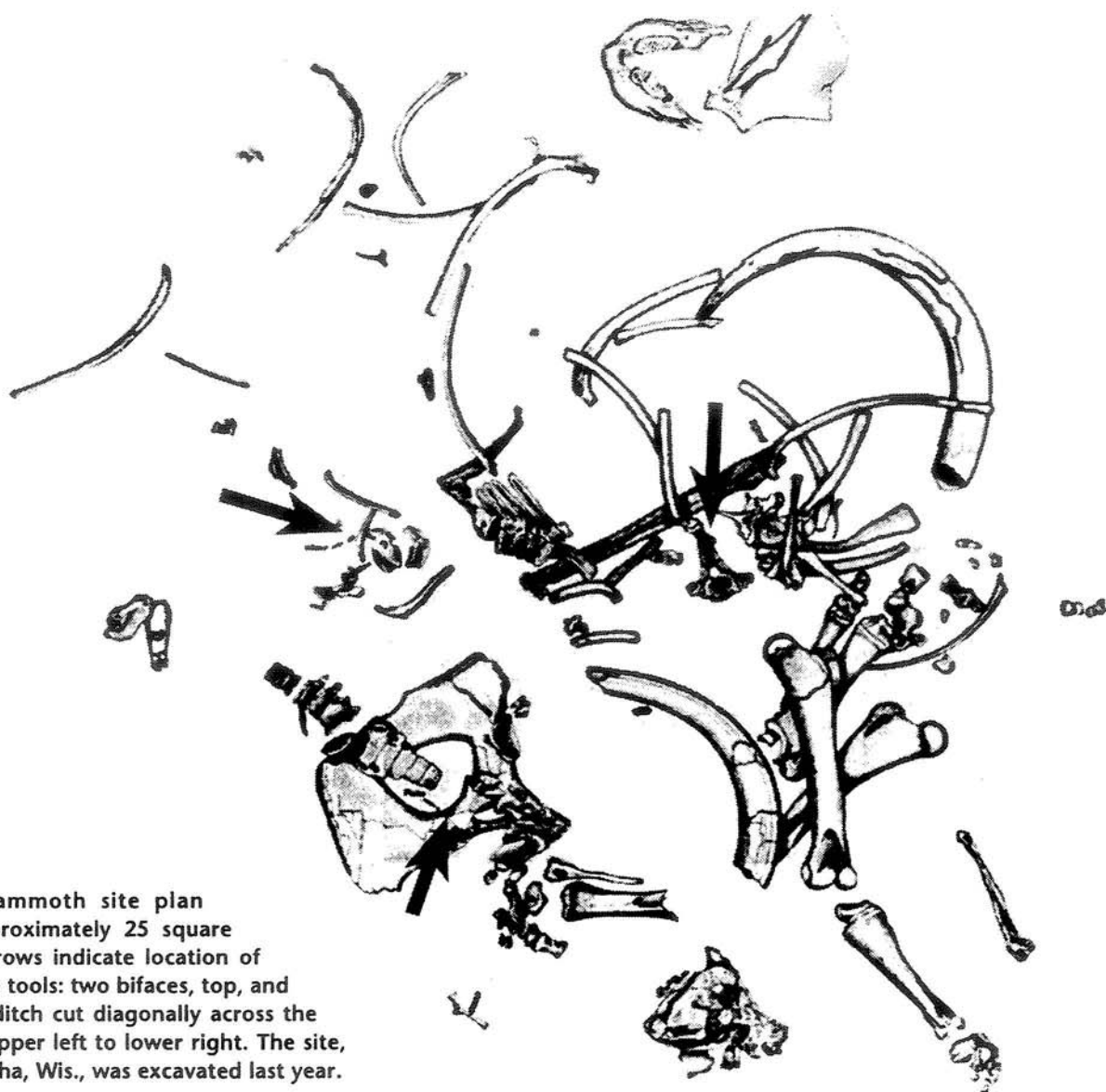
Because preservation of organic matter is so good in the southeastern Wisconsin sites, Overstreet says the locality is extraordinarily well suited to addressing many of the major issues in research relating to the Pleistocene-Holocene transition. However, the drainage and development projects that were responsible for the discovery of several of these sites are probably threatening still-undiscovered sites with deterioration as drying soils allow oxygen to reach buried organic materials.

"I think there's some urgency here," Overstreet said, discussing the cluster of sites in southeastern Wisconsin. He explained that the sites are associated with



A sample of three Chesrow Complex tools (obverse and reverse), approximately 75 percent of actual size, found in Pleasant Prairie Township, Kenosha County, Wis. All were fashioned from local chert and are in private collections.

former glacial and post-glacial lakes that subsequently became wetlands, which were attracting duck hunters until the 1950s and 1960s. Gradually farmers extended their cultivation into the low, wet areas of muck soil by ditching and the installation of drain tile. Their ditching machines chanced upon some of the most spectacular faunal materials yet discovered, including the Schaefer Mammoth (Mammoth Trumpet 8:4 "Mammoth



Hebior Mammoth site plan covers approximately 25 square meters. Arrows indicate location of three stone tools: two bifaces, top, and a flake. A ditch cut diagonally across the site from upper left to lower right. The site, near Kenosha, Wis., was excavated last year.

Kill Dated 10,960") and the Hebior Mammoth, which Overstreet and colleagues recently excavated. Bone and other organic materials in the sites are beginning to be affected by oxygen, says Overstreet.

"I don't know what this holds for 20 years down the line," he adds. Though the archaeology of undisturbed Paleoindian sites is exciting, he believes that the overall picture of the environment at the Pleistocene-Holocene transition may be the most significant contribution of the Chesrow complex sites.

Besides dramatic bones of extinct megamammals, Overstreet points out that the locality offers well-studied stratigraphy and sedimentary deposits that can be correlated over considerable dis-

tances. "And there's wonderful organic preservation. Our excavations have recovered snails, clams, twigs, tree stumps, wood rafted up along former shore lines, insects, pond-weed seeds, needles of at least two species of pine, seeds, nut frag-

*Do the bone piles
indicate active and
systematic hunting?*

ments, spruce cones and other organic remains." He notes that pollen, too, is well preserved in the wet sediments.

Overstreet excavated the Chesrow site in 1986 and subsequently investigated lithic artifacts from several related sites. Chesrow lies alongside Sheridan Road in the village of Pleasant Prairie at the south edge of Kenosha. It is situated atop one of several old glacial-lake beach strands that parallel the present shore of Lake Michigan, which is about a mile to the east. It and other nearby sites have been known to artifact collectors since the beginning of the century. It had been placed on the National Register of Historic Places in 1977, but Overstreet's involvement began in 1985 when the municipality commissioned a study of the proposed right-of-way for a sewer line. His test excavations found undisturbed archaeo-

logical deposits and a Paleoindian fluted point.

After thorough excavations and analysis of material from the Chesrow site, Overstreet was left with the enigma of a Paleoindian occupation that had no obvious local or regional analog. "It flies in the face of conventional wisdom. This stuff doesn't seem to me to be closely related to Clovis, but somebody was hunting elephants in southeast Wisconsin about 11,000 years ago." The Chesrow site revealed undisturbed Paleoindian features including a heat-treating kiln for processing raw material for stone tool manufacture. Less than a mile away at a discovery known as the Lucas site, he found completely undisturbed living floors with hearths, tools and calcined bone. "I hope to go back there again in the next couple of years."

These discoveries prompted three years of study of the region's lake-border moraines and glacial beaches, work partially funded by the National Parks Service through survey and planning grants administered by the State Historical Society of Wisconsin. Overstreet identified about 35 sites or components of Chesrow complex. "From this work I developed a preliminary settlement-subsistence model for the Chesrow complex with two site types: well-drained beach ridges of Glacial Lake Chicago, and so-called interior bog-margin sites in swales of Lake Border moraines."

Overstreet suggests that beach-ridge sites were well situated to allow hunters to take advantage of possible caribou migrations. He notes that the lake shore would have formed a natural barrier to animals moving between summer calving grounds and winter forage areas. The interior sites, he suggests, were well suited to exploitation of regional megafauna. Overstreet notes that Chesrow-complex sites offer the opportunity to test current models of eastern Paleoindian subsistence that hold it unlikely that early people in Eastern North America exploited mammoths and mastodons.

Starting with the Schaefer Mammoth site, the focus of his research has turned more toward considering faunal and other environmental evidence. Schaefer was the first mammoth found in intimate association with stone tool material east of the

Mississippi River. While archaeologists were excavating the Schaefer Mammoth, they learned of another farm-ditching project that had brought up a large bone fragment. That led to the Hebior Mammoth site, where excavation started last April, and concluded in November. With the bones of an adult male mammoth were some flakes, a crude chopper and two chipped-stone knives.

*Chesrow Complex is a cluster of
Paleoindian sites that are neither
stylistically nor typologically related
to Clovis or Folsom.*

Overstreet invited experts from other areas to visit the site while the stone tools were still in place. The mammoth material, he said, "is so tightly associated with bifaces right under the bones that I don't think anybody would argue that they're not contemporaneous." Vance Holliday,

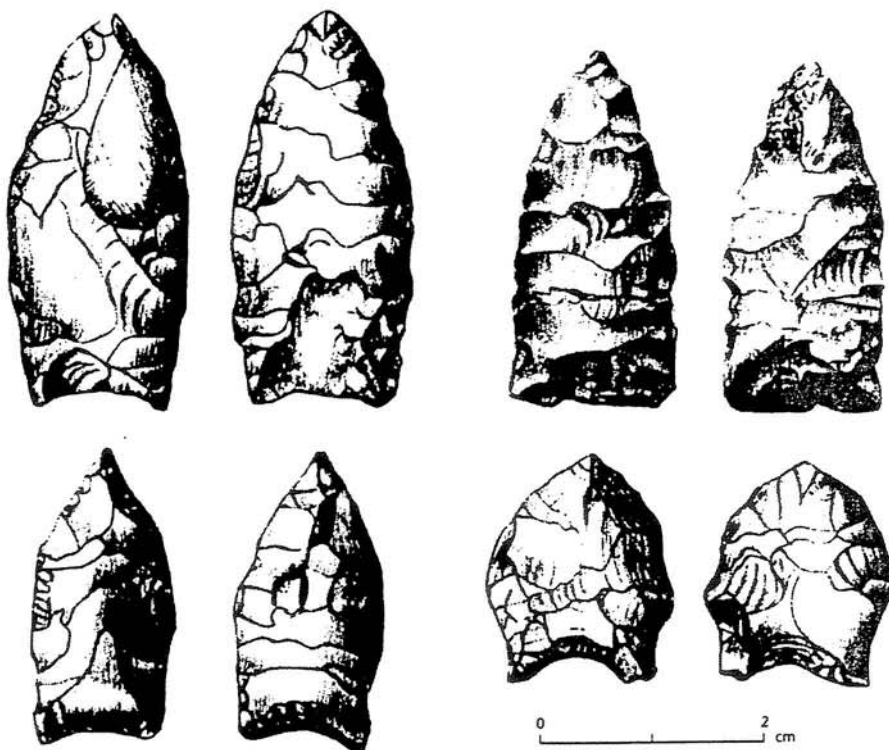
University of Wisconsin stratigraphy expert, and David Meltzer, Paleoindian authority from Southern Methodist University, looked and were convinced, Overstreet said.

The mammoth sites, he said, raise many questions. Do the bone piles indicate active and systematic hunting? Or were the animals scavenged after dying under the stress of climatic transition?

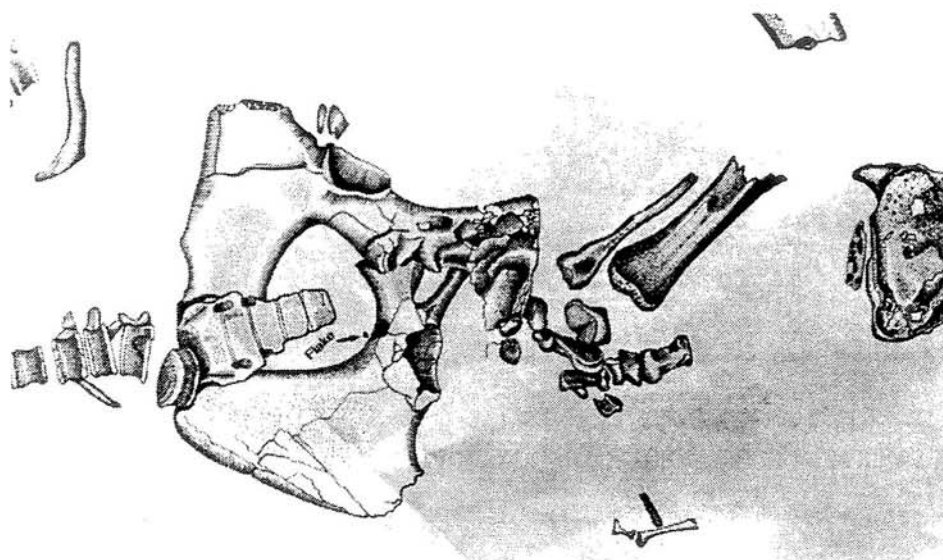
"Resolution of these questions will provide critical information for addressing the potential human role in extinction of mammoths on the North American continent," Overstreet said.

"The archaeology with undisturbed Paleoindian habitation sites and well-preserved megafauna is very exciting," Overstreet says.

"However, I think the well-preserved pollen, plant macrofossils, gastropods and bivalves and insect remains, all in undisturbed sediments, are even more tantalizing. From continued research at this small basin and its associated pond sites, we hope to be able to provide a very comprehensive look at the end of the Ice



Four projectile points (obverse and reverse) of local chert from one part of the Chesrow site near Kenosha, Wis. Chert in the upper left and lower right points had been heat treated.




Detail from plan view drawing of the Hebior Mammoth.

Age, the relationship of human predation to extinction of megafauna, and the climatic conditions under which these events took place."

He noted that Wisconsin's Milwaukee, Racine and Kenosha counties (on Lake Michigan) have been largely overlooked by archaeologists as places to find such data. Now, however, more than 50 sites have been identified as offering important environmental information. "Furthermore, the Ice Age landscape here is very well defined, based on the work of Pleistocene geologists." He cited Alan Schneider and Ardeth Hansel as geologists who have contributed important characterizations of the landscape. "We

need now to integrate the vast amount of data at hand and to bring together the numerous specialists from several disciplines to accurately portray the Ice Age ecology," Overstreet said.

"Continued research will allow for a fine-tuned assessment of climatic changes at the end of the Ice Age in this locality, a detailed reconstruction of Paleoindian lifeways, information relevant to the mammoth-extinction debate, a detailed record of vegetational history, and a well-anchored understanding of the paleoecology of the southwestern Lake Michigan Basin between approximately 13,000 and 9,000 years B.P." 

—Don Alan Hall

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COMING CONFERENCES

March 23–25 Northwest Anthropology Conference, Portland, OR.

Contact: Ken Ames or Virginia Butler, Department of Anthropology, Portland State University, P.O. Box 751, Portland OR 97207.

March 29–April 1 64th Annual Meeting, American Association of Physical Anthropologists, Oakland.

Contact: Robert Jurmain, Anthropology, San Jose State University, San Jose CA 95192.

April 2–5 35th Annual Meeting, Northeast Anthropological Association, Lake Placid, NY.

April 9–11 Annual meeting of the Society for California Archaeology, Eureka, CA.

Contact: Breck Parkman, California Department of Parks and Recreation, 20 East Spain St., Sonoma, CA 95476; 707-983-1519.

April 19–21 Annual Meeting, Southern Anthropological Society, Raleigh, NC.

Contact: Kate Young, Anthropology/Sociology Department, North Carolina State University, P.O. Box 8107, Raleigh NC 27695-8107; 919-929-6306, e-mail young@server.sasw.ncsu.edu

April 26–30 Cultural Significance of Wetland Archaeology, Vancouver, British Columbia.

Contact: Kathryn Bernick, UBC Museum of Anthropology, 6393 N.W. Marine Drive, Vancouver BC, Canada V6T-1Z2 604-822-6530, FAX 604-822-2974.

May 3–7 Annual Meeting, Society for American Archaeology, Minneapolis.

Contact: SAA, 900 2nd St. NE #12, Washington, D.C.; 202-789-8200, FAX 202-789-0284.


May 17–19 Joint Annual Meeting Geological Association of Canada-Mineralogical Association of Canada, Victoria, British Columbia.

Contact: Chris Barnes, SEOS, University of Victoria, P.O. Box 1700, Victoria BC, Canada V8W 2Y2; FAX 604-721-6200.

Aug. 3–10 XIV INQUA Congress, Berlin, Germany.

Contact: National Academy of Sciences, 2101 Constitution Ave. NW, Washington, D.C., 20418; 202-334-2744.

Sept. 15–16 Durango Conference on Southwest Archaeology, Durango, CO.

Contact: Phil Duke, Dept. of Anthropology, Fort Lewis College, Durango, CO 81301. 303-247-7346. 



THE BIOTECH ERA has reached the shores of archaeology. Just as biotechnology provides information and services to scientists, forensic labs, farmers, and others, a paleo-tech nexus is arising to provide information and services to archaeologists and paleontologists. The idea of catching DNA and other molecules in their original "time trap" is certainly alluring.

As a paleo-tech prelude, consider the case of Bruce Hardy, a former student of Nicholas Toth at Indiana University. Dr. Hardy's postdoctoral plans include developing a paleo-tech lab in the Indiana Institute for Molecular and Cellular Biology. Dr. Rudolf Raff, the director of this institute, is interested in fostering interdisciplinary work between molecular biology and anthropology at Bloomington.

In a telephone interview, Hardy said that he will first study DNA extracted from blood residues on stone tools and flakes from a Neanderthal site in France. The object of this work is to determine the particular uses of various tools found at the site. The site contains a large bone midden. By studying the blood residues on tools, Hardy hopes to identify the species of animal associated with various tool types. Except for auroch (European bison) bones, all bones in the site's midden are from extant species, so DNA reference information on living animals can be compared with DNA information gleaned from the tools.

Taking another approach, a group at Oregon State University is studying the DNA relationships among living and prehistoric elephant species. It all started with the discovery of mastodon remains by a **Center for the Study of the First Americans** team led by Director Robson Bonnichsen. The find, dating to about 12,000 years ago, was made at a farm-pond excavation in Kings Valley, about 10 miles northwest of Corvallis, Ore. The Oregon State team of Dr. Walt Ream, Dr. Kate Field, and Curtis Best, a student, has analyzed a 307-base-pair stretch of DNA extracted from one of the mastodon's vertebrae. In comparing this DNA with that of an African elephant, they found only five differences. Now they are in the process of comparing these findings with the DNA extracted from mammoth bones and from a living Asian elephant. An important point is that this work is being performed in several separate lab rooms, in order to avoid cross-contamination of DNA from one test species to another. In cases where two samples of DNA are quite similar (for example, human No. 1 vs. human No. 2, or African elephant vs. mastodon), the question, "How do you do the analysis?" must be answered in part, "Very carefully."

Possibly others will follow the lead of these and other pioneers, setting up their own labs, either inside or outside universities. While the long-term significance for archaeology of such a start-up industry remains unclear, a few questions can be explored that may be useful in monitoring future developments.

Assuming that the cost of paleo-tech lab work will be within

the reach of archaeologists and that the quantity of ancient biological material will be sufficient for testing—assumptions that may be unwarranted—two concerns loom large: accuracy and reliability.

Accuracy and Authenticity

Taking DNA as a "test case" of ancient materials, one issue is how accurate any paleo-tech lab can be in obtaining DNA information, given the intrinsic limits to DNA technology. Under the

most favorable circumstances, biotech labs that sequence DNA from fresh tissue samples obtained under sterile conditions do make sequencing errors. Reputable labs cannot always agree, even when testing the same tissue sample under look-alike conditions. Errors may creep

into the final data as a result of prior contamination with extraneous DNA, by the use of contaminated reagents or faulty chemical conditions, by the error-prone action of certain enzymes, or even by computer-assisted clerical mistakes in constructing DNA sequences.

Analysis of ancient DNA poses these same technical problems, plus others. Ancient DNA is usually degraded. This is true for old tissue (whether soft or hard) and also for blood residues found on items of material culture in an archaeological context. It is often contaminated by contact with other organisms. In addition, modern handlers of archaeological items can contaminate ancient human DNA with their own DNA (on hands, in hair, on glassware, etc.). In the recent "Ice Man" study (See **Handt in Suggested Readings**), the DNA of at least two handlers was proved to have contaminated the ancient sample.

Two conclusions arise from these considerations. First, authenticating the "ancientness" of human DNA seems to require constant vigilance. Second, analysis of any kind of ancient DNA is more technically challenging than sample analysis in a blood bank.

Hardy's work protocol suggests how quality control can be maximized. First, in the excavation of the French site rubber gloves were worn and samples were entombed in plastic bags until time for DNA extraction. Second, the DNA work is being performed in a laboratory not previously used for vertebrate DNA analysis, thereby precluding cross contamination of Hardy's DNA samples. Third, blood residues are being multiply tested for DNA data. Fourth, when feasible, residues will be sent to another lab for independent analysis. Also, Hardy collected tools in France in their soil matrix. The adhering soil is to be separately analyzed in parallel with the tool analysis. The purpose of this test is to determine if DNA found on a tool surface is a primary or secondary deposit, since animal blood soaked into the ground at the site could have accidentally adhered to tools.

Despite these "devils in the details," much good news does exist. Techniques for DNA analysis are evolving rapidly, hinting

DNA Labs Bring Biotech Era to Archaeology




the Novel Approach



CUES ASSEMBLED BY ARCHAEOLOGISTS allow us to visualize many features of prehistoric peoples' lives. We can study about the tools and physical features of ancient people, and we can learn about their environment and food resources, but we can never really know them. Scientists do create models of prehistoric life from studies of contemporary non-industrial cultures, yet science necessarily puts limits on inventiveness. Novelists, free from science's constraints, combine known facts with theories and their own vivid imaginations to provide detailed ideas of how people lived, how they thought about their world, and how they related to other people.

With this issue, we begin a renewed examination of the novelist's role in the understanding of prehistory (See "Jean Auel's Novel Slant on the Past,"

Mammoth Trumpet 2:3 and 2:4) with interviews of two popular writers, Sue Harrison and Linda Lay Shuler. Though they write of very different peoples and their writing styles are quite dissimilar, these writers are alike in that they capture our imagination and make us feel as if we are living in the time and place of their characters. "Prehistoric novels," as such fiction is often termed, are not to be taken as truth about past peoples, but by their descriptions of times and places and by their stories of how people grappled with life, novelists help scientists articulate and test their ideas. Further, by presenting people of the past as interesting and complex humans with significant achievements, they educate readers about the importance of preserving prehistoric sites and investigating the data they provide. Because novels focus on life's basics--survival, procreation, conflict, and resolution--they compel us to consider peoples holistically. One can't read the works of Jean Auel, Sue Harrison or Linda Lay Shuler without gaining an understanding that human groups are dynamic. Human biologists can explain gene flow and population expansion, but novelists illustrate it with details of social interaction, intermarriage, travel, and conflict. Archaeologists can outline the movements of materials and techniques, but novelists bring these aspects to life with stories of subsistence, creativity, and trading trips.

Though authors have multiple goals, they offer the basic message of explaining how people maintained their unity as a species and why we're all so much alike. 


at more improvements to come. Further, studies of ancient DNA, such as one published in 1993 by Svante Pääbo, have already provided novel and fascinating information. Other studies (see **Suggested Readings**) have revealed genetic affinities of ancient Polynesians both to Melanesians and to Asians, the close relationship of the ancient quagga to Burchell's zebra, and the affinity of "Ice Man" to today's Europeans. Also, F. A. Kaestle has described differences between the 2,200-year-old Carson Stillwater human remains in Nevada and descendants of Numic-speaking peoples who later expanded from California into the Great Basin.

Reliability and Reliance

Assuming that the level of paleo-tech lab

accuracy becomes acceptable to the archaeological community, a further question is whether the results are reproducible. One way to minimize skepticism about results on ancient materials is to perform "double-blind" tests, such as by testing subsamples in two or more separate labs (and hoping for matching results). As for ordinary biotech work, equivalency between paleo-tech testing labs is a worthwhile goal. This goal also encourages meticulous research environments (standardization of protocols, etc.) in labs.

In considering the level of confidence that archaeologists will come to place on DNA findings, the human propensity to make false or fuzzy assumptions should not be underrated. In a letter to *Science* in 1992, Steven Austad pointed out that

people (and courts) tend to accept eyewitness evidence, as well as the claims of dog trainers that their animals can connect suspects with material evidence of a crime. Estimates of reliability for such evidence, based on controlled studies, are usually ignored. In these and other areas (fingerprinting, for example), no standardized, quantitative criteria exist for accepting or rejecting submitted evidence. Given this situation, the results provided to the archaeological community by paleo-tech labs may be accepted by some and questioned by others. These disagreements might be minimized by establishing criteria early on as to the probative value of test results from the labs. Perhaps relevant professional societies will act to set standards. 

-Dee Baer



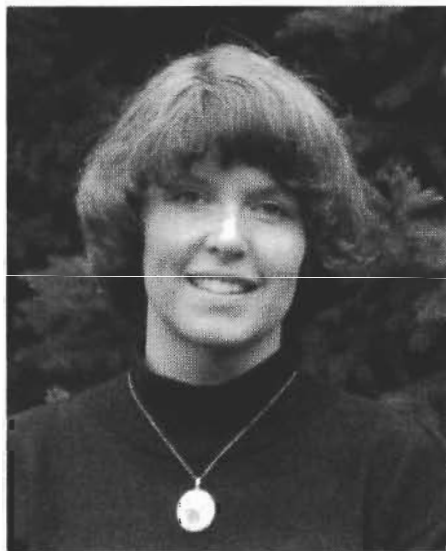
NEIL HARRISON

On windswept St. Paul Island in the Bering Sea, Sue Harrison scrambles over the remains of an Aleut *barabara*, a sod house.

Sue Harrison: Seeking Roots in the Americas

NOVELIST SUE HARRISON may have made more people think about American cultures of 9,000 years ago than all the archaeologists, prehistorians, and anthropologists who have ever lived. Her third book, *Brother Wind*, which completes her "Ivory Carver Trilogy," came out in October. It followed on the successes of *Mother Earth Father Sky*, published in 1990, and *My Sister the Moon*, two years later. Her publisher started with an initial printing of 65,000 hardback copies, and her success has continued from there. But she is anything but smug about her achievements and is quick to credit the scientists who have provided her with the extensive background she uses in her stories.

"I am very indebted to anthropologists and archaeologists and to their research, and I am in awe of their knowledge and their discoveries and techniques," she said in a recent telephone interview from her home in Pickford, Mich.



NEIL HARRISON

Though her critically acclaimed books have experienced rapid success, Harrison devoted at least 15 years to becoming a novelist, and her research continues. Working largely on her own, she achieved what one might regard as

graduate degrees in the subjects necessary to detail the hypothetical lives of people migrating along the Pacific fringe of North America at the end of the Ice Age. Beginning from a basis of the few empirical elements that scientists have reported, she fills in the full spectrum of humanity thoughtfully extrapolated from the knowledge of peoples in other times or places. She conducted most of her research herself while living in the wooded and relatively remote eastern end of Michigan's upper peninsula with her husband, a computer expert, and their two children.

Harrison always thought of herself as a writer, a calling her parents and teachers encouraged. As a young adult she knew she wanted to write novels, so she had to find a subject to write about. "A large percentage of our population in the eastern upper peninsula of Michigan is Native American," she said, and that society seemed a logical choice.

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Linda Lay Shuler: **Exploring the Invisible**

"How can one measure accurately the feeling of an artist who created an artifact, or truly know why he created it?" asks Linda Lay Shuler, author of the best-selling novels *She Who Remembers* and *Voice of the Eagle*. "How may scientists examine and explore the invisible?"

Shuler is explicit in answering her rhetorical questions:

"This is the novelist's responsibility."

Replying to questions regarding the correlation of science and art in comprehending prehistoric Americans, Shuler told the **Mammoth Trumpet** that novelists can tread paths that are off limits to scientists. "Because scientists must, by nature of their profession, be factual above all, it follows that emotional aspects may be disregarded."

Linda Lay Shuler has been acclaimed a master of recreating the spirituality and emotions of prehistoric Native Americans. *She Who Remembers*, the first novel of "The Time Circle Quartet," examines the dilemma faced by the enigmatic cliff-dwelling peoples of the American Southwest more than 700 years ago. How did the Anasazi react when their most sincere, devoted ceremonies of worship failed to bring rain? How would a powerful, proud community that builds a cliff city in the domain of eagles cope with decline and collapse of the natural order?

Physical evidence leaves an unambiguous empirical framework, but beyond that is only mystery. Archaeologists and other scientists must hypothesize if they wish to follow prehistoric peoples' lives from empirical results to causes, motives and responses. When reaching into their knowledge of human nature to formulate working hypotheses, scientists enter the world of the novelist. And the subject may not be anything so momentous as the abandonment of a beautiful city; more often the physical evidence they consider is a single stone tool, carefully made but lost long before it wore out. Why?

Was it stashed and forgotten by its maker? Was it lost when its maker was slain by an enemy? Or a predator? Perhaps it was



Novelist Linda Lay Shuler at her home in Brownwood, Texas.

traded to a shaman who hid it during a ceremony. It could have fallen into the hands of people quite foreign and hostile to its maker. By analyzing the tool and the area where it was discovered, scientists may learn where the tool was made, ascertain the location of the source material and make an estimate of its age, yet in a sense, every archaeological discovery is a potential novel.

Shuler's novels contain the stories of individual artifacts as

well as whole cities, and each has its place in her story. Her characters visit the Alibates flint quarries (in the Texas Panhandle northeast of Lubbock) and trade for the colorful, widely valued tool material. In spare time, men in her books work on lithic tools. Scientists expert in lithic technology can describe the steps of tool making and note how an ancient tool maker reorganized his strategy in response to the results of each blow of his hammerstone. With like material a skilled worker can make a reasonable facsimile of the original artifact; a scientist can analyze his actions and study the results, but can only guess at his emotions such as pride in workmanship. (Tool makers are usually assumed to have been men, and Shuler's heroine is told that the flint quarries are off limits to women, but a novel set in another time and place might well present a society where women do the mining and flint knapping.)

Shuler says that whether building cliff-top cities, creating useful tools, or fashioning beautiful jewelry, the work demanded real intelligence, often more than is generally granted to prehistoric people.

"I believe that most people, not only scientists, tend to underestimate the intelligence and accomplishments of ancient peoples," she says, and quotes Pablo Neruda, the late Chilean poet, who wrote in his *Heights of Machu Picchu*: "There beats within me a bird/Imprisoned for a thousand years;/The old and unremembered human heart."

"As for people of today," Shuler asks, "who are we but descendants of ancient ones? The blood remembers."

She believes that novelists can help scientists attract Native American children to explore and appreciate their own culture. "I think this is needed." She suggests that the scientific commu-

nity should encourage writers to help involve Native Americans in archaeology, anthropology and related sciences. "Writers specializing in children's books would be the most interested," she says, adding that some kind of financial inducement would help.

Before she turned to writing fiction, Shuler operated Shuler Productions, a radio, film and television production company based in Dallas. She was a researcher, writer, director, and producer until her husband retired. They sold their home in Dallas and moved to Brownwood, a city of 18,000 in the geographical center of Texas, and she began to realize her lifelong ambition of writing novels. The roots of that desire go back to

her childhood in Los Angeles where a bout with pneumonia led to her discovery of the magic in poetry.

"That was before antibiotics, so I was in bed for quite a while," she explains. During her illness she was given a copy of *Verses of Our Day*, a book which proved a

revelation. "I was thrilled to the bone by Carl Sandburg's poetry, especially 'Fog comes on little cat feet. . . .' Later I wrote him a fan letter and received a nice note of thanks, which I still possess and treasure."

Though at that time she had no thoughts about prehistoric people, she knew she wanted to be a writer. With each of her homework assignments she tried to give her teachers some kind of a story. "I got A's, which encouraged me," she recalls.

"Carl Sandburg influenced me the most in his imagery and lean prose. I read everything I could get my hands on, but I do not recall being influenced by any other writer in particular; I soaked up all of them."

Asked if she considers herself a novelist or a storyteller,

*"We are, indeed, of the same genes
that marveled at the first mastery of fire
or gazed in awed wonder at the moon."*

Perils, Sacred Responsibilities

In the first novel of "The Time Circle Quartet," the young heroine Kwani is chosen "She Who Remembers," a responsibility handed down from generation to generation to assure that lore vital to Anasazi, and to all womankind, will not be lost. It will be Kwani's duty to teach crucial lessons she learned from the Old One to young girls, one of whom she must eventually choose as the next She Who Remembers.

Because of her responsibility, Kwani is "one with the Ancient Ones, all who were She Who Remembers before," and to remind her of her obligation, she wears a sacred necklace, "the talisman of all those before her." This necklace, featuring a pendant of scallop shell inlaid with turquoise in a mystical design, links the heroine with the past and provides her with what she regards as supernatural strength. It also links the four volumes of "The Time Circle Quartet."

Seeking an explanation for the drought that threatens to force them from their citadel, Kwani's people accuse her of

witchcraft. As *She Who Remembers*, Kwani is different; moreover, she has blue eyes—highly unusual. Eventually she is driven away, but a Toltec nobleman turned trader, none other than the legendary Kokopelli, takes her as a temporary mate, and their survival and adventures take them far—and to the conclusion of *She Who Remembers*, the first book of the trilogy. *Voice of the Eagle*, the second volume, begins with the birth of Kwani's Anasazi son and the miraculous vision of the white buffalo. The heroine's adventures with a new mate take many unexpected twists as they return to his Pecos Pueblo home. Shuler is finishing the third volume and planning the fourth.

Linda Lay Shuler provides vivid details of pueblo life. Her characters are deeply religious; she presents spirituality not merely as ambience but as a determining element of the story because it is such an integral part of her characters' lives.

—DAH

Shuler replies: "I try to be a storyteller in novel format. I think that a novelist, per se, is one who fits a story into a certain pattern that novels require, whereas a storyteller just lets the story roll, come what may." And her stories do take the reader on a whirl of color and intensity. She holds nothing back: her scenes are dramatic, often powerfully so. (In the opening pages of her second book there's a desperate search for a man's head severed in a fight, an encounter with the sacred White Buffalo, and the heroine giving birth alone in a strange rockshelter.) Shuler presents 13th-century life in the Southwest that is vividly real in both its beauty and its earthy detail. Drama obviously comes naturally to her.

Although her men dominate the society's religious/governmental hierarchy, Shuler's women and their own hierarchy are a strong force; they choose mates, sometimes for temporary amusement.

"The idea for *She Who Remembers*, my first book, was born at Mesa Verde," she says. "I visited there three times—and got the vibes. Writers will understand what I mean. Subsequent books are continuations of the original story. The events shaping the lives of my characters are determined by research first, to be authentic, and then by entering the mind of each character—pretending to be that person, doing and saying what I think that person would do and say." She discovered Kokopelli, a fertility figure immortalized on cliff walls, in the Mesa Verde museum and developed him into a character of her first book. Though he doesn't appear in the second or third books, he remains an important behind-the-scenes figure. Because of the popularity of *She Who Remembers*, Kokopelli has become something of a cult figure with replicas of his figure appearing in many forms. Shuler has a mug from Germany with his picture on it, and she hears that a restaurant has been named for him.

She emphasizes the importance of the research and of knowing as much as possible of the time and places, so her experience as a researcher serves her well. "I needed, and am tremendously grateful to those archaeologists, anthropologists and others who advised me generously, and still do." Among those she acknowledges for scientific help are Curtis Schaafsma of the Laboratory of Anthropology in Santa Fe, and others including J. Richard Ambler, James A. Brown, W. W. Newcomb, and Dennis Peterson.

"In approaching research, I keep in mind that I am a novelist, period, and I try to find the most knowledgeable people in the discipline I'm interested in. I simply tell them what I must learn, and ask for help. Never have I been refused." Shuler herself has not been involved with archaeological or ethnographic projects.


Working with her husband to pay the bills and raising four children (now grown) there was never time for academic or volunteer field work. "Now that bills are no longer a problem, I find myself up to here trying to meet a deadline on my third book, and planning the next."

Shuler appreciates the need for careful archaeological research and knows the toll taken by irresponsible artifact collecting. "The project I am working on now is difficult because the site, Spiro Mounds in eastern Oklahoma, was crudely raped by pot hunters and much was lost that would reveal the culture of these remarkable people." So for her latest book, *Let the Drum Speak*, she is relying on research that has been done on the mound builders of the Mississippian culture. "However, I am fortunate to have as an advisor Dennis Peterson, manager of Spiro Mounds Archaeological Park. He is knowledgeable and generous with assistance."

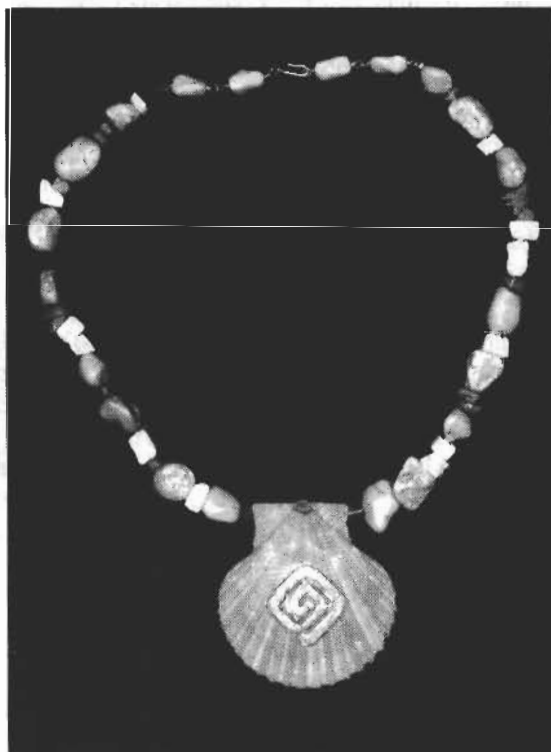
Truth, she finds, "often is, indeed, stranger than fiction, and I discover priceless bits I could never dream up." For example, in an old book from a local library she found a reference to the Swimmer Manuscript. "Swimmer Manuscript? I never heard of it. So I asked the librarian to locate a copy for me. It turned out to be a gem, an account by a Cherokee medicine chief in which he explains reasons for various illnesses, and lists the methods of cure." As a result, a character in her new novel is a medicine chief.

Artifacts have been important in Shuler's research and in the creation of her stories. "When I was at Mesa Verde researching in the museum, I saw a necklace displayed that impressed me tremendously." This necklace became that of *She Who Remembers*, and is a unifying device between the books. Curiously, when she returned to the Mesa Verde museum to photograph the original article it was no longer on display. "No one could tell me where it was, so I recreated it from memory." Now, the author can wear a replication of Kwani's sacred talisman. As a Christmas gift, one of her daughters commissioned jewelers to recreate the necklace according to her descriptions.

"I would like people to remember me as a novelist who has entertained and enlightened them, and one who has touched them emotionally. I think a truly creative person can and should be creative in more than one medium, so writing novels and writing and producing radio and TV programs were related.

"I hope that I, as a novelist, enable my readers to relate to the Ancient Ones, and to realize that we are, indeed, of the same genes that marveled at the first mastery of fire or gazed in awed wonder at the moon." 

—Don Alan Hall



Following descriptions in the novel, jewelers recreated the necklace of *She Who Remembers* as a gift for the author.



Sue Harrison

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"About that time I read Alex Haley's book, *Roots*, and I decided I would like to write a "Roots" of Native Americans. We were raised in a wilderness, basically, so I knew a lot about the woods and survival skills, and I thought I'd obviously be building on an area that I knew something about." Harrison's research soon became something of a personal quest for the First Americans. "I realized that if I really wanted to write about the roots of Native Americans, I couldn't start in Michigan—I had to start in Alaska. I would have preferred to start in Siberia, but in those days there was no hope of getting to Siberia."

In fact, research about early people anywhere would prove difficult. "My husband and I were poor and we had children three and five years old." Travel to distant archaeological sites was out of the question, and there was no possibility of volunteer field work. Even library work was difficult. "I'm 300 miles away from any large library, so I had to use either inter-library lending or borrow from people who had resources. So I really spent a lot of time finding what I was looking for. I

had to find the names of books I needed and then go to a local library and use their lending program." As luck would have it, she was introduced to an Aleut man whose mother had been a librarian on the Alaska Peninsula, and that contact resulted in access to many books that she couldn't have learned about otherwise.

Early in the process of studying about the peoples of Alaska and their past, she came across the work of William Laughlin (now professor emeritus at the University of Connecticut), who has excavated sites in the Aleutian Islands and described the physical and cultural aspects of early peoples there. From Dr. Laughlin, Harrison learned that the first Aleuts settled the islands about 9,000 years ago—possibly longer. "This just fascinated me," Harrison said. "The more I studied about the Aleut people, the more I fell in love with them



NEIL HARRISON

During a visit last September to a classroom on St. Paul Island, Alaska, Sue Harrison gets a lesson in the Aleut language.

and their culture. So I chose to write about them."

But before the writing came much more research. "The ancient Aleut culture was something so different from what I knew and had experienced in my own life." And of course it also was very different from life among today's popula-

ADVENTURES 9000 YEARS AGO

Mother Earth Father Sky, the first book of "The Ivory Carver Trilogy," opens on a small island in the Aleutian chain as a young girl returns from picking berries to find that an enemy group has slaughtered everyone in her tiny village except her baby brother. Survival skills are not a novelty for the girl, called Chagak, an Aleut word for obsidian or cedar wood, because she has observed and helped her family procure food, make and repair clothing and maintain and use skin boats. The story follows her trip to another island where she finds an old man who, in addition to being expert at survival skills, is also a talented carver who creates depictions of the animals and people of their world from bone, wood, and ivory. The human inhabitants of that world consist of Chagak's

group, the First Men, and other groups, the Whale Hunters, Walrus People, and Short Ones.

Harrison's deeply personal portrayals of the people are consistent with a variety of scenarios for the initial peopling of the Americas. Her characters could be models of people who entered the New World from Asia by way of the Pacific Rim more than 20,000 years ago, or they could be seen as people whose forebears crossed the Bering land bridge 12,000 years ago. The cultures serving as her models include Aleuts, Inuits, various other Native American groups, and some Asian cultures.

On the presumption that big-game hunting groups probably were male-dominated, the farther Harrison's fictional groups live from the mainland (where

their forebears presumably hunted mammoths, caribou and the like), the less the degree of male dominance. As a contrast to Chagak's society, in which women are totally deferential and obedient, the trilogy also presents a related whale-hunting group in which women, vital in butchering and rendering beached whales, experience more equality.

The second and third books of the first trilogy follow the fortunes of Chagak's son and his beloved, a young woman who endures endless abuse, and several other characters. Currently Harrison is outlining "The Storyteller Trilogy," which begins 500 years later when the original characters and events have passed into legend.

—DAH



tions of native Alaskan peoples. Gradually, however, Harrison established for herself a body of information that would be the basis for her stories.

"These ideas are colored by my opinions and could be wrong," she says. "I tried very hard to base everything on serious study, but another person could make the exact same study and come up with a different conclusion." In that respect she is no different from workers in many of the sciences. "As a reader, you have to suspend disbelief and say, 'OK, in this case I'm going to allow Sue Harrison to carry me into the world she envisions from her studies.' That's where you diverge from the scientific basis or foundation into the world of art."

Archaeological records provided her with little direct evidence except some lithic materials and shells on which to base her fictional societies. The volcanic soil did not preserve any evidence of the clothing or boats of the earliest people—not even pollen is preserved. The one relative certainty is the unifacially knapped stone blades her characters employ. From known lithic assemblages, Harrison has created an assortment of commonplace tools and utensils that serve a broad human array of purposes. They facilitate procuring food and fuel oil from large sea mammals, treating skins for warmth, creating clothing, and carving art objects, and they're used as trade goods. Occasionally lithic tools are used for self-defense, murder and even sexual abuse. When greeting a stranger, a man in a Harrison novel says "I am a friend. I have no knife."

Though the early unifaces of the Aleutian Islands and Alaska Peninsula may seem rather crude if compared with bifacially knapped tools in use at the time elsewhere in the Americas, they're refined instruments in the hands of Harrison's characters. Often hafted and mounted in various ways, they're a fundamental part of life, as are the bone, hide and wooden artifacts they help create. Her hunters may have the largest and most deadly lithic tools, but Harrison's most submissive and servile women possess "women's knives," which they use deftly in preparing food, clothing and shelter.

"I had the choice—either make up



Harrison did not get to visit coastal Alaska, the setting of her first three novels, until after she had spent years of study and writing.

what I thought they would do or use the earliest-known artifacts. And I decided to use, with minor modifications, the clothing that the Aleut people were wearing in the 1740s when the Russians first came upon those islands." Physical anthropology studies done by Laughlin of burials from that period of contact provided her with ideas about the stature and strength of the people. In one scene, a character accidentally discovers a secret of his own ancestry when investigating the burial chamber of a deserted village.

Because island people need boats, Harrison provides them with seaworthy craft of oil-treated hides stitched onto wooden frames and ballasted with stones.

"Spiritual beliefs and fears sometimes motivate people to act in ways that don't seem to make a lot of sense to their survival and personal comfort."

Hunters are protected from the icy sea with well-oiled garments fashioned from entrails of sea or land mammals. Her characters seem to utilize everything available: stomachs and bladders hold oil or dried food; grasses and other fibers are woven into objects ranging from waterproof baskets to partitions that provide some privacy in the people's semi-subterranean homes. Regardless of whether her domestic details reflect exactly the way people lived 9,000 years ago, they're plausible and she does not let them intrude into her stories.

Harrison doesn't apologize for assuming people of the Paleoindian period were as clever as people today. "I truly believe that people in those days were every bit as intelligent as we are," she says. "They didn't have as much knowledge in various areas, but in natural things and survival skills they had more knowledge. Their knowledge of how animals live and their ideas about the spiritual world were very well thought out. They were very intelligent. Otherwise they wouldn't have survived."

She cites language as proof of ancient peoples' intelligence. "Languages are extremely complex," she says, and to master languages by two years of age, as people seem to do, implies considerable intelligence. Thus she makes no apologies for creating characters whose concerns and emotions may have parallels among those of her readers. And though people today may be relatively good models for prehistoric people, Harrison notes a major difference: "The average age of people in prehistoric populations—actually from the Middle Ages on back—was much younger than our average age nowadays."

Harrison's young-adult audience undoubtedly relates to the characters, who though barely adolescent, are frequently faced with wholly unprecedented crises they must endure by their own wits and with whatever spiritual traditions they can recall. Although she's reluctant to say so, she suggests that a younger, less-experienced population may necessarily be a crueler one.

At a time when people had no explanations for the earthquakes, volcanic eruptions, and tidal waves that still afflict their region, and none for seasonal progressions except that experience dictated that they were cyclical, Harrison is sure spirituality was important. Her characters worship the nearest volcano, and their elaborate rituals and customs regarding hunting touch almost every phase of life. Characters often attribute good ideas and intuitions to friendly spirits such as those of sea otters. She says her own Christian faith makes her comfortable with spiritual issues, though she says she has been criticized for her matter-of-fact portrayal of shamanism, which she sees as a natural result of people's fears.

"It's important for scientists and all of us who are interested in ancient civilizations to realize that spiritual beliefs and fears sometimes motivate people to act in ways that don't seem to make a lot of sense to their survival and personal comfort," she said. Novelists, she suggests, have a real advantage over scientists when it comes to considering spirituality of prehistoric peoples because beyond the observation of objects assumed to have had spiritual significance, interpretation necessarily involves speculation.

Harrison sees a definite difference between the novelist and the storyteller. "I've tried to combine the two. A storyteller in the traditional sense is an actor or an actress. They tell the story orally and the theater arts play a great deal in their effectiveness. You're limited, dimensionally, when you're working as a novelist, because your words are black and white on a two-dimensional page." She incorporates some Native American storytelling techniques into her novels. Names, for example, reflect people's attributes. She has also used rhythm of Native languages in her writing. Each new book also incorporates an excerpt from the last book, because that is the way of traditional storytellers. "And I've also tried to incorporate within each novel a deeper thematic meaning that goes beyond the story."


Harrison has been gratified by the success of her novels. After *Mother Earth*, *Father Sky* was published, she and her husband were at last able to visit the Alaska Peninsula and the Aleutian Islands. "That was such a treat, and such a relief," she recalls. Though she knew the color of

New Books

The First Discovery of America: Archaeological Evidence of the Early Inhabitants of the Ohio Area William S. Dancey, editor. ix + 212 8½-by-11-inch pages. \$24.95 (paperback). The Ohio Archaeological Council, Columbus.

This book contains 12 papers presented in late November 1992 at The First Discovery of America: A conference on Ohio's Earliest Inhabitants. The chapters are grouped into four sections: Environmental Background, Paleoindian Studies, Early Archaic Studies, and Projectile Point Studies. "This book contains recently acquired archaeological data examined in original ways to kindle a rebirth of interest in research on the early inhabitants of Ohio between approximately 11,000 and 8,000 B.P.," editor Dancey, who is Associate Professor of Anthropology at The Ohio State University, says in the introduction.

The work of 22 contributors, some well known to **Mammoth Trumpet** readers, is included. For example, David S. Brose of the Royal Ontario Museum describes archaeological investigations at the Paleo Crossing site, which has been confidently dated to 10,980 years B.P. In another chapter, Kenneth B. Tankersley of State University of New York, Brockport, examines the question of whether Clovis was a colonizing population. He argues that it was, but he notes that he does not conclude that it represented the first peopling of the continent. Curtis H. Tomak of the Indiana Department of Transportation describes the Alton Paleoindian site in Perry County, Ind., and Mark F. Seeman, Garry Summers, Elaine Dowd and Larry Morris compare fluted points from three of the largest Early Paleoindian sites in Ohio, Nobles Pond, Sandy Springs, and Welling. They argue that the three sites were functionally different. Evidence for butchery of the Burning Tree mastodon is presented by Daniel C. Fisher, Bradley T. Lepper, and Paul E. Hooe. They conclude that the cause of the mastodon's death is undetermined, but evidence suggests that it was hunted and killed by Paleoindians.


Papers in the volume are well illustrated with diagrams, maps, drawings and photographs. 

the beach sand and that there were pufins on the cliffs, it was reassuring and rewarding for her to see for herself.

"One of the main reasons I started to write about Native Americans was because I wanted to see them and myself [she has some native ancestry] have pride in that heritage." Though she hopes first of all to entertain her readers, she takes the novelist's role as teacher very seriously. She likes to think that readers of her books would be more likely to protect and report accidental archaeological discoveries. Because she frequently speaks at schools, she believes she and others could do more to get children—especially Native American children—interested in archaeology and prehistory. Harrison suggests that science organizations could help by providing her and others with specific messages to encourage children into science. Noting that children, perhaps not unlike the heroines and heroes of her novels, are acutely

aware of their surroundings, Harrison said if there were ways children could be encouraged to take part in scientific quests, she would gladly include the information in her appearances at schools.

"I want scientists to see me as someone with some of the same goals that they have—discovering who we are by uncovering our past. By uncovering ancient civilizations we can engender pride in ourselves. I'm proud of being a human being. I think we've done pretty well."

Though novelists may never know exactly how they connect with their readers, Harrison received a particularly rewarding tribute last fall when she was serving as a guest artist in school systems in the Pribilof Islands off Alaska. As she was leaving, a library aide at one of the schools stopped her. "Thank you," the Alaskan native told her, "Thank you so much for making me proud to be Aleut." 

—Don Alan Hall



A Window on Ice Age Environment



A MULTIDISCIPLINARY TEAM headed by Robert Ackerman of Washington State University is investigating the possibility of early human occupation in the Lime Hills region of south-central Alaska. Pending further funding, a team of archaeologists, geologists, a palynologist, and a zoologist will set out this summer to begin a three-year project of paleoenvironmental reconstruction. They believe that understanding the environment is the key to identifying and interpreting aspects of the human presence.

"When you study the context for humans in the Pleistocene, then you are dealing with a different environment, different vegetation patterns and different animals, and the adjustments for humans to the landscape would be different," Dr. Ackerman said in a recent telephone interview. He did a preliminary archaeological investigation in a cave in the Lime Hills region in June, 1993 with field support provided by the Alaska Division of Geological and Geophysical Survey.

Ackerman was contacted about possible cave sites there because he had done archaeological surveys in the Holitna and Hoholitna river drainages to the west of

Did Cave in Alaska's Lime Hills Shelter People 15,000 years ago?

Lime Hills. Thomas Bundtzen of the Alaska Division of Geological and Geophysical Survey headed a research team mapping the geology of lands that were transferred from the federal government to the state of Alaska. During his 1992 geological survey Dr. Bundtzen found more than 50 shafts or caverns in the limestone topography east of the Stony River north of the community of Lime Village.

Having only 10 days to carry out field work, Ackerman immediately set out to determine if there were a human presence in a cavern Bundtzen thought would be the most promising archaeological site; it had been designated as Cave 1. Ackerman said the cave is about 1,700 feet in elevation at the eastern extreme of Lime Hills. He described it as having an opening two and a half meters high at its maximum and being about six and a half meters wide. From the entrance it extends into the hill more than 17½ meters

(58 feet). Dung and quills indicated that porcupines were the cave's current residents.

Ackerman made the initial excavations at the south side of the entrance: two adjoining one-by-one-meter test units, extending about two and a half meters back under the cave's shelter. These were excavated just over one meter deep without revealing a great deal of cultural evidence being recovered. "I found some bone that looked like it had perhaps cut marks on it, but that was it," he said.

Two separate one-meter-square test units were dug in the main corridor of the cave about one and three meters back from the drip line. These yielded artifacts made of organic material that included a bone or antler arrowhead with side-blade slots. These findings confirmed that preservation of bone and antler tools is possible in similar limestone caves of the Lime Hills region.

Charcoal and bone samples from the

units were used for radiocarbon dating to determine the antiquity of the site. Two components were identified, indicating that there were two periods of occupation. The upper layer was found to contain artifacts of stone, bone and antler, and the lower component was found to contain a large amount of faunal remains. Technology combined with good luck provided the earliest dated artifact from the upper component.

"While I was washing the [charcoal] sample I found a microblade in it," Ackerman said. "It couldn't get any better than that." The charcoal sample produced a radiocarbon age of $9,530 \pm 60$ years B.P. (Beta 67667/CAMS 9896). That date and the presence of the microblade and the side-slotted arrowhead indicate that the cave occupancy was contemporary with the Denali complex of central Alaska, according to Ackerman's field report.

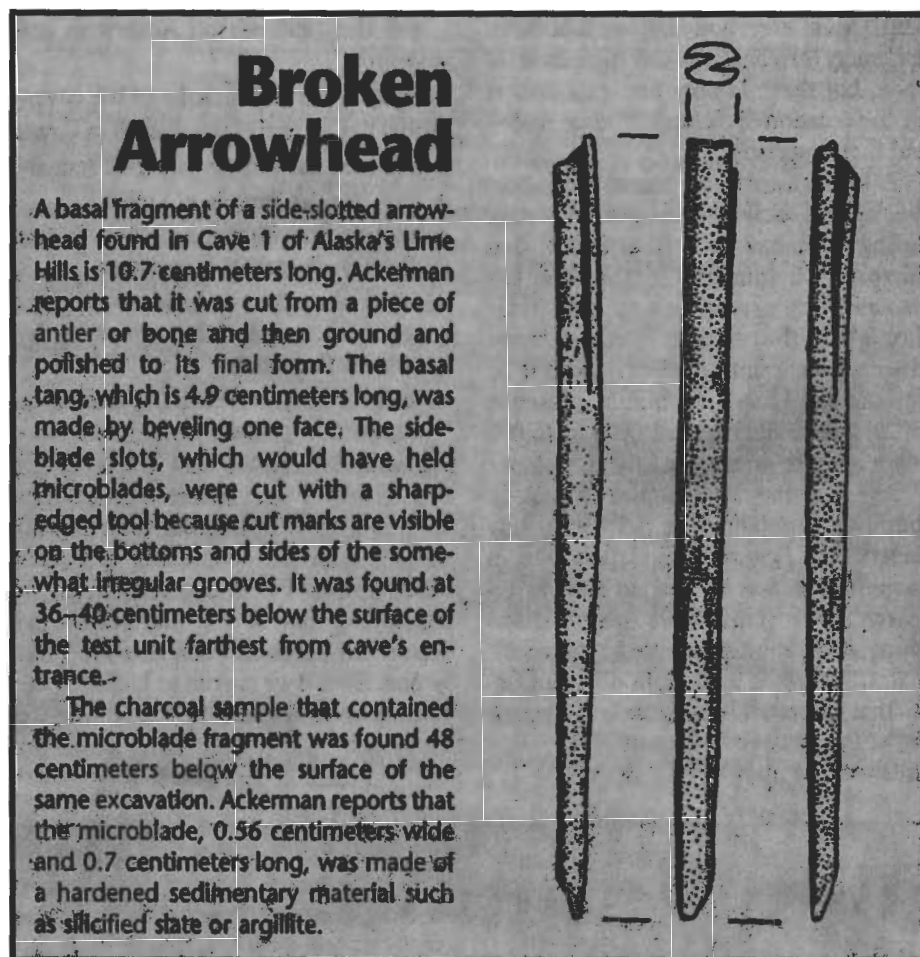
The artifacts, Ackerman says, demonstrate that around 9,000–10,000 years ago Denali complex people were using the bow and arrow.

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The recovery of a side-slotted bone arrowhead associated with the Denali complex assemblage at the Ilnuk site on the Holitna River, and H. Larsen's work at the Trail Creek site on Seward Peninsula, seem to back Ackerman's suggestion of such an early use of the bow and arrow.

"This is a very early use of it, and it's quite exciting because we have some idea what the microblades were used for." He points out that the bow and arrow is not known to have appeared in Washington until about 2,500 years ago.

Ackerman chose two samples of caribou bones and a bison bone to determine radiocarbon ages of the lower component of the Lime Hills Cave 1 site. He reported that the caribou bones were well preserved and provided satisfactory amounts



Broken Arrowhead

A basal fragment of a side-slotted arrowhead found in Cave 1 of Alaska's Lime Hills is 10.7 centimeters long. Ackerman reports that it was cut from a piece of antler or bone and then ground and polished to its final form. The basal tang, which is 4.9 centimeters long, was made by beveling one face. The side-blade slots, which would have held microblades, were cut with a sharp-edged tool because cut marks are visible on the bottoms and sides of the somewhat irregular grooves. It was found at 36–40 centimeters below the surface of the test unit farthest from cave's entrance.

The charcoal sample that contained the microblade fragment was found 48 centimeters below the surface of the same excavation. Ackerman reports that the microblade, 0.56 centimeters wide and 0.7 centimeters long, was made of a hardened sedimentary material such as silicified slate or argillite.

of collagen for radiocarbon assay. One, a broken metapodial that he says possibly could have been a fleshing tool, was dated at $13,130 \pm 180$ B.P. (Beta 67671). It was found 114 centimeters down in the outermost test unit in the cave's passageway. The other, a humerus bearing probable cut marks found at 91 centimeters in one of the earlier-excavated units, was dated at $15,690 \pm 140$ B.P. (Beta 69669). More puzzling was a bison astragalus

site consists primarily of caribou bones as well as smaller amounts of rabbit, bird, sheep, rodent, and bison bones. So far there is no conclusive evidence of human occupation in the lower component. Because the cave was not continuously occupied, but was used incidentally in hunting, other creatures used it, too.

Though evidence is slim for human occupation of the lower component, Ackerman says that it can't be ruled out.

**"I was washing the sample and found a microblade
in it—it couldn't get any better than that."**

(ankle bone) from 70–77 centimeters down in one of the initial units; it yielded a date of $27,950 \pm 560$ B.P. (Beta 67670). Ackerman reported that it must have been brought into the cave from a fossil locality. It was stained darker than other bones in the level.

He said the lower component of the

He notes that numerous studies conducted since 1978 suggest multiple causes for alteration of bone between animals and humans, or by a combination of both. To conclusively show that humans occupied the cave before 9,500 years ago Ackerman believes it may be necessary to find stone tools in the lower compo-


nent. "Most everybody agrees that there are many explanations for alteration of bone, but there is only one explanation for the creation of a chipped stone tool—and that's humans."

Ackerman's written report notes that the lack of facilities for wet screening during the initial excavation means that microblade fragments from the lower levels could easily have been missed. "Only through further testing of Cave 1 and other adjacent limestone caves can it be determined if there is a human presence in the Lime Hills region 13,000 to 15,000 years ago," he wrote.

Although the nature of the deposits in the lower component is not completely understood, Ackerman is certain there is enough evidence to warrant further research in the Lime Hills area. He has proposed a multidisciplinary approach that will target at least eight different facets that will provide a better understanding of the paleoenvironment of the Lime Hills and the place of humans within it.

For the 1995 season Ackerman proposes to:

- analyze the stratigraphy of the caves
- find the bottom of the deposit in Cave 1
- increase the sample of faunal remains
- increase the sample of pollen
- explore the limestone ridge to find and correlate cave formations
- arrive at a better understanding of the cave structure and the events that led to their formation
- look for more evidence of human occupation, especially stone tools.

Ackerman noted that these caves, because they are limestone and they preserve environmental information, present a unique opportunity to open a window on the Pleistocene. "Naturally we are hoping that we will find human evidence that takes us back into the Pleistocene. Even if we are not so lucky . . . our paleoenvironmental data will still be tremendous." 

—Robert W. Richards

Two Old Caribou Bones

Ackerman's report on the 1993 Lime Hills Cave investigation makes the following observation about the bone that was radiocarbon dated at 13,100 years B.P.:

A caribou metatarsal 21.8 centimeters long had been broken lengthwise with two impact scars noted along the broken edge. The proximal end was partially intact while the distal articulations had been broken away. Along the length of the split metatarsal and on the distal end there was wear polish. The bone was unusual as it had not been broken into shorter segments like most of the bones in the cave, and it did not have the heavy chatter along the edge from carnivore gnawing. Numerous short striations, perpendicular to the broken edges of the metapodial, were noted. At first these were taken to be use-wear marks that could have come from abrasion against a surface such as that of a scraping tool to remove the fat and bits of flesh adhering to the inner surface of hides. The amount of polish along the broken edges and on the tip of the metapodial also suggested use-wear polish. Such tools have been identified as fleshers in the archaeological literature.

The report goes on to note that Lewis

Binford has observed that dogs chewing, licking and sucking metapodial bones also have produced polish on the ends and rounded, smooth broken edges. Ackerman noted that though Binford's examples were different, "his study does suggest that alternatives to human agencies need to be given careful consideration."

The report includes the following about the bone dated at 15,600 years B.P.:

A caribou humerus with several cut marks that appear to be produced by stone tools was recovered. . . . The cut marks were straight or curving, at an angle rather than transverse to the shaft, [and were very narrow in width] with sharp side walls. Such cuts could have been made in defleshing the meat from the carcass for drying. Carnivore and rodent tooth marks, in contrast, were broad, generally transverse to the shaft, and generally ragged (skip marks as the teeth bounced against the bone.) The medial and lateral condyles of the distal portion of the shaft had been heavily gnawed exposing the cancellous portion of the bone.

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