MAMMOTH TRUMPET

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Center for the Study of the First Americans
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BRIAN KOOYMAN

Tracking Megafauna In Southern Alberta

The draining of a large irrigation reservoir in southern Alberta and subsequent wind erosion have chanced to expose sensational paleontological and archaeological findings. Here, scientists have marked the tracks of a mammoth with a rock cairn. Research continues at the site, which is at the southern funnel of the Ice-free Corridor (Page 1).

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

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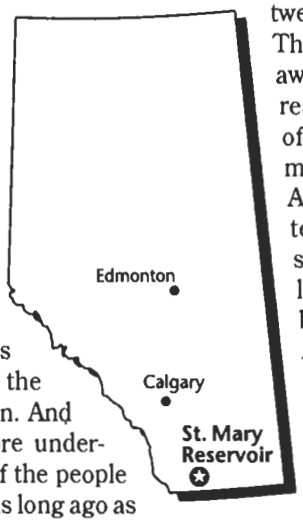
Alberta Scientists Track Mammoths Across Recently Exposed Landscape

Draining a reservoir near Cardston, Alberta, a year ago chanced to open a totally unexpected window on life along the St. Mary River at the end of the Pleistocene when mammoths, steppe musk oxen, camels, horses, and giant bison grazed and watered there. Presence of those extinct animals is not merely inferential, for paleontologist Len Hills and archaeologist Brian Kooyman of the University of Calgary have actually *tracked* them, or at least collected their remains.



What's more, Drs. Hills and Kooyman and their colleagues hope to track or excavate more such marvelous beasts this fall when water in the reservoir is to be drained again. And Kooyman expects to gain more understanding about the presence of the people who were in southern Alberta as long ago as the Pleistocene.

The site, potentially two square kilometers or more in extent, is northeast of Cardston and not far from the eastern ramparts of the Rocky Mountains. It became exposed by the most unlikely circumstances. "It's totally by chance," Hills said in a telephone interview from his office in Calgary. St. Mary Reservoir, constructed in 1950 to supply irrigation water to the region's farmers, was drained at the end of the 1998 growing season so that work could begin on a new spillway for the dam. By lowering the water level 10 meters to accomplish the work, operators of the dam also exposed to view several square kilometers of barren earth.

The land also was completely exposed to powerful winds that regularly roar down between the Rocky Mountain peaks. The wind soon began stripping away at sediments on the barren reservoir bottom, forming clouds of dust and exposing surfaces much older than the reservoir. An inquisitive Cardston school teacher, Shayne Tolman, inspected this newly revealed landscape and was astonished by what had been uncovered. As the sediments yielded to the wind, animal bones and even artifacts were being exposed, and he began collecting some of what he found.

News of such discoveries reached an official of the Geological Survey of Canada who informed Hills, professor emeritus in the Department of Geology and Geophysics at the University of Calgary. "When I first went down to look at his collection," said Hills, "he showed me a bison skull." It was *Bison antiquus*, suggesting that it was at least 11,000 radiocarbon years old. When Hills returned to Calgary, he described the site to Kooyman of the U of C archaeology department.

Days later Hills got a phone call from

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INSIDE

Recent survey discovers cultural material survives modern farm practices.

There is a very different set of rules for analyzing pre-human ancestors than for analyzing modern humans.

New Books

Ice Age Peoples of North America, Robson Bonnichsen & Karen L. Turnmire, editors. A co-publication of the Center for the Study of the First Americans and Oregon State University Press, 510 8½ x 11-inch pages. 1999. $49.95 (hardcover) plus $4 shipping and handling.

Here is a detailed compendium of late-Pleistocene Paleoamerican archaeological records from North America and Northeast Asia that are changing perceptions about the origin of the First Americans. Though scientists have been investigating the peopling of the Americas for much of the twentieth century, there still is no specific evidence that allows us to say when the first people entered the Americas. However, this volume's 19 chapters bring together the latest significant information from a wide variety of disciplines. All will interest Mammoth Trumpet readers. The sheer breadth of the subject matter may be somewhat surprising, too.

In the first chapter, the editors describe the background and consequences of the paradigm shift away from the Clovis-first model, which they note was caused by the discovery of several pre-11,500-year-old sites in the Americas; identification in North America of co-traditions contemporaneous with Clovis; and acceptance by skeptics of the 12,500-year antiquity of the Monte Verde site in Chile. Their introduction presents a detailed analysis of the status and the future of First American Studies.

The following three chapters focus on geophysical aspects—Ice Age environments of Northern Eurasia, especially western Beringia; the impact of ice-related plant nutrients on the environments of glacial margins; and periglacial ecology. These are discussed with regard to their significance for human biology. For example, the unique ice-age environment is shown to have a great abundance of resources. From paleoenvironment, the focus goes to Asian origins of Americans with chapters on the Pleistocene peoples of Japan, the colonization of western Beringia, the peopling of Alaska, and the Old Crow Basin of the Yukon.

Several chapters by archaeologists directly involved in the research follow Paleoamericans into the High Plains, the Great Basin, mountains and basins, and the Southwest. The focus of the book moves into the mid-continent with a detailed summary of information from the earliest sites in several states and provinces. The next chapter assesses radiocarbon chronology of 13 Paleoamerican sites in the Northeast. The Meadowcroft Rockshelter in southwest Pennsylvania is the subject of its own chapter in which J. M. Adovasio, its principal investigator, and three colleagues examine the long-standing controversy over the site's radiocarbon dates and what it means to the site and to First Americans studies in general. They argue that Meadowcroft "represents the earliest bona fide evidence of human occupation south of the glacial ice in North America."

A chapter by South Carolina archaeologist Albert C. Goodyear presents an extensive focus on early sites in the Southeastern United States, including the pre-Clovis evidence at the Cactus Hill site on Virginia's interior coastal plain. Dr. Goodyear reviews in detail the geoarchaeological situations of sites from Florida to Missouri and Virginia. The late-Pleistocene inhabitants of Mexico are the subject of a chapter by the late Jose Luis Lorenzo and Lorena Mirambell. They describe the chronology of human occupation, starting from the earliest period that they believe began between 40,000 and 35,000 years ago.

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The book's concluding chapter, "Breaking the Impasse on the Peopling of the Americas," by Bonnichsen and Alan L. Schneider, lawyer and avocational archaeologist, will interest Mammoth Trumpet readers regardless of their particular interest because it critically assesses the theoretical propositions on which Clovis-First and Early-Entry models are based and looks at the future of First American Studies.

Who Were the First Americans? Proceedings of the 58th Annual Biology Colloquium, Oregon State University, Robson Bonnichsen, editor. Center for the Study of the First Americans, 160 6 x 9-inch pages. 1999. $24 (paperback) plus $4 shipping and handling.

Recent research suggests that the Clovis-first model of the initial peopling of the Americas is incorrect and that there may have been multiple colonizing events. New human biological evidence provides the most direct evidence for colonizing events, and this new book brings together some of that evidence. The book is an expansion of papers initially presented at the 58th Annual Biology Colloquium at Oregon State University in 1997 ("Paleobiology Focuses on First Americans," **Mammoth Trumpet** 12:3). The seven chapters include genetic and craniometric studies. In his introduction, Bonnichsen summarizes these and what they may mean to First Americans studies.

Human geneticist Anne C. Stone explores the problems and potentials of studying ancient peoples by analyzing DNA in their remains, and in the next chapter geneticists Theodore G. Schurr and Douglas C. Wallace discuss how analyzing mitochondrial DNA from contemporary Native American and Siberian populations helps to explain ancient human migrations.

Physical anthropologists Douglas W. Owsley and Richard L. Jantz describe the importance of their project to create a database of human skeletal biology and how such data can aid the understanding of early human migrations as well as foster understanding of human health. In the next chapter, D. Gentry Steele and Joseph F. Powell present details of their research on the earliest American human skeletal remains. They conclude that these differ from more recent North American Indians and have the closest morphological similarities to Asian and southern Pacific Rim populations.

Dr. Owsley contributes a chapter, "From Jamestown to Kennewick," based on his experience analyzing human skeletal remains, in which he argues for the importance of museum curation of skeletal material. In the final chapter Francis P. McManamon, chief archaeologist of the National Park Service, analyzes the Native American Graves Protection and Repatriation Act and its impact on First Americans research.

The History of the Origin, Evolution and Dispersal of the Late Pleistocene Mammuthus-Coelodonta Faunal Complex in Eurasia (Large Mammals), by Ralf-Dietrich Kahlke. Mam-

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ONCE-IN-A-LIFETIME OPPORTUNITY!

Posters

Paleoindian Occupations in the Southeastern United States
David G. Anderson

Limitations on Early Coastal Migration
Everett Bassett

Clovis Era Manifestations in Northern New Hampshire
Richard A. Boisvert

Pleistocene Archaeology of the Manix Basin, Central Mojave Desert, California
Fred E. Budinger, Jr.

The Paleoamerican Skeleton Known as Kennewick Man
James C. Chatters

Patterns of Regional mtDNA Variation in the Ancient Americans
Shawn W. Carlyle, M. Geoffrey Hayes, and Dennis H. O'Rourke

Clovis along the Southern Plains Periphery
Michael B. Collins

Lahontan Chronology and Early Human Occupation in the Western Great Basin: A New Look at Old Collections
Amy J. Dansie and William Jerry Jerrems

Paleoamerican Skeletal Features of the Huntley and Willson Crania from the Late Archaic of Eastern Wyoming
George W. Gill and Carlos J. Jiménez

What is Clovis? Assessing Technological Variability in Flaked Stone Tool Assemblages
Kevin T. Goodrich and Robson Bonnichsen

The Enigmatic Eurasian Origins of Clovis People: Dental Anthropological and Archaeological Considerations
Alice M. Haeussler

The Status of Ancient Remains
Cleone Hawkinson and Beth Walton

Clovis in the Southwestern United States
Bruce B. Huckell

Clovis in the Rockies: How High Do They Get?
Marcel Kornfeld and George C. Frison

Documenting and Pictorially Displaying the Scientific and Artistic Process of Forensic Facial Approximation on the Spirit Cave Burial
Sharon A. Long

Mitochondrial DNA Control Region Haplotypes of the Ancient Ones
David Glenn Smith

Geological Studies at the Kennewick Site, Washington: Results from Stratigraphic and Geochronological Analyses
Thomas W. Stafford, Jr.

Additional posters were submitted too late to be listed here.

Top Experts to Gather For Conference on Peopling of Americas

The Clovis and Beyond Conference, Oct. 28–31 in Santa Fe, N.M., will be much more than public presentations by many leading experts on current research on the peopling of the Americas. Conference-goers also will get treated to poster presentations on many topics relating to the archaeology and paleobiology of the Americas and displays of many of the most important Clovis artifacts.

Those displays of specimens never before seen together will undoubtedly be the main attraction of the conference for many people. Included for the examination of conference registrants will be flaked-stone, bone, and ivory artifacts from many of the major Clovis mammoth kill sites including Blackwater Draw, Naco, Colby, Dent, and Lange-Ferguson; complete Clovis caches such as Simon, Fenn, Drake, and Crook County; and weapons and tools from the Sheaman site.

Poster sessions will give conference registrants the opportunity for one-on-one meetings with presenters who will be sharing their specific expertise on early Americans and early archaeological sites (see Poster list).

Together, presentations, posters and exhibits constitute a once-in-a-lifetime opportunity for all who are fascinated by the mysteries surrounding the peopling of the Americas. The first conference of its kind, called "Symposium on Early Man," was held in Santa Fe in 1941. That meeting set the course of Paleoamerican archaeology until this day.

Presentations will begin at 8 a.m. Friday, Oct. 29, with Robson Bonnichsen's Introduction to the Conference Perspective. Dr. Bonnichsen is Director of the **Center for the Study of the First Americans** at Oregon State University and one of the organizers of Clovis and Beyond. Other leading experts on the earliest archaeology of the Americas will follow (see Presentation list).

It's still not too late to register for the Clovis and Beyond Conference. In-person registration will be between 5 and 8 p.m. Thursday Oct. 28 at the Hilton of Santa Fe, 100 Sandoval St., Santa Fe. The conference itself will be at the nearby Sweeney Convention Center in downtown Santa Fe. Complete conference and registration details are available on the World Wide Web at www.peak.org/csfa/csfa.html. Information is also available by writing Clovis and Beyond, P.O. Box 8174, Santa Fe, NM 87504 or by phoning 505-987-8461.

Clovis and Beyond is being organized by the New Mexico Museum Laboratory of Anthropology and Forrest Fenn and is sponsored by the **Center for the Study of the First Americans,** The Smithsonian Institution and *Discovering Archaeology* Magazine.

Presentations

▪▪Friday, October 29▪▪

Welcoming Address — *Eric Blinman, Museum of Indian Arts and Culture*

Introduction to the Conference Perspective — *Rob Bonnichsen*

The Future of Public Policy: How Do We Go From Here? — *Moderator, Jo Ann Harris*

The Society for American Archaeology Perspective — *Ken Kintigh*

The Academic Archaeologist Perspective — *Brad Lepper*

The Avocational Archaeologist/Collector Perspective — *Jim Warnica*

A Native American Perspective — *Joe Watkins*

The Department of Justice Perspective — *Lois Schiffer*

The Lawyer/Scientist's Perspective — *Alan L. Schneider*

The Government Regulatory and Cultural Resource Manager's Perspective — *Frances P. McManamon*

Summation Statement — *Jo Ann Harris*

Archaeology Presentations

History of Research on the Initial Peopling of the Americas — *Alan Bryan*

Clovis, Climate Change and Extinction — *C. Vance Haynes, Jr.*

Clovis and Non-Clovis Traditions West of the Mississippi — *Dennis Stanford, Margaret "Pegi" Jodry, and Rob Bonnichsen*

Lunch break

Are We Sure It's Clovis? — *Kenneth Tankersley*

The Goshen Cultural Complex: A Paleoindian Cultural Group Overlapping Clovis — *George Frison*

Evidence of Pre-Clovis Sites in Eastern North America — *Albert Goodyear*

Mastodons, Mammoths, and Humans in the North American Mid-Continent — *Dan Fisher*

Late Pleistocene Bone Technology in the North American Mid-Continent — *Steve Holen*

▪▪Saturday October 30▪▪

A Geoarchaeological Approach to the Study of Early Archaeological Sites in the Western United States — *Mike Waters*

Current Archaeological Evidence for a Late Pleistocene Settlement of South America — *Ruth Gruhn*

North Asian–North American Connections: The Smithsonian Workshop — *David Madsen*

Ice Age Beringia and Human Colonization of the Americas: A New View from the North — *Ted Goebel*

Human Biology Presentations

A Molecular Anthropological View of the Peopling of the Americas — *Theodore Schurr*

Ancient DNA from Overlooked Sources: Stone Tools and Hair — *Walter Ream, Orin Shanks and Rob Bonnichsen*

Lunch break

Ice Age Humans in Asia and the Peopling of the Americas — *Richard Jantz and Douglas Owsley*

Ice Age and Recent Skeletons in the Americas — *Joseph Powell, Gentry Steele, and Walter Neves*

The Future of Research: Where Do We Go from Here? (10-minute presentations)

How can we develop better chronologies of the past? — *Tom Stafford*

Thoughts on Clovis Exploration and Colonization of New Lands. — *David Meltzer*

How can we build better models of Paleoamerican lifeways? — *Pegi Jodry*

What does the Monte Verde site, Chile, experience have to tell us about the nature of the First Americans research environment and where future research activities should be directed? — *Tom Dillehay*

What is the importance of "soft technology" in the reconstruction of Paleoindian lifeways and the colonization process for both Siberia and the New World? — *James Adovasio*

What is Clovis and how do we explain Clovis variability? — *Michael Collins*

How do we explain skeletal variability of Paleoamerican populations in comparison with modern Native Americans and what are the implications for understanding the peopling of the Americas? — *Richard Jantz*

Tracking Genes through Time and Space: Changing Perspectives on New World Origins. — *Theodore Schurr*

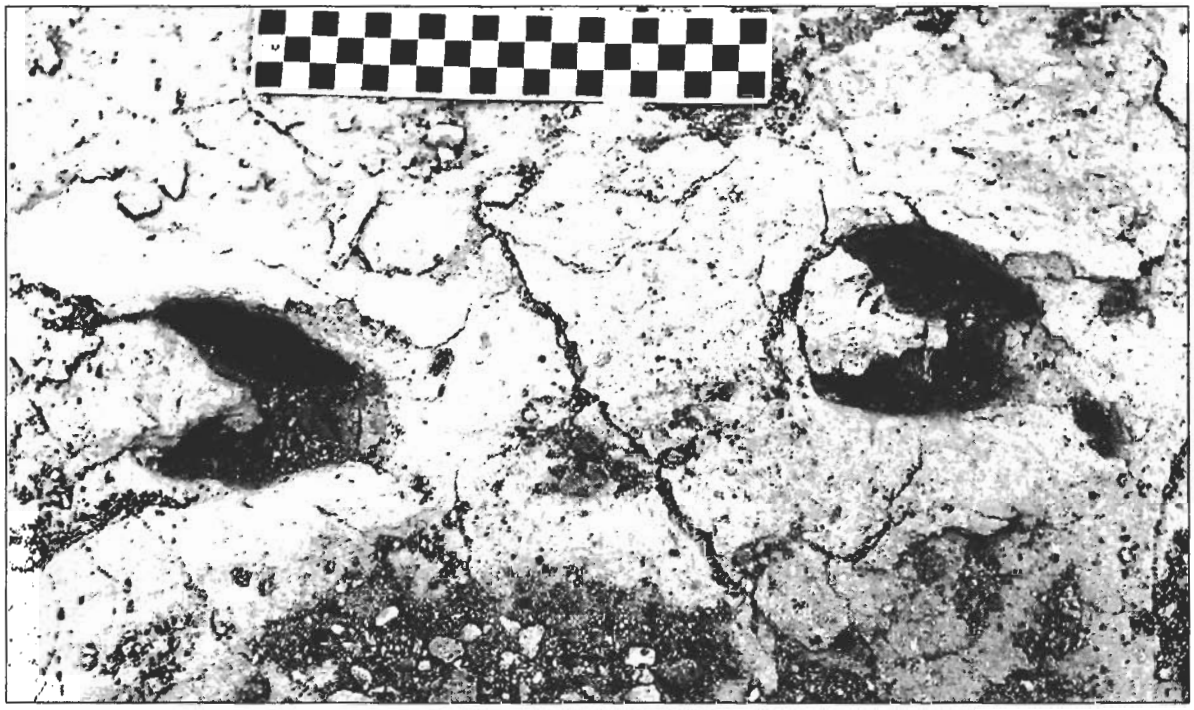
Integrating archaeological, genetic and skeletal data from Asia, North America and South America: How solid is the case for pre-11,500-year-old occupation? — *Alan L. Bryan*

▪▪Friday & Saturday▪▪

Exhibits and book sales at the Sweeney Convention Center

Exhibits of Clovis and pre-Clovis artifacts, Mark Mullins, Curator

Organized exhibits of archaeology and paleobiology posters



GERRY NEWLANDS

Tracks of a Pleistocene ungulate are perfectly preserved in the recently uncovered sediments. The animal was moving from right to left; note the impression of its "dew claws" behind each impression.

Tracking Mammoths

continued from page 1

Tolman reporting another large skull. Hills and Kooyman went to the site, which is northeast of Cardston, nearly 200 kilometers south of Calgary and only about 20 kilometers from the international boundary in Montana. They discovered and recovered the skull and some other bones of an extinct woodland, or steppe, musk ox, *Bootherium bombifrons*. As winter approached and the water level continued to recede, more interesting materials came to light.

Another call from Tolman brought the U of C scientists back to the drying reservoir to find not another musk ox or bison, but the skeleton of an extinct horse. They mapped the area, putting in survey lines in preparation for excavation once spring thawed the frozen earth. With Tolman, Kooyman and Hills walked about the site, returning to where they had extracted the *Bootherium* and there they found an artifact—a retouched flake tool.

They also found tracks of a large ungulate; the surface on which these tracks appeared evidently was approximately as old as the nearby Pleistocene animal remains. Identifying the species of animal that left those tracks became the object of considerable study and discussion.

Winter made work on the reservoir bottom practically impossible—not only was the ground frozen, the roaring winds seemed to move all sediments that weren't frozen solid. Dust clouds could make the visibility zero and quickly foul cameras and other instruments with grit.

"We decided that the best thing to do with the ungulate tracks was to cover them and protect them from wind erosion," Hills said. "Shayne and two friends went out the next day and did that. When they finished, they did a walk-around and they found large tracks." These tracks were so large, in fact, that they, and later Hills and Kooyman, knew that nothing other than a mammoth could have made them.

Finding the tracks of long-extinct animals was an exhilarating experience. Like a hiker coming across tracks in the woods, investigators analyzed them to identify the animals that made them. "We got quite excited," Hills said, describing the initial discovery. Those ungulates, they decided because of the shape, were not bison, nor were they musk ox, the animal that still lives on northern tundra. But neither were the tracks those of caribou or deer, and they didn't think they were made by a sheep. The tracks were in the same horizon that had yielded the *Bootherium* bones.

"We found there were two of them walking side by side," Hills said. "They would stop and shift their feet—they were obviously feeding across that surface. You could see their feeding behavior." Identity of those ungulate tracks still is not absolutely certain. The potential the tracks held for revealing animal behavior was so intriguing that Paul McNeil, a Ph.D. student studying dinosaur locomotion, became interested and joined the research team.

Although the identity of the ungulate species is uncertain, there has been no doubt at all about the identity of the maker of the mammoth tracks, which were staggered across the moonscape of the reservoir bottom the way elephants would walk across soft ground anywhere. And they were huge.

"The impression in the soil was just about a meter across," Hills said, explaining that McNeil's research had shown that within each depression was a central undisturbed area where it wasn't deformed in the same sense. In some tracks, he said, "we could actually see the front foot and then the overstepping of the hind foot." The tracks revealed the animal's two large toes and its two small toes.

Hills noted that a large number of the tracks are at the top of the rise, but the first set of mammoth tracks they found was lower on the paleo-slope; the animals

had been heading up hill. Other tracks, he said, were heading up out of the valley, "so we know that they were going up and down those slopes into the valley."

Such evidence is as exciting to archaeologists as it is to paleontologists. "Now as our work progressed," Kooyman said in a telephone interview, "we have tracks of at least four different species." In addition to mammoth and the ungulate tracks, there were definitely tracks of camel and horse. Animal trails, of course, do more than simply indicate the presence of the animals, they provide valuable clues to paleoenvironment and culture.

"Most of the tracks are oriented rather in and out of the valley," Kooyman said, "as though they were going down to water or something like that. There's a real pattern to it." He believes the animal trails probably explain the archaeological material that has been discovered, and the study of the animal remains certainly led to archaeological discoveries.

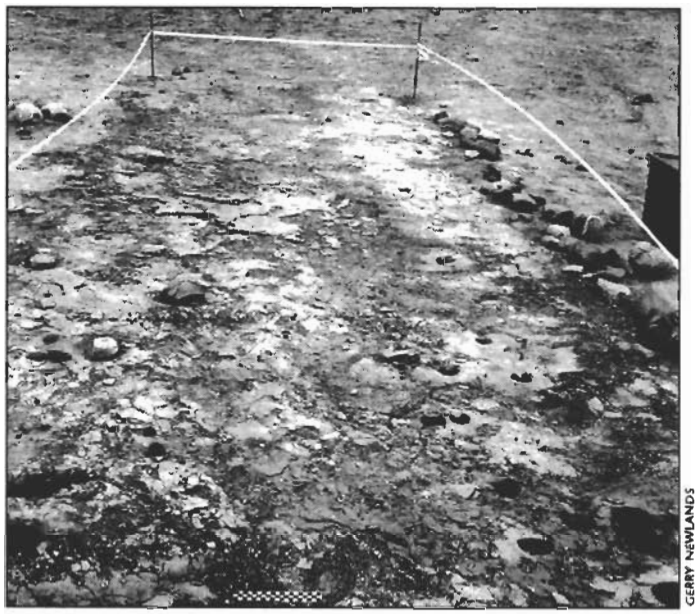
Kooyman described an incident that occurred during the excavation of the skeleton of a horse that was becoming exposed. Hills, wanting photographs of the process, returned the next morning with his camera and found three stone tools that the wind had exposed overnight. "They're quite obvious tools," said Kooyman, and they were in direct association with the horse remains—"say 20 or 30 centimeters away from some of the bone—and in the same layer." Earlier, they found an edge-modified flake of quartzite in situ in the same sediment as the musk ox bones, and only about 75 centimeters away.

"It was those things," Kooyman said, "that first generated the feeling that 'wow, this stuff really *DOES* seem to be associated with archaeological material!'" The investigators excavated near the ungulate tracks and approximately 30 or 40 meters from where the musk oxen bones were found and recovered some archaeological material in a paleosol there. "We haven't actually dated that yet," Kooyman said, "but when we excavated one of the horses (so far portions of five have been discovered) we found a number of small flakes and pieces of shatter that are in situ in the sediments, and seem to be associated with this horse."

Hills explained that stratigraphically there are three closely spaced paleosols at the site, and the bison, horse, and *Bootherium* skeletons were all found in the B horizon, although the *Bootherium* and bison both projected into the A horizon. The researchers have gotten direct radiocarbon (accelerator mass spectrometer) dates on each of the three animals. The *Bootherium* came out to 10,980 ± 90 years B.P.; the bison, 11,130 ± 70 years B.P.; and the horse, 11,330 ± 80 years B.P. Those are uncalibrated dates and in the proper stratigraphic order—the bison, for example, appears somewhat above the horse.

The dates were gratifying to the investigators. "Talk about enthusiasm and excitement," Hills quipped, "the grins were pretty big as the dates came back."

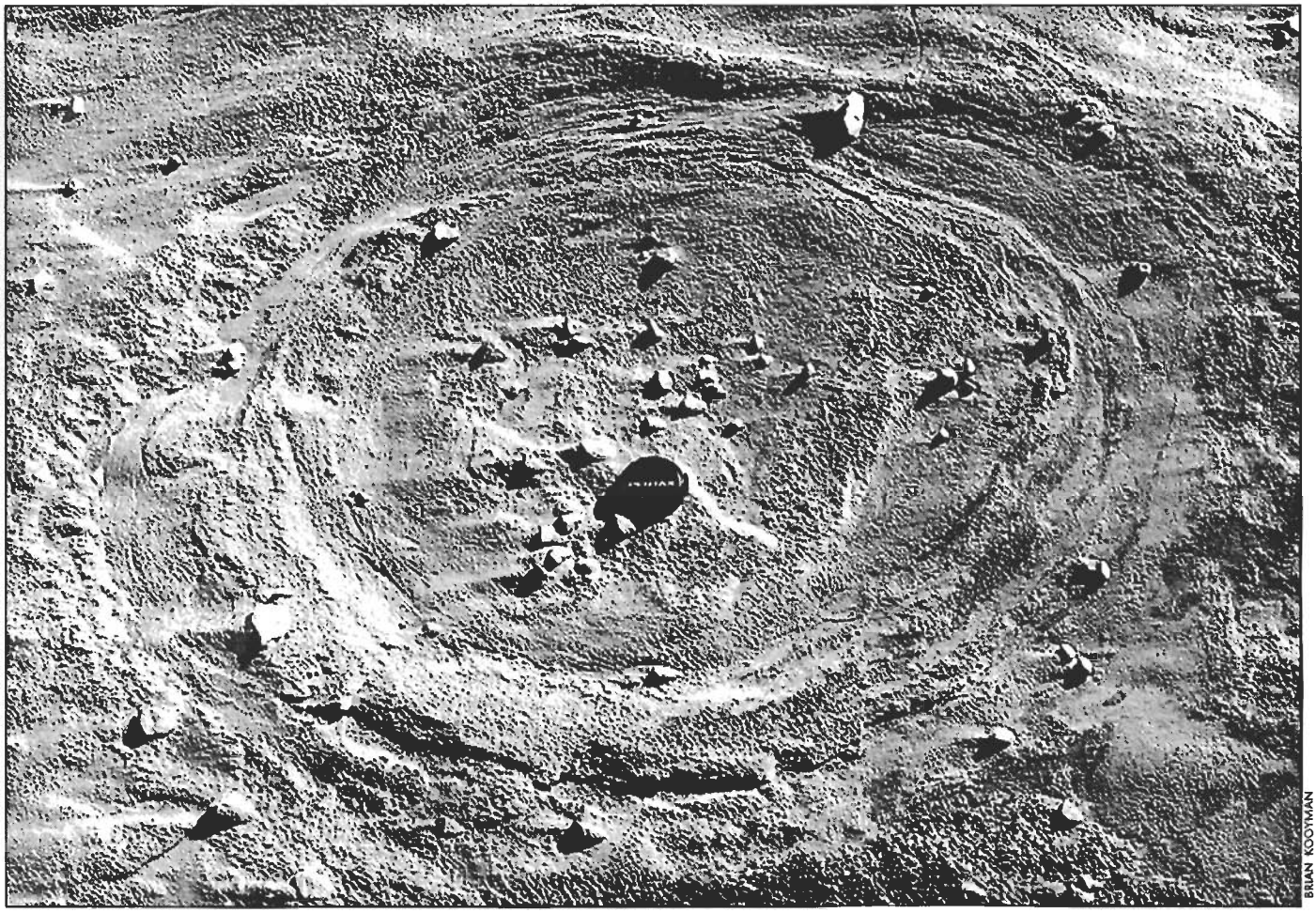
Although the archaeology of the particular site, which Jack Ives, Alberta's provincial archaeologist, calls Wally's Beach, is only beginning to be analyzed, it is clear that the sequence of cultural material extends from Clovis artifacts up to artifacts from historic time. "We have the whole sequence," Kooyman said, and he emphasizes that early artifacts, including Clovis points, were recovered "anywhere from a couple of hundred meters from where the bones have been found to within a kilometer or two. We have three certain Clovis points, we have one certain Folsom point, we have a number of Paleoindian points, and, in fact, the sequence goes right up to one historic metal trade point."


GERRY NEWLANDS


MONICA WEBSTER

The trackway of ungulates (above) on the exposed Ice Age surface of the St. Mary Reservoir site as it was being studied by University of Calgary researchers. A pocket knife provides a size reference for this camel track (below) exposed last year after the reservoir was drained.

Kooyman and his colleagues are only beginning the research that could strengthen the links between the Pleistocene



BRIAN KOOYMAN

Appearance of Pleistocene Animal Tracks

How do imprints of the hoofs of Ice Age animals become preserved beneath the waters of an irrigation reservoir? It's an extremely unusual situation that is not easy to understand, but renewed field work beginning this fall may confirm the tentative answers researchers have developed.

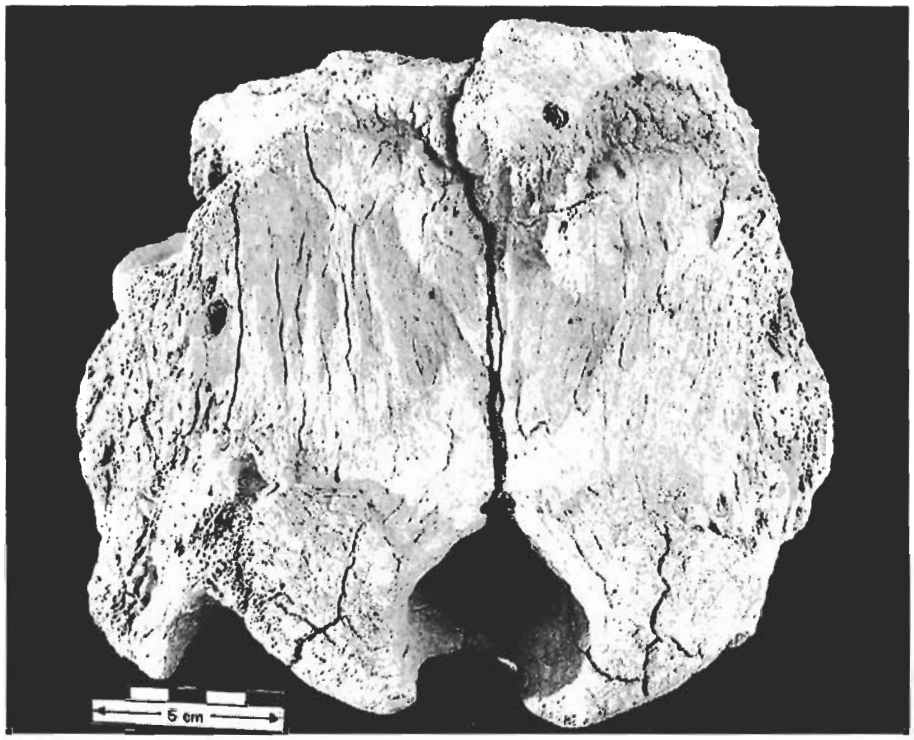
The key factors are barren earth exposed after nearly half a century under water, and a strong prevailing wind. Landforms, both ancient and modern, also must play a role. Investigator Len Hills, emeritus professor in geology and geophysics at the University of Calgary, has interpreted the Ice Age context as an extensive, barren floodplain to the west of the site, with the wind bringing material up the valley's eastern slopes where vegetation traps the sediments.

That particular context—source of sediment to the west, high winds, and vegetation trapping the sediment—has preserved the tracks. "The tracks," explained University of Calgary archaeologist Brian Kooyman, "are, for the most part, concentrated in what seems to be the top of the river valley." The investigators cautioned that geological studies of the area are still quite preliminary.

However, it is probably the particular depositional situation that preserved the tracks. Normally so fragile that they're destroyed rapidly, they were buried for thousands of years under a protective blanket of sediments. They must have been buried very rapidly, soon after they were been created.

The key to discovering the tracks was the removal of what Dr. Hills believes is a minimum of 1.3 to 2 meters of sediment, a conclusion based on a fascinating bit of paleontological detective work. The amount of sediment that eroded was precisely enough to reveal tracks of the mammoth and other extinct beasts—any less erosion would have left the tracks buried and any more would have removed them. Once exposed on the slopes that had been beneath the reservoir, the tracks have proven unfortunately ephemeral.

The wind was a constant challenge for the investigators, and as it exposed tracks, it could also destroy or bury them. "Some of the mammoth tracks that we were going to work on last spring," Hills said, disappeared before they could be analyzed. "The wind came up and deposited 10 cm of sand on top of them, and so they were invisible for the rest of the sea-



GERRY NEWLANDS

A single mammoth track is revealed to sun and wind (opposite) after being exposed by erosion after the water was drained from the St. Mary Reservoir northeast of Cardston, Alberta. The camera's lens cap is near the center of the track. At right is the posterior view of the skull of the woodland, or steppe, musk ox *(Bootherium bombifrons)* discovered after the reservoir was drained.

animals and the cultural materials. Work on the environmental evidence is only beginning, also. A phone call from the **Mammoth Trumpet** found Kooyman just beginning to examine phytoliths, microscopic and almost indestructible "plant stones" left behind when plant material decays. "I've just done three samples so far from some of the paleosols and I seem to be getting, at least at this point, pretty good recovery of phytoliths." He hopes the phytoliths will help the investigators reconstruct past environments through a better understanding of paleo vegetation, but he emphasized that the analysis is only beginning.

Another process that's just beginning is analysis of lithic artifacts, first to be certain the lithic materials are cultural and not the result of natural shattering. "I've been spending time examining them microscopically to look at the edges and the dorsal ridges and so on," Kooyman said, "to look at the degree of rounding or absence of rounding and how that compares with other material." He said that he had some artifacts tested for blood residues, but wasn't surprised when none was found on those particular items.

Kooyman and Hills emphasize that two other investigators have been consistently involved with them on the St. Mary Reservoir project. Paul McNeil, one of Hill's Ph.D. students, has been doing

Due to Unusual Series of Circumstances

son. Hopefully they'll be re-exposed this coming winter when the reservoir again is drained for continued work on its spillway, but there's no guarantee."

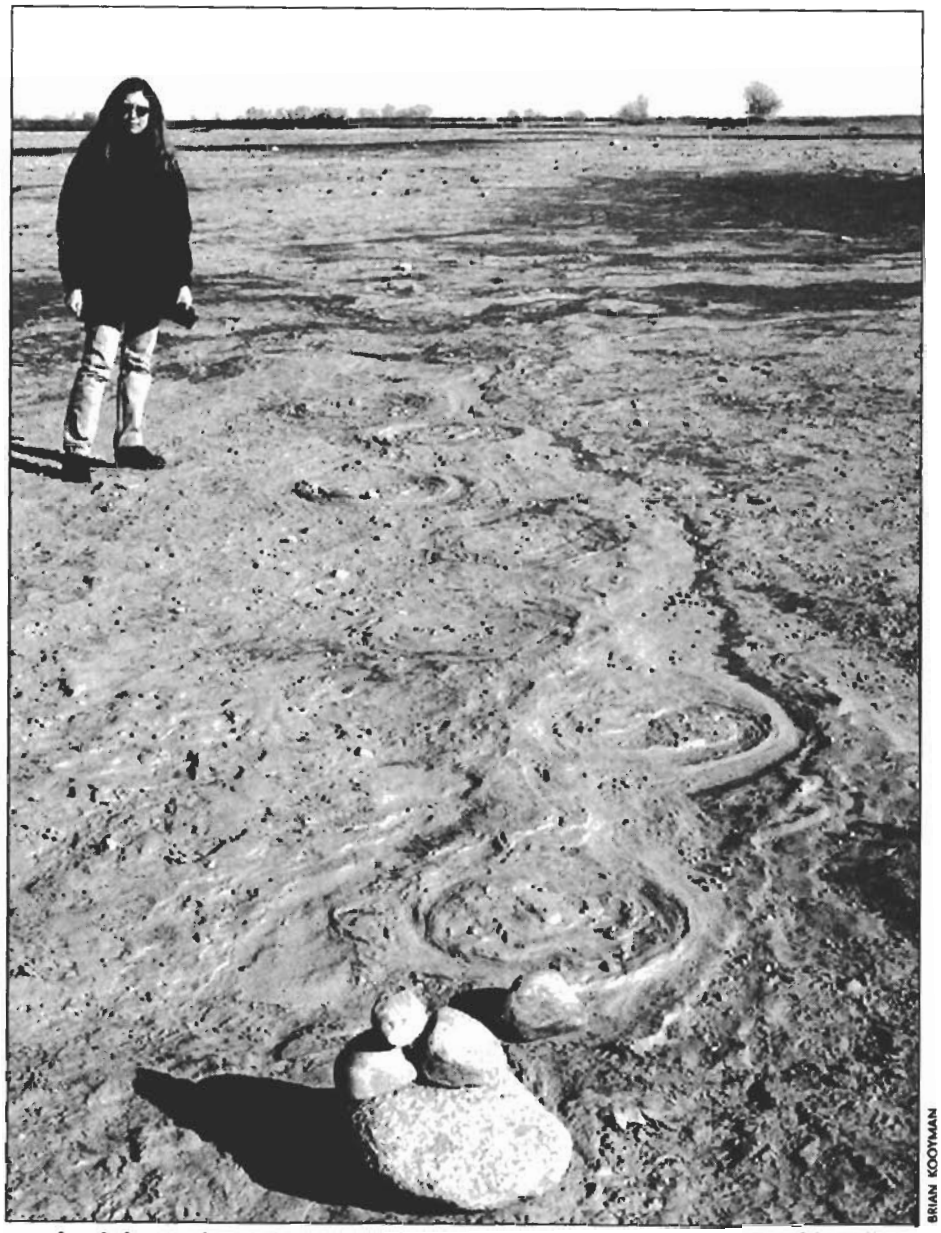
"We'll all be bracing to see what happens in the fall and the winter as the deflation occurs," Alberta Provincial Archaeologist Jack Ives told the Mammoth Trumpet. "It's so ephemeral, you worry a bit about that, but there are massive areas involved, so if there's more exposure, we will be working with the operator of the reservoir to try to secure some funding to take larger scale measures than Brian and Len were able to put into place."

Although conditions will remain difficult at the site, the investigators will have more time to examine the land normally covered by reservoir water. As Hills explained: "They're still using the old spillway—and they've got to take away the last remaining bedrock to open up the new spillway and in order to do that they've got to draw the water again this winter to finish the work." Further, the province has recognized the significance of the site and has arranged for reservoir levels to remain low to allow Hills, Kooyman, and their colleagues to complete fieldwork. Weather, however, often isn't as cooperative.

"There were times when we just couldn't work because we would be literally trying to excavate in sandstorms," said Dr. Kooyman, who described instances of leaving the site for lunch and returning to find five centimeters of sand deposited in their excavation. Dr. Ives described the site as "a Martian landscape," and added that the researchers "spent a lot of the time out there getting sandblasted trying to recover these material."

So how does Hills know how much sediment was removed to expose the Pleistocene tracks? Modern ground squirrels provided him with the crucial clues. Exposed along with tracks and bones of ancient animals were burrows that ground squirrels had dug and stocked with oats and clover for hibernation, apparently just as the reservoir was first being filled. In the Cardston area, the squirrels' winter burrows must be at least 1.3 to 2 meters below the surface to assure the animals will be below the frost line, so Hills knows that is about how much erosion occurred to expose the Ice Age surface.

–DAH



BRIAN KOOYMAN

A rock cairn marks the trail of a mammoth across the newly uncovered Ice Age surface.

much of the study of the tracks themselves, analyzing what he can see about locomotion, size of animal and other details. And working on all aspects of the site is Shayne Tolman who, after completing teaching duties in Cardston, registered as a graduate student at the University of Calgary.

In addition to the professionals, members of The Archaeological Society of Alberta, including chapters in Medicine Hat, Lethbridge, and Calgary, helped with field work last fall and spring and will be involved in future work. As well, up to a dozen students from the Department of Archaeology have donated their time for excavating. "They've been of great help," Kooyman said.

As field work resumes this fall, researchers will continue to seek information about southern Alberta's Ice Age people and fauna. The area is at the southern funnel of the Ice-free Corridor, the gap that existed at times between the great Laurentide ice sheet on the east and north, and the Cordilleran ice on the west. Presumably, the corridor allowed people and animals from unglaciated parts of the Yukon area to migrate southeastward onto the Great Plains.

Provincial Archaeologist Ives notes that many scientists have written off the Alberta corridor as not having any relevance for the continent's early human population ("Coastal-Entry Model Gains Support as Ice-free Corridor Theory Fades," **Mammoth Trumpet** 13:3). Yet, says Ives, "In Clovis time that corridor probably is going to be important. Alberta," he adds, "has 10 times as many small, though classic, fluted points of Clovis or Folsom style as Montana does." It may be, he said, that the province has such an inhospitable geology that it takes an event like the emptying of a reservoir to clear off the overburden to reveal materials of Clovis age.

The St. Mary site, says Ives, is "no small find," especially in the overall study of the peopling of the Americas. Though not discounting the importance of recent discoveries along the North Pacific Coast ("Following the Pacific Coast to America," **Mammoth Trumpet** 14:1) he said that the Alberta corridor should not be ignored.

"I think we need to pay unbiased attention to both of these areas."

For paleontologist Hills, the faunal material is sufficient reason to be excited about the site. "We've talked about the mammoth and the camel and the horse and so on, but overall we've recovered faunal remains of between 20 and 25 distinct species." Those include two different canids, badger, rabbit, ground squirrels, and birds. Besides the initial radiocarbon dates, Hills knows many of the animal bones are old because they were discovered within the paleosols. A badger, he said, for example, "was in exactly the same horizon as the bison, so we're fairly confident that the badger was there at the site at that time—11,000 years ago."

Hills, who from March until August had to balance his work on St. Mary Reservoir fauna along with his organizational role for the 14th International Conference on the Carboniferous and Permian, seems especially pleased with the horse discoveries. As for the horse, he said, "as nearly as we can tell, it is the most complete specimen of *Equus conversidens,* and we don't just have one, we have *two.* When you work on this, you know, it's quite exciting to say, 'Hey, we've put that animal together like no one else had been able to put it together.'"

NOTTOWAY RIVER SURVEY ARCHAEOLOGICAL RESEARCH

This peanut field occupies an area that held some of the Williamson site's major evidence of Clovis activity. The field is pictured in April, several weeks after the Nottoway River Survey excavated test location 6. The peanut crop requires deep-row cultivating, which is harsh on archaeological resources.

Virginia's First Clovis Site Still Holds Scientific Riches

HOW MANY WELL-STUDIED Paleoindian sites are there in the Eastern United States that have undisturbed deposits believed to have been lost beneath plowed fields?

Virginia archaeologist Joseph M. McAvoy has reason to suspect that there may be many. McAvoy's company, Nottoway River Survey Archaeological Research, best known to Mammoth Trumpet readers for its discoveries at the Cactus Hill site ("Simple Tools, Hearth Beneath Clovis Horizon," **Mammoth Trumpet** 11:4), recently completed a preliminary assessment of threatened parts of the Williamson site in Dinwiddie County, Va.

"As you may know, the Williamson site was the first large Clovis site reported in the East," McAvoy told the Mammoth Trumpet. "The original work was done exactly 50 years ago by the late Dr. Ben C. McCary of Williamsburg, Va." McAvoy explained that the most extensively utilized parts of the Williamson site, devoted to cultivated fields, were thought to have been "plowed out" years ago. But through funding from the Virginia Department of Historic Resources (Threatened Sites Program), the Nottoway River Survey contracted to test the site to see if undisturbed material remained below the plowzone.

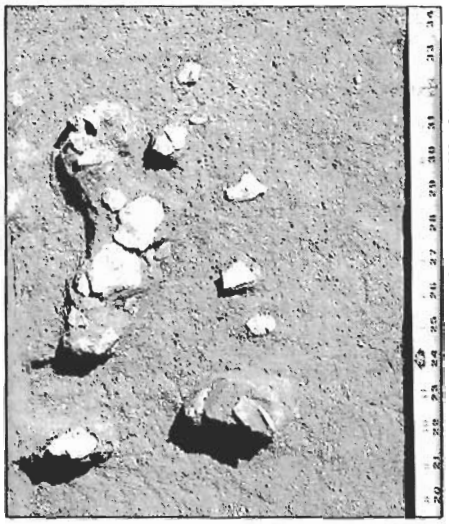
"Three months of shovel tests and three months of excavations produced a much different picture than previously imagined," said McAvoy. "On low terraces undisturbed deposits of Clovis-age material, 8 to 20 inches below the modern surface, were revealed." These indicate excellent potential for future research.

McAvoy is also excited about the variation in materials his team's research uncovered. Tool types recovered at the different test locations revealed extreme intrasite variability.

The Williamson site, designated 44DW1, is possibly the largest Clovis chert quarry and base camp in all of North America. Since its discovery in 1949, the site has attracted surface collectors interested in its Paleoindian artifacts, McAvoy said. However, he reports that "over the past three centuries the primary challenges to the subsurface integrity of the Williamson site have been from clearing the land, logging and agricultural activity."

David K. Hazzard of the Virginia Department of Historic Resources secured written permission from members of the Williamson family to conduct the excavation at the site. Most of the site is on the farm of Sally Williamson. The VDHR required McAvoy's team to select four areas of the site for auger and shovel testing followed by a 100-square-foot excavation in each of the four areas. McAvoy had extensive knowledge of the site, but before testing was started the team conferred with several collectors, a member of the Williamson family, and the farmer who leases the property. The team carefully studied Dr. McCary's published work as well as the topography of the farm. Then they selected for initial auger/shovel testing eight areas that showed the highest artifact concentrations in combination with the best topography for preservation of buried strata.

Most of the eight test locations re-



BOTH: NOTTOWAY RIVER SURVEY ARCHAEOLOGICAL RESEARCH

Plow cuts are revealed (left) in the archaeological deposit in this unit being excavated last February in Williamson test location 6. The concentration of flakes (above) was found in the same location. All had used edges and had come from only two cores. A graver also was found in the cluster.

vealed undisturbed deposits of apparent Clovis age beneath the plowzone. In the second test location the Clovis-age deposits were up to seven inches thick. Clovis-age material up to five inches thick was found in many of the tests in the third test location, but areas four and five seemed less promising. Test location six, an area that, because of the large number of artifacts recovered over the years, appeared to have been the most intensively occupied, proved to have undisturbed Clovis-age material up to 2.5 inches thick between deep chisel-plow cuts. Test location 7 produced a high density of artifacts in a shallow undisturbed deposit of Clovis-age material below two distinct plow zones. This discovery was somewhat surprising, McAvoy reports, because there were no previous accounts of artifacts being found there and because it contained wetland soils. This occurrence of artifacts was revealed by accident when the farmer put in a new drainage ditch. Test location 8 revealed a mixture of archaeological materials from Middle Woodland to Clovis with no apparent separation.

From the results of their shovel and auger testing, the Nottoway River Survey team selected locations 2, 3, 6, and 7 for the four 100-square-foot excavations required by the VDHR. Work started at location 6, which had to be excavated before the end of March to facilitate the farmer's plowing and planting schedule for the 1999 peanut crop. Approximately 1,000 lithic artifacts were recovered from the location. McAvoy reports that the

NOTTOWAY RIVER SURVEY ARCHAEOLOGICAL RESEARCH

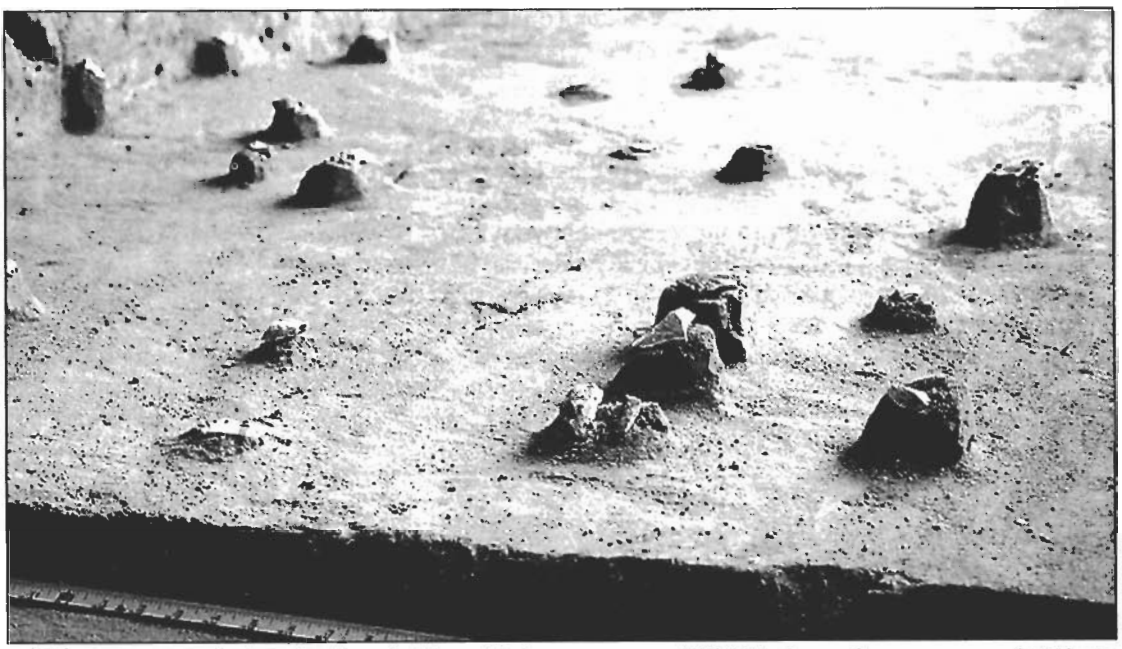
Joseph McAvoy stands in location 2 several weeks after it had been excavated. Cultural material, which included about 1,000 lithic artifacts, was found 17–19 inches below the surface. Debris had washed in after the excavation was completed but before it was backfilled.

most significant finding was a shallow, flat-bottomed pit filled with used flakes—possibly removed from two cores that appeared of Clovis age. The team retained all the soil from the feature for flotation and water screening.

Location 7, which had gummy, wet subsoil that made screening difficult, yielded clusters of chisel-wedges in most of the five excavation units. McAvoy said that hard percussion chisel-wedge spalls were associated with the wedges, but very little else. The team identified the location, which yielded several hundred lithic artifacts, as a specific task area where items such as large bones, tusks or trees were split and cut into smaller pieces. McAvoy hopes some of the artifacts can be analyzed for residual proteins and use wear.

ALL: NOTTOWAY RIVER SURVEY ARCHAEOLOGICAL RESEARCH

Lynn McAvoy (above, left) excavates an artifact cluster in test location 2. Artifacts visible in her unit include a core, a core-chopper, a side scraper, and flakes. Above are the basal fragment of a Clovis point, center, and a flake as they emerged from the moist earth of location 2. Joseph McAvoy (left) stands near test location 7, where the farmer's shallow drainage ditch, left, revealed artifacts. The Williamson farmhouse is in the extreme right.



NOTTOWAY RIVER SURVEY ARCHAEOLOGICAL RESEARCH

At the Williamson location 3 excavation in May, larger artifacts remain in situ. Joseph McAvoy believes that chert cores and blades in the site date to early in the period of Clovis occupation.

Location 2, on a relatively flat terrace, had cultural material about 17 to 19 inches below the surface. It yielded about 1,000 lithic artifacts from the more than 132 square feet that the team excavated during April and May. McAvoy speculates that the terrace probably was built up from fine materials that washed or blew from the top of the nearby hill when it was denuded by heavy use by the Clovis people. There the survey team discovered fragments of Clovis living surfaces.

NOTTOWAY RIVER SURVEY ARCHAEOLOGICAL RESEARCH

A crayfish excavating its home in the low ground near test location 7 brought up the artifact visible beside its hole. For its efforts, the crayfish was designated an honorary Nottoway River Survey volunteer.

At location 2 the team recovered fragments, just 16 inches apart, of two Clovis points made of metavolcanic materials, foreign to the site. These fragmentary points appear to have been discarded as they were being replaced by a new point made on site of Williamson chert.

Location 3 revealed the best-preserved charcoal samples, which were intermixed with burned chert artifacts, because of its sandy clay-loam soil. Among the 1,500 lithic artifacts recovered were some that seemed unusual for the Clovis occupation at the Williamson site. McAvoy reported that chert core blades were common in the location. "They all probably date from early in the period of Clovis use of the Williamson site," he reported, "But the small examples also resemble some of the small pre-Clovis quartzite examples recovered at Cactus Hill below the fluted-point level." Cactus Hill is just 12 miles southeast of the Williamson site.

"Radiocarbon dates from the lowest levels in the location 3 excavation units might help resolve the question of the earliest Clovis settlement of this area, as well as any relationship, time-wise, with the late pre-Clovis tradition at Cactus Hill." McAvoy also recommended that a few of the artifacts from location 3 be analyzed for residual proteins and use wear.

This initial assessment of the Williamson site included analyses by soils scientist Robert Hodges and an investigation of the wetland in location 7 by wetland consultants Mike Keeler and Pete Constanzer. A probe of the wetland revealed a band of gray clay, below the seasonal water table, that contained a large amount of charcoal, samples of which are being dated.

McAvoy says detailed preservation plans for the Williamson site are still several years away, but he is urging that deep plowing be halted at the two most-threatened test locations. Calling the two very significant and extremely threatened, he said they have "only two to three inches of undisturbed cultural material remaining." Deep plowing is required for growing peanuts, the crop grown this season on location 6, one of the two areas of greatest concern.

For the next phase of the study, McAvoy is recommending a variety of laboratory analyses including study of paleobotanical samples, at least 10 radiocarbon tests by accelerator mass spectrometer, further analysis of wetland soils, pollen analysis, phytolith analysis, and studies of lithic artifacts, as well as studies of tool wear and organic deposits on artifacts.

–DAH

First Americans Studies:

Caught Between Two Extremes

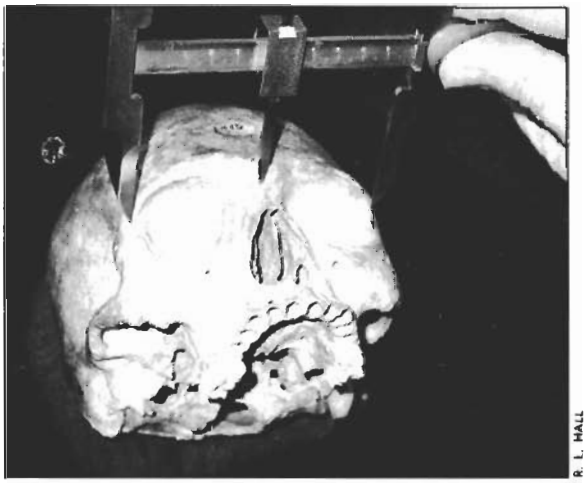
INVESTIGATION OF WHEN the Americas were first settled and by whom is a more perplexing challenge than I realized when I first began editing this news magazine eight years ago. Indeed, our reports of significant advances in First Americans Studies can cause us to lose sight of the staggering difficulties facing researchers who pursue the elusive goal of explaining human origins and migrations.

In addition to the real scientific challenges, I recognize that researchers also must face some artificial challenges because peopling of the Americans is a discipline caught between two extremes.

Two personal experiences, unrelated to First Americans Studies, recently converged to grant what I believe are insights into the dilemma facing all who would explain the earliest settlements of the Americas. With your indulgence, I'll try to explain these. First, for the past several months I've been working part time at the U.S. Environmental Protection Agency's Western Ecology Division laboratory writing brief newsletter articles about the results of a wide range of environmental research projects being conducted by the lab's many scientists. Secondly, over the past three years I've occasionally served as a technician in a human biology research project in which I have helped to measure more than 650 crania of humans who lived in all parts of the world.

The former experience has showed me the enormous lengths to which environmental scientists (mostly biologists and ecologists) must go to convince their peers of the validity of their research. To analyze problems such as human impact on the nation's streams and lakes, changes in the world's carbon's balance, and the effects of global warming, these scientists often employ enormous data sets. Statisticians and the complex new methodologies they have developed are key to much of environmental research.

The latter experience has made me aware of the great difference between the study of humans of historic times, say, the past 500 years, and humans of 10,000 or more years ago. It also has taught me the problems involved with newly discovered single specimens, while at the same time it has given me inside looks at some of America's leading museums where I've watched physical anthropologists at work on various projects regarding human origins, variations and dispersals. For example, at the American Museum of Natural History in New York, in addition to working with an extensive collection of skulls of people who lived in Europe, Africa, South America, Australia, and Asia, I was privileged to work in the proximity of scientists who were analyzing a *Homo erectus* skull on loan from its home country. This dark bowl-shaped object was thick and mineralized.



R. L. HALL

Scientists studying modern *Homo sapiens* must analyze many specimens to describe human variations.

These scientists discussed every topographical detail of this single fossil and what each might mean. It appeared to me more like a lithic artifact than it did the human crania I was working with. While I was helping to take measurements of many individuals in our project's study of modern variation, they were pondering, among other things, the slope of a single brow. Is that slope evidence that it was a different species than other *Homo* skulls known from Java, China, and Africa? Does its morphology indicate its age? Does its endocast, the cast museum scientists made of the shape of its brain, prove that this individual had the power of speech? Here were technical papers in the making, for these scientists would be publishing their descriptions of this marvelously preserved object. We shall be able to read their analyses in scholarly journals, and perhaps their conclusions will be reported in news magazines and papers. Each single fossil of human ancestors and related species is rare and precious almost beyond words, and as a result many words of description and analysis are heaped on each individual discovery, regardless of how fragmented the specimen might be.

Each perfect modern human skull I was measuring, in contrast, was not at all remarkable for itself, although I presume that the 19th-century collectors who gathered them for the edification of science believed that each had a story to tell. I could see that each skull was as individually unique as the person who occupied it, but I am well aware that the study of modern humans requires dozens of measurements on scores of skulls and statistical manipulation with computers to yield data that can be of scientific interest.

Yet to me, a non-scientist, the differences apparent in various modern skulls seem every bit as pronounced as differences between, for example, two particular early hominid skulls. I found myself wondering whether, if science in another time or place possessed *only* the last two or three skulls I'd measured, these might not be seen as representing two or three separate species rather than normal variations within a single population.

There is, in short, a very different set of rules for analyzing pre-human ancestors than there is for analyzing modern humans like ourselves. Single specimens of very ancient bones are of great interest, though science generally regards single

examples of relatively modern individuals as insignificant.

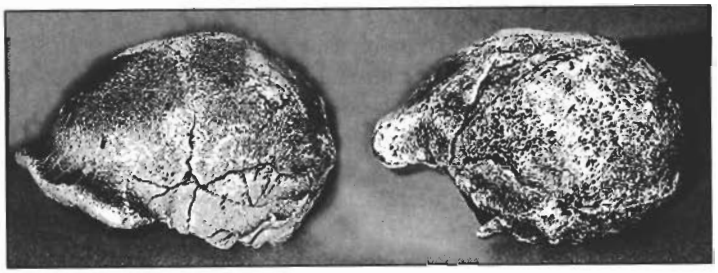
Precious remains and artifacts of the earliest Americans are caught between these two extremes. Science holds approximately the same standards for analysis of peoples and cultures a few thousand or several hundred years old as it does for the rare and rather skimpy discoveries dating back to the Pleistocene.

Archaeology, in particular, in its necessity to uphold scientific integrity, requires more or less the same standards for the earliest American sites as it does for sites that are much more recent. Further, earliest American sites are expected to look like those well-studied early European sites where the arrival of modern humans was marked by a profusion of stone tools. Some Clovis sites seem to fit this model, but earlier American sites obviously do not. Some evidence seems to suggest that earlier Americans may have specialized more in tools of bone, wood, or other materials that don't stand up to the ages as does stone.

Artifacts from any era are far more abundant than the remains of those who created them. The **Mammoth Trumpet** has frequently reported on the rarity of remains of the earliest Americans. Very few date back to the Paleo era, and those of early-Archaic age are almost as rare. In a real sense, each is an unknown and isolated individual from a mysterious time and an enigmatic place. Individual bones, however, do tell important stories of the life and hardships of one person. The question is whether we think their story is significant.

When is a single specimen—an artifact, a bone, a whole skeleton—significant? We've all heard of paleoanthropologists positing a new species of hominid based on the discovery of a single tooth and bit of jaw. I once heard a Neanderthal authority give a 20-minute presentation on a single bone fragment from a mid-Pleistocene site. It was considered worthy of such scrutiny because it was the only trace of human remains found in a famous British site that has yielded many artifacts.

An American anthropologist would not, could not, describe such a discovery, because all archaeological material in the Americas is presumed evidence of modern humans, and we're all anatomically the same, single species.



The two single *Homo erectus* skull caps (casts) from China, left, and from Java, each have been intensively described in scientific literature. The single specimen above them (known as "the black skull") has been the subject of an entire conference. Considered by many as representing the species *Australopithecus aethiopicus*, its status is still controversial. Even fragments of Australopithecines, such as the example below, are subjects of many scientific publications.

ALL: DON ALAN HALL

If an alien scientist found a skeleton of our species, it surely would study the bones with great interest, but there's a good chance that even the most careful description of the specimen would not portray *Homo sapiens* very accurately. Having performed measurements on many crania from modern humans who lived on every continent, my nonspecialist's impression is that there is great variety within each geographical population, and further, that people everywhere look remarkably similar. Although we may have ideas of what an "Eskimo," a "Bushman" a "Mongolian," an "Australian," or an "American Indian" looks like, I've been struck by the amount of variation in the facial architecture of every group I've been privileged to examine. Among every people I've perceived there are big, rugged faces and small, delicate faces. There are no obvious "normals," and although forensic anthropologists will disagree, I believe that only statisticians can make scientific order of all our measurements of these crania.

An ecologist can tell us much about the state of a lake by carefully examining the flora and fauna it harbors, but regardless of how carefully the study was conducted, the data can't describe the environmental health of the entire region. Only collective data from a properly chosen representative sample of the region's lakes can do that.

Similarly, human biologists must base sweeping observations of modern human variation only after analysis of many individuals. Even the observation of large numbers of individuals raises questions of sampling, because the collections in the world's museums and medical centers certainly do not contain human remains that were randomly selected. Today's analyses can, however, strive not to introduce additional biases. Further, the afflictions of a single individual, as evidenced by marks left in the skeleton, can tell much about the morphology and the relative health of one person. Problems come only if we try to generalize from one to all. I believe each specimen *does* have a story to tell.

First Americans Studies will no doubt remain in its uncomfortable in-between position, never having abundant enough evidence for large statistical data sets, nor seldom, if ever, dealing with data considered so exceedingly rare that each single unit is looked on as significant *per se*. We may not like the situation, but it means that interesting scientific controversies about initial human settlement of the Americas are sure to continue.

–Don Alan Hall

Scientific Profiles of Remote Baja Site?

NO PROBLEM

"The literature of science is filled with answers found when the question propounded had an entirely different direction and end."

–John Steinbeck,
"The Log from the Sea of Cortez"

SO IT WAS when two dust-covered, sweat-bathed archaeologists stood on a sun-cracked dry lake on the high plains of Baja California staring forlornly at the twisted wreckage of a rented backhoe they had just sacrificed on the altar of scientific exploration.

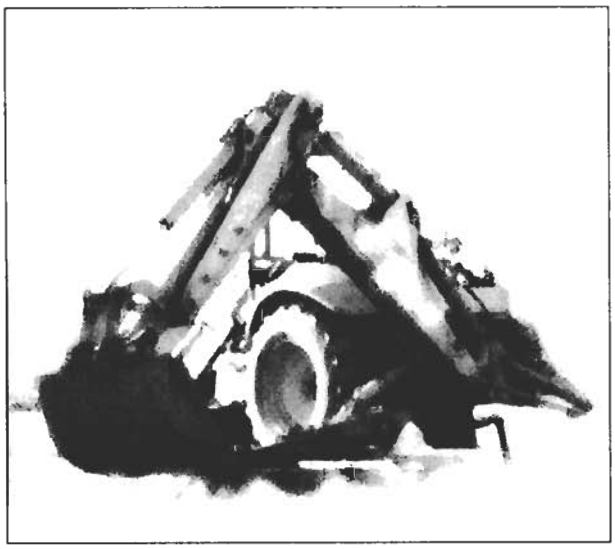
What had begun weeks earlier as a late 20th-century search for answers to questions about early humans in the New World had suddenly taken a different direction. Problem solving of a practical sort now became the focus and the resulting answers, while not on such a theoretical plane as the initial inquiry, enhanced their appreciation of cultural linguistics among a Mexican people skilled at meeting challenges with limited resources.

The two researchers and others in their party had come with high expectations to Laguna Seca Chapala about 325 miles south of San Diego. A year earlier, stone tools dated to about 9,000 years old were found in excavations along the prehistoric lake shore. During this field season, trowel-wielding archaeologists were recovering more stone tools and tool-making debitage, possibly of the same age or older. Their finds might illuminate more clearly when people first came to the New World.

Scores of bone fragments, tentatively identified as mastodon and possibly prehistoric camel, lay scattered about the surface of another dry lake a scant dozen miles to the northwest. Stone tool fragments that also lay among the bones suggested that people may have been associated with the animals, possibly contributing to their deaths or benefiting from their remains.

Stretching the limits of their Spanish language skills, the researchers had negotiated for the backhoe to quickly dig trenches to reveal soil stratigraphy necessary to define the lake's prehistoric shorelines. The backhoe trench could also determine whether mastodon and camel bones and cultural artifacts lay underground in the outlying dry lake.

But negotiating for the backhoe, an integral part of a Massey Ferguson tractor, was neither quick nor easy.



DON ALAN HALL

Its owner, at the infrequent times he was in Baja, was more than one hour away and might be reached by telephone at his home on the Sea of Cortez. Possibly he could be reached in Los Angeles, Calif., where he often worked on construction projects. The nearest telephone, when it was available for public use, was 40 minutes away from the archaeologists' camp, but protracted negotiations eventually produced the backhoe.

There ensued a 400-mile journey to procure 50 gallons of diesel fuel to keep the backhoe running. Lots of diesel fuel pumps are shown on Baja maps, but supplies are sporadic and not at all reliable.

Once it was fueled by (the archaeologists) sucking fuel into a length of plastic hose and then siphoning the diesel to the tractor, the machine bounced and lurched across the dry lake and its rolling environs that bristled with spiny plants such as the agave, cirio (also known as the boojum tree), and ocotillo. Twenty-five trenches quickly scored the suspected shoreline.

Thrilled by their rapid success, the archaeologists took the backhoe on a bone-jarring drive to the outlying dry lake at an average speed of six miles an hour. On that playa's wind-clawed and cattle-stomped face, their trenching discredited the hypothesis that stone tools and mastodon bones lay beneath the surface scatter.

Of more immediate concern on the journey, the homeward-bound backhoe itself now listed toward the setting sun near the edge of the second dry lake. The tractor nearly jarred itself apart bouncing along a crumbling asphalt road and rutted dirt track to the lake bed, where the surface *really* got rough. There, the backhoe pulled loose from mooring bolts tying it to the tractor.

Now motionless and balanced askew on its bucket, the backhoe threatened to topple into the sand. That obviously would shear its umbilical cord of hydraulic hoses—repairing such a disaster would even more obviously strain the project budget.

The situation looked grave, not to mention embarrassing for the amateur backhoe operators now concerned more about economics than archaeology.

Facing the problem squarely, the researchers moaned and rationalized—it wasn't as if the backhoe was in good condition when they rented it. Weren't two of its mooring bolts broken when the machine first arrived? And one hydraulic hose had spouted fluid like a ruptured artery. Also, one of the solid front tires was shredded to its core.

The mechanics who had delivered the machine shrugged and in English uttered a commonly heard phrase: "No problem."

Now, it appeared, there *was* a problem.

Fortunately, another motor vehicle fa-

cilitated the agonizingly slow retreat to a telephone, where the frantic call to the backhoe's owner produced a short and seemingly shocked silence.

Then he calmly announced that his mechanics would assess the damage.

Dollar signs hung in the air.

After providing researchers ample worry time, the same two mechanics who earlier delivered the machine arrived to meet the archaeologists. They followed the researchers to the outlying lake bed in a clean pickup, which soon was caked in dust and mud. With expressions clearly questioning the judgment of those who had driven the backhoe over such tortuous terrain, they huddled near the backhoe, talking animatedly between themselves in Spanish.

Their conclusion?

"No problem."

With nothing but a chain connected to one of the backhoe's hydraulically powered outrigger feet, the mechanics swung the backhoe mounting plate back onto its stripped bolts with the machine's own muscle. The process seemed painfully slow and several near-disasters occurred. But the mechanics only laughed, knotting the stomachs of the watching archaeologists.

Cannibalizing bolts from elsewhere on the machine, the mechanics used available wrenches and geology hammers to cobble the broken parts together. They tied the jerry-built rig to the tractor with the chain. Then with clenched teeth and shoulders hunched at every bump, one researcher piloted the trussed machine back to Laguna Chapala for future repair. The backhoe owner blamed no one. He took the mishap in stride—a complete surprise to the archaeologists who "knew" this lesson would be expensive.

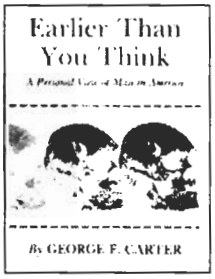
Long-term analysis of data collected from archaeological excavation and geoarchaeological exploration with the backhoe may yet illuminate issues related to early humans in the New World. But immediately profound answers to the more mundane mechanical problem offered keen insight into cultural adaptability by the natives who call this often difficult-to-work-in isolated desert environment their home.

And they gave deeper meaning to the phrase "no problem." MT

–George Wisner

A Personal View: Older Than We Think

Editor's note: Publicity about the Coastal Entry hypothesis and pre-Clovis-age sites like Monte Verde prompted geographer George F. Carter to remind us that he and other investigators have long argued that humans have been in the Americas for at least 100,000 years. His book, Earlier Than You Think: A Personal View of Man in America *(Texas A & M University Press, 1980) describes his research and perspectives. The following article focuses on a few California sites and artifacts, notably the metate, that Dr. Carter believes deserve further attention.*



George F. Carter, formerly full professor and department head of the Johns Hopkins University Department of Geography, thinks evidence in California points to people having been in North America for at least 100,000 years—perhaps twice as long. His interest in archaeology dates back to his undergraduate degree in anthropology from the University of California at Berkeley and his four-year stint as Curator of Anthropology at the San Diego Museum of Man in the 1930s. From 1967 until his retirement in 1977, he was Distinguished Professor of Geography at Texas A & M University.

In a recent interview, Dr. Carter told the **Mammoth Trumpet** that he thinks researchers would do well to take another look at some of the California sites and artifacts that have been studied in the past. Carter's study of plant geography has led to his special interest in the America's early people, whom he classifies as "broad-spectrum hunters and gatherers, meaning they ate anything that they could catch or gather." His specialty in plants caused Carter to pay special attention to the *metate*—a stone block with a concave surface people used to grind corn and other grains with a milling stone called a *mano*. Manos and metates have been used for thousands of years by various hunter-gatherer peoples in California and throughout the world. Carter says metate users were preceded by a "very long time when less-equipped people existed in America." Following is a summary of some of Carter's observations about metates and places they have—and have not—been found.

At San Diego, metates are found in alluvial layers that were built upon the exposed continental shelf when sea level lowered as the glaciers grew in size. In interglacial times, as the sea rose these alluvial layers were cut back by the attack of the surf. Long cross sections were exposed above water in what can be referred to as flights of terraces. These terraces have been geologically dated from late Pleistocene to Pliocene. The metates are found in the younger terraces, below the 300-foot level, and are younger than 100,000 years, probably dating to the early part of the last major glaciation, said Carter. To put it in perspective, the upper terraces, from 300 feet on up, are considered middle to early Pleistocene, and Carter says that metates are never found associated with them. Terraces below 300 feet date from the last lowered sea level that exposed the coastal shelf.

Manos and metates were found directly on top of the shell beds that underlie Crown Point at Mission Bay in San Diego. A huge granite mano was found cemented right to the top of the highly eroded surface of the older shell bed, said Carter. There is evidence of a high sea level followed by a low sea level with the shell bed eroded. He believes that people moved in to live close to the sea when the sea level rose again. This period, he says, was followed by another high sea level and the filling of Mission Bay with sandy silts, then erosion due to a lowered sea level. Two metates were found right on top of the shell bed, again, he believes, providing a record of people moving back to the seashore. Then still another episode of erosion occurred and finally, with the rising sea levels in the current inter-

glacial period, the bay is again being filled by the San Diego River.

The Texas Street site is on the south side of Mission Valley, about five miles from the sea and three miles from Mission Bay. This site is now virtually in downtown San Diego. There are no metates in the deep levels at the Texas Street site, which he believes dates back 100,000 years.

At Santa Barbara, D. B. Rogers noted the presence of very early metate users who made much use of sea and land resources, says Carter. (Three men named Rogers have been involved in Southern Californian prehistory: Malcom Rogers at the San Diego Museum of Man, Spencer Rogers at the University of San Diego, and D. B. Rogers at Santa Barbara.) According to Carter, the record of early coastal people using the metate survives on knolls today covered with oak groves. D. B. Rogers called these people the Oak Grove people, and the metate was their defining implement. The soil at the Oak Grove sites is extremely hard and cemented. The manos and metates found there are well rotted and indicate great antiquity, says Carter.

The final period noted by Rogers was the Canalino Period. These people were skilled fishers who went to sea for sea mammals. The soil at these sites is loose and fluffy. Carter says that UCLA archaeologist Clement Meighan once sent him a soil sample from a Canalino site at Little Harbor on Catalina Island that dated to 3,880 years ago ± 200 years. Carter describes this soil as black, loose, fluffy, and with no discernible soil horizons. It is as fresh as the modern sites in the San Diego area, he says. According to Carter, 4,000 years is not enough to even start the soil processes that lead to the formation of the young, brown soils of the Hunting Period or the much older soils of the Oak Grove Period.

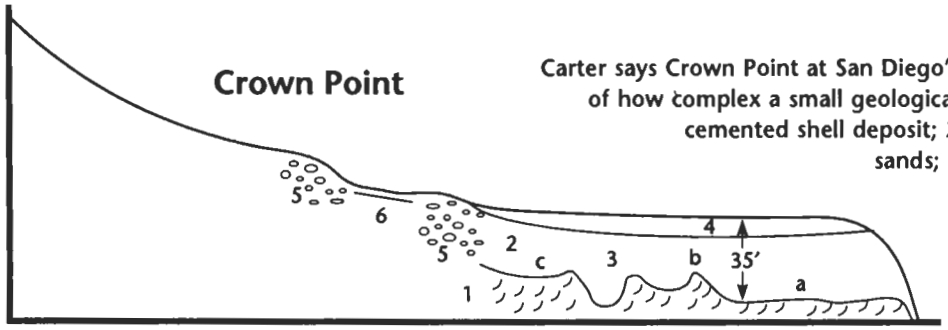
Carter says that at times Rogers found superimposed sites with Canalino at the surface and the soil fluffy, black and loose. Under that lay the Hunting Period with stiff brown soils, and under that the remains of the Oak Grove culture with weathering now gone on to virtually stony conditions.

At Tecolote Canyon, 11 miles west of Santa Barbara, Rogers found a site with evidence of manos and metates resting right on a beach formation that was deeply buried by about 50 feet of alluvium. A deep highway cut had been made through an older terrace and a landslide had blocked the highway. The road crew told Rogers that artifacts had been seen at this site, so he took a closer look. He found a fragment of a metate in the slide material, but discounted it as not in place.

According to Carter, Rogers studied the strata that rose about 50 feet above the road level and noted that the original front of the formation was 50 feet back from the face of the present cut. He studied the strata in the face and described them in detail. A shale formation was overlain by a beach material and above that was evidence of a brief violent episode of heavy boulder deposit and then finer material to the surface. He found a well-worn mano in place immediately above the beach material. On subsequent visits he found a fragment of a metate and another mano in the same stratification position. All showed advanced weathering. He described their condition as fragile and the metate fragment in the slide debris the same.

Carter later visited this site and reviewed Rogers's stratigraphy, which he thinks is generally correct, though perhaps closer to 35 feet in elevation rather than 50 feet. Carter says that Rogers did not note that the overlying strata seem mildly folded, nor did he note the presence of a Hunting Period midden on the surface that was probably not exposed in his day. Carter says the Hunting Period site was not likely to have contaminated the site because manos and metates had been replaced by the mortar at Santa Barbara by that period. At San Diego, Carter says the metate remained in use into the historic period alongside the late-arriving mortars.

Carter says he asked Phil Orr (late curator of anthropology at the Santa Barbara Museum of Natural History) to show him the Crown Point site, and he found D. B. Rogers's description quite accurate. "It is unimportant whether the high terrace is the result of uplift of land or the falling of sea level due to an oncoming glacial," says Carter, who says that soil at the site guarantees an early date, "certainly far beyond 10,000 years ago." Unfortunately, today the Crown Point site is mostly obscured by development.



GEORGE F. CARTER (P. 167, *EARLIER THAN YOU THINK*)

Carter says Crown Point at San Diego's Mission Bay is a good example of how complex a small geological feature can be: 1) underlying cemented shell deposit; 2) a younger shell beach; 3) cemented sands; 4) loose brown sands; 5) buried cobble ramps of old beaches; 6) buried ancient soil. The archaeological finds from this site include a) hearth; b) mano; c) metates directly on top of the shell beds.

On Santa Rosa Island off Santa Barbara, says Carter, thick alluvial strata overlie interglacial beaches, and evidence of humans is found throughout these alluvial covers. He says the long sequence of cultures is much like what D. B. Rogers reports for Santa Barbara. Carter says he pointed out to Phil Orr that the dwarf mammoths Orr found on the island were resting inside fireplaces. Orr later found slaughtered mammoth bones that date to about 27,000 years ago. Carter says that a UCLA geochronology specialist also found the foreleg of a mammoth in a fireplace along with stone tools, but he does not know if the geochronologist ever published that finding.

California's Channel Islands were never linked with the mainland, even at lowest Pleistocene sea levels, and could only be reached with watercraft. Carter says in 1930 he and a San Diego Museum of Man party spent five weeks on San Nicolas

Island, which is considerably farther than Santa Rosa Island from the California mainland. The expedition, Carter says, found no evidence for the Oak Grove people on San Nicolas, but did find evidence for the Hunting People on the highlands of the island. So Carter believes that humans were living not only along the California coast, but even getting out to sea at quite an early time.

Small stone bowls, the bases of basket-hoppered mortars, occur in several submarine sites along the Southern California coast, says Carter. To create a basket-hoppered mortar the maker cuts the bottom out of the basket, then cements the top part of the basket with tar to a small shallow base of stone. The stone bowl is typically about eight inches in diameter and four to six inches thick.

At Santa Barbara Rogers found bases in onshore sites with the remains of the tar still present that had held the basket hopper in place. Typically, says Carter, these are found offshore in Southern California in concentrations of hundreds and suggestive of dense occupation. Near San Diego such a site was examined in detail by the divers at the Scripps Institution of Oceanography. These finds record the occupation of the continental edge at a time of lowered sea level. Ten thousand years ago the sea level was still 100 feet below that of today and the continental shelf at San Diego was well exposed. The stone bowls, says Carter, record people of D. B. Rogers's Hunting Period living on the exposed coastal shelf. Carter has never found these little bowls at San Diego in the late onshore sites.

–Carol Ann Lysek

Suggested Readings

Birkland, P. W. 1972 Late Quaternary Eustatic Sealevel Changes along the Malibu Coast, Los Angeles County. *California Journal of Geology* 80:452–448.

Carr Tuthill and A. A. Allanson 1954 Ocean Bottom Artifacts, *The Masterkey* 28:222–232.

Carter, George F. 1957 *Pleistocene Man at San Diego*. Johns Hopkins Press. Baltimore.

——— 1956 On Soil Color and Time. *Southwestern Journal of Anthropology* 12:295–324.

——— 1980 *Earlier Than You Think*. Texas A&M University Press

Orr, P. C. 1968 *Prehistory of Santa Rosa Island*, California. Santa Barbara Museum of Natural History, Santa Barbara.

COMING CONFERENCES

Sept. 30–Oct. 2 4th Rocky Mountain Anthropological Conference, Hotel Colorado, Glenwood Springs, Colo.
Contact: Marcel Kornfeld, University of Wyoming, P.O. Box 3431, Laramie, WY 82071-3431; 307-766-3548. Abstracts due July 1. e-mail:anpro1@uwyo.edu.

Oct. 4–8 XIII Congreso Nacional de Arqueología Argentina, Córdoba, Argentina.
Contact: Casilla de Correo 1082, Correo Central 5000, Córdoba, Argentina. Fax: 5451-68-0689. e-mail: 12cnaa@ffyh.unc.edu.ar. For information: www.filosofia.uncor.edu.

Oct. 20–24 57th Annual Plains Anthropological Conference, Ramkota Inn, Sioux Falls, S.D.
Contact: Archaeology Laboratory, Augustana College, 2032 S. Grange Ave., Sioux Falls, SD 57105. 605-336-5493. HANNUS@inst.augie.edu.

Oct. 28–Nov 1 Conference: Clovis and Beyond, Santa Fe, N.M. Sponsors: Center for the Study of the First Americans, Museum of Fine Arts, Laboratory of Anthropology of the Museum of New Mexico, and the Smithsonian Institution.
Contact: Clovis and Beyond Conference. 505-982-8520.

Nov. 7–11 Multidisciplinary Conference—Human Remains: Conservation, Retrieval and Analysis, Williamsburg, VA.
Contact: Deborah S. Chapman, Williamsburg Inst., P.O. Box 1776, Williamsburg, VA 23187-1776. 800-603-0948. dchapman@cwf.org.

April 5–9, 2000 65th Annual Meeting of the Society for American Archaeology, Philadelphia.
Contact: SAA, 900 Second St. NE, Suite 12, Washington, D.C. 20002. 202-789-8200. meetings@saa.org; www.saa.org. Deadline for submissions: Sept. 2.

Send conference notices to Mammoth Trumpet, 620 Northwest Witham Drive, Corvallis, OR 97330

New Books

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moth Site of Hot Springs, SD, Inc., 220 8½ x 11-inch pages. 1999. $29.95 (softcover) plus $6 shipping and handling. Available from publisher, P.O. Box 692, Hot Springs, SD 57747; e-mail: mammoth@mammothsite.com.

This book uses the model proposed by R. Dale Guthrie of the University of Alaska–Fairbanks for the "Mammoth Steppe" biome to trace the evolutionary history of the mammoth-rhinoceroses faunal complex from the Pliocene to the end of the Pleistocene. These are the cold-adapted mammals that inhabited the Eurasian Mammoth Steppe, which included the steppe tundra of Beringia. It was originally published in Germany in 1995 and quickly went out of print. Mammoth Site of Hot Springs has published this English edition, translated by Hans van Essen of Dieren, Netherlands.

Dr. Kahlke is a paleontologist-geologist specializing in the large mammals of the Quaternary of Eurasia. He directs the Quaternary Paleontology Section of the Friedrich-Schiller University–Jena at Weimar, Germany. Organized taxonomically, the book covers carnivores, including wolves, foxes, mustelids, bears, hyenas and cats; mammoths; horses; rhinoceroses; and artiodactyla, including deer, moose, caribou, bovids, bison and musk oxen. He discusses the fossil records, geographic origins, chronology of origin and dispersal, essential adaptive mechanisms, ecological development, and precursors of the late-Pleistocene fauna. The book includes an extensive bibliography and a number of range-distribution maps.