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).
Alberta Scientists Track Mammoths Across Recently Exposed Landscape

Draining a reservoir near Cardston, Alberta, a year ago changed 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 wa-
tered there. Presence of those extinct animals is not merely inferential, for paleontologist Len Hills and archaeologist Brian Kooyman of the Uni-

versity of Calgary have actu-

ally tracked them, or at least collected their remains.

What’s more, Drs. Hills and Kooyman and their col-

leagues hope to track or ex-
cavate more such marvelous beasts this fall when water in the
reservoir is to be drained again. And Kooyman expects to gain more under-
standing about the presence of the people who were in southern Alberta as long ago as the Pleistocene.

The site, potentially two square kilome-
ters or more in extent, is northeast of Cardston and not far from the eastern ramp-

arts of the Rocky Mountains. It became exposed by the most unlikely circum-

stances. “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 1980 growing season so that work could begin on a new spillway for the dam. By

lowering the water level 10 meters to accom-
plish 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 be-
tween 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, in-

spected 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 Geo-

physics at the University of Calgary. “When I first went down to look at his collect-

ion,” 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 de-
scribed the site to Kooyman of the U of C archaeology department.

Days later Hills got a phone call from

continued on page 6
New Books

Ice Age Peoples of North America, Robin Bonnichsen & Karen L. Turner, editors. A co-publication of the Center for the Study of the First Americans and Oregon State University Press, 510 8th x 11-inch pages, 1999. $49.95 (hardcover) plus 54 shipping and handling.

Here is a detailed compendium of late-Pleistocene Paleoamerican archaeologi-
cal records from North America and Northeast Asia that are changing percep-
tions about the origin of the First Ameri-
cans. Though scientists have been investigating the peopling of the Ameri-
cas for most of the twentieth century, there still is no specific evidence that al-
lows us to say when the first people en-
tered 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 de-
scribe the background and conse-
quencies 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-
tractions contemporaneous with Clovis; and acceptance by skeptics of the 12,500-
year antiquity of the Monte Verde site in Chile. Their introduction presents a de-
tailed analysis of the status and the future of First American Studies.

The following three chapters focus on geophysical aspects—Ice Age environ-
ments of Northern Eurasia, especially western Berigie; the impact of ice-re-
lated plant nutrients on the environments of glacial margins; and periglacial ecol-
ogy. 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 or the Pleistocene peoples of Japan, the colonization of western Berigie, the peopling of Alaska, and the Old Crow Basin of the Yukon.

Several chapters by archaeologists di-
rectly 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 de-
tailed summary of information from the earliest sites in several states and prov-
ces. The next chapter assesses radiocarbon chronology of 13 Paleoamerican sites in the Southeast. 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 ra-
diocarbon dates and what it means to the site and to First Americans studies in general. They argue that Meadowcroft represents the earliest bona fide evi-
dence of human occupation south of the glacial ice in North America.

A chapter by South Carolina archae-
ologist 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 geo-
archaeological 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 Mire-
bell. They describe the chronology of human occupation, starting from the ear-
liest period that they believe began be-
tween 60,000 and 35,000 years ago.

MAMMOTH TRUMPET

The Mammoth Trumpet (ISSN 8755-8989) is published quarterly by the Center for the Study of the First Americans, Department of Anthropology, Oregon State University, Corvallis, OR 97331-6510. Phone 541-737-4595. Periodical postage paid at Corvallis, OR 97333. e-mail: csfa@orst.edu.

POSTMASTER: Send address changes to:
Mammoth Trumpet
356 Wessinger Hall, Oregon State University,
Corvallis, OR 97331-6510

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The Center for the Study of the First Americans is a non-profit organization. Subscription to the Mammoth Trumpet is by membership in the Center.
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, Bobon Bonnichsen, editor, Center for the Study of the First Americans, 160 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 ("Paleo-biology 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. Gezzy 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. Owsey 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 Mammutthus-Coelodonta Faunal Complex in Eurasia (Large Mammals), by Ralf-Dietrich Kahleke. Mammoth.

Just published—a milestone contribution to American paleoarchaeology

The Fenn Cache: Clovis Weapons and Tools
by George Frison and Bruce Bradley

The Fenn cache is a remarkable collection of 56 projectile points, tools, and preforms manufactured in America when the primary food source was mammoth. Beautiful actual-size color photographs by Pete Bostrom show both sides and one edge of Clovis points and preforms. There are also full-size line drawings of both sides of each artifact.

Text by two of America's foremost paleoarchaeologists covers Clovis origins and archaeology, mammoth hunting, flintknaping, and much more. This beautiful new book may be purchased for $45.00 plus $4.75 postage and handling. Questions? fenn@trail.com

Published by One Horse
Land and Cattle Company
of Santa Fe, New Mexico

[Form for orders and payments]
Top Experts to Gather For Conference on Peopling of Americas

The Clovis and Beyond Conference, Oct. 28–31 in Santa Fe, NM., 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 time to present on many topics relating to the archaeology and paleohistoriography 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, Penn, Drake, and Crook County; and weapons and tools from the Sheepeater.

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 Sandia Shopping Center, 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/ceda/cda.htm. 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

Welcome Address
Eric Blom, Museum of Indian Arts and Culture

Introduction to the Conference Perspective
Rob Bonnahe

The Future of Public Policy: What Do We Do from Here?
Moderator: Andrea Harris
The Society for American Archaeology Perspective
Ken Kiritgy
The Academic Archaeologist's Perspective
Brad Legge
The Avant-Garde Archaeologist/Killer-STAR Perspective
Jim Warren
A Native American Perspective
Joe Watkins
The Department of Justice Perspective
Leah Schiller
The Lawyers/Scientist's Perspective
Alex K 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
Alex Regen
Cline, Climate Change and Extinction
C. Yvonne Heggan Jr.
Cline and the Pre-Clovis Traditions West of the Mississippi
Dennis Stanford, Margaret "Peg" Jodry, and Rob Bonnann

Lunch Break
Are We Sure It's Clovis?
Kenneth Sekerak

The Goshen Cultural Complex:
A Paleoindian Cultural Group Overlapping Clovis
George Frison
Evidence of Pre-Clovis Sites in Eastern North America
Albert Goodyear
Mastadon, Mammoths, and Humans in the North American Mid-Continental
Doug Fisher
Late Pleistocene Bone Technology in the North American Mid-Continental
Steve Holen

Saturday, October 29

A Geochronological Approach to the Study of Early Archeological Sites in the Western United States
Mike Waters

Current Archeological Evidence for a Late Pleistocene Settlement of South America
Roth Grun

Horticulture North American Connections: The Smithsonian Workshop
David Mellen

The Age of 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
Walker Ross, Gris Shanks and Rob Bonnahe

Lunch Break
Ice Age Humans in Asia and the Peopling of the Americas
Richard Jones and Douglas Owsley

Ice Age and Recent Skeletals in the Americas
Joseph Powell, Emily Shels, and Walter Myers

The Future of Research: Where Do We Go from Here? (10-minute presentations)
How can we develop better chronologies of the past?
Tom Stoddard

Thoughts on Clovis Exploration and Colonization of New Lands
David Mellen

How can we build better models of Paleoamerican dynamics?
Peg Jodry

What does the Monte Verde site, Chile, say about the nature of the first Americans? What research opportunities should be addressed?
Ben Dilley

What is the importance of "solid technology" in the reconstruction of Paleoamerican 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 chipped variability of Paleoamerican populations in comparison with modern Native Americans and what are the implications for understanding the peopling of the Americas?
Richard Jones

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

Integrating archeological, genetic and skeletal data from Asia, North America, and South America: How solid is the case for pre-11,500-year-old occupation?
Alex L. Shopar
Tracking Mammoths

continued from page 1

Tolman reporting another large skull. Hills and Koosman 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, *Buducrium bombycinos*. 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, Koosman, and Hills walking about the site, returning to where they had extracted the *Buducrium* 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 ceaseless 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 Koosman, 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 *Buducrium* 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." Identification of those ungulate tracks still is not absolutely certain. The potential the tracks held for revealing animal behavior was so intriguing that Paul McNeill, 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 so the mammoth 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 hadn'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 30 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 Boreothion skeletons were all found in the B horizon, although the Boreothion 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 Boreothion came out to 10,080 ± 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 are 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 Lien, 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."" Kooyman and his colleagues are only beginning the research that could strengthen the links between the Pleistocene
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 flat plain 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 was added would be 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-
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 woolly mammoth, or steppe, musk ox (Bootherium boomeri) 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 microbiopscopically 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 attentively 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 Archeologist Jack Rees 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 large-scale samples from them and see if we can put it 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 fast moving 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. has described the site as "a Martian landscape," and added that the researchers "spent a lot of the time out there getting sensitized trying to recover these materials."

So how does Hills know how much sediment was removed to expose the Pleistocene track? 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 stacked with rocks and clover for hibernation, apparently just as the reservoir was first being filled. In the CavStone 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.

-DAN
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 end 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 southward 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 Gain Support as Ice-free Corridor Theory”), but Ives, 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 inexpressible 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 bisons, 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.’”
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 12:4), 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 plowline.

"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, 6 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 44DW3, 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 the 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 form. 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 night test locations re-
revealed undisturbed deposits of apparent Clovis age beneath the plowzone. In the second test location, the Clovis-age deposits went up to seven inches thick. Clovis-age material up to five inches thick was found in many of the areas 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 seven 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 eight 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
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, tubers or trees were split and cut into smaller pieces. McAvoy hopes some of the artifacts can be analyzed for residual proteins and use wear.

Lynn McAvoy (above, left) excavates an artifact cluster in test location 2. Artifacts visible in her silt 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 3, where the farmer's shallow drainage ditch, left, revealed artifacts. The Williamson farmhouse is in the extreme right.
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. The survey team discovered fragments of Clovis living surfaces.

At location 2 the team recovered fragments, just 16 inches apart, of two Clovis points made of metamorphic 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 identified 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 south-east 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 Constante. 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 soil wear and organic deposits on artifacts.

"-DAH
First Americans Studies: Caught Between Two Extremes

INVESTIGATION OF WHEN the Ameri
cans were first settled and by whom is a
more perplexing challenge than I esti-
lated 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 migra-
tions.

In addition to the real scientific chal-
lenge, I recognize that researchers also
must face some artificial challenges be-
cause prepping of the Americans is a dis-
cipline caught between two extremes.
Two personal experiences, unrelated to
First Americans Studies, recently con-
verged to grant what I believe are in-
sights 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 Protec-
tion Agency's Western Ecology Division

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

...lab writing brief newsletter ar-
ticles 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
cranial of humans who lived in all parts of
the world.

The former experience has showed me
the enormous lengths to which environ-
mental 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
to key of 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 discov-
ered 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 hu-
man 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, Af-
rica, South America, Australia, and Asia, I
was privileged to work with the profusely
of scientists who were analyzing a Homo
erectus skull on loan from its home coun-
try. This dark bowl-shaped object was
thick and mineralized.

These scientists discussed every topo-
graphical detail of this single fossil and
what each might mean. It appeared to me
more like a poetic artifact than it did the
human cranial 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. In 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 sci-
entists make 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 mar-
velously preserved object. We shall be
able to read their analyses in scholarly
journals, and perhaps their conclusions
will be reported in newspapers and
magazines. Each single fossil of human an-
cedotes 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 effacement of science be-
lieved that each had a story to
tell. I could see that each skull was
as individual unique as the person who occupied it,
but I am well aware that the
study of modern humans re-
quires dozens of measure-
ments 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 differ-
ces apparent in various modern skulls seem
every bit as pronounced as differ-
ces between two or the particu-
lar early homind 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 var-
iations 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 hu-
mans like ourselves. Single specimens of
very ancient bones are of great interest,
though science generally regards single
examples of relatively modern individu-
als as insignificant.
Precious remains and artifacts of the
earliest Americans are caught between
two extremes. Science holds ap-
proximately 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 shaggy
discoveries dating back to the Pleis-
cocene.
Archaeology, in particular, in its neces-
sity to uphold scientific integrity, re-
quires more or less the same standards
for the earliest American sites as it does
for sites that are much more recent. Fur-
ther, earliest American sites are expected
to look like those well-studied early Euro-
pean sites where the arrival of modern
humans was marked by a pro-
fusion 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 cre-
ated them. The Mammoth
Trumpet has frequently re-
ported on the rarity of re-
mains of the earliest Ameri-
cans. 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 iso-
lated individual from a mysterious
time and an enigmatic clan. Indi-
vidual bones, however, do tell impor-
tant 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 arti-
fact, a bone, a whole skeleton—signifi-
cant? We’ve all heard of paleoanthro-
pologists 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-Plenistocene site. It was con-
sidered 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
America is presumed evidence of mod-
ern humans, and we’re all anatomically
the same, single species.

The two single Homo erectus skull caps (casts) from Java, 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.

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 non-
specialist’s impression is that there is
great variety within each geographical
population, and further, that people ev-
erywhere look remarkably similar. Al-
though we may have ideas of what "Bakhtos," a "Bushman," a "Hmongian," an "Australian," or an "American Indian" looks like, I’ve been struck by the amount of variation in the facial architecture of everyone I’ve been privileged to exam-

ine. Among everyone I’ve observed, there are big, rugged faces and small,
delicate faces. There are no obvious "normals," and although forensic anthro-
pologists will disagree, I believe that only statistics 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 con-
ducted, the data can’t describe the envi-
ronmental health of the entire region.

Only collective data from a properly chosen representa-
tive sample of the region’s lakes can do that.

Similarly, human biolo-
gists must base sweeping ob-
servations of modern human variation only after analysis of
many individuals. Even the observation of large numbers of individuals raises ques-
tions of sampling, because the collections in the world’s
museums and museums are almost cer-
ters certain do not contain human remains that were recently selected. Today’s analyses can, however, serve to introduce additional biases.

Further, the affinities of a single in-
dividual, as evidenced by marks left in the skeleton, can tell much about the morphology and the relative health of an individual. Problems come only if we try to generalize
from one to all. I believe each speci-
tum does have a story to tell.

First Americans Studies will no doubt remain in its incomparable in-between position, never having abundant enough evidence for large statistical data sets, but seldom, if ever, dealing with data con-
sidered 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 contro-
versies about initial human settlement of the Americas are sure to continue.

-Don Allan Hull
Scientific Profiles of Remote Baja Site?

NO PROBLEM

"The literature of science is filled with answers found when the question propounded had in entirely different direction and end."
—John Steinbeck,
"The Log from the Sea of Cortez"

O 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 started with high expectations to Laguna Seca Chapultepec 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 debris, 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 being benefited from them.

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 under the outlying dry lake.

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

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 strapping 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, cítrix (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 immediate concern on the journey, the homeward-bound backhoe itself now listed toward the setting sun near the edge of the secondary 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, scuttled to its mooring bolts tying it to the tractor.

Now motionless and balanced askew, 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 spluttered fluid like a ruptured artery. Also, one of the solid front tires was shredded to its core.

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

Now, it appeared, there was a problem. Fortunately, another motor vehicle fa-
A Personal View: Older Than We Think

Editor's note: Publicity about the Coastal Entry hypothesis and pre-Clovis-age sites like Monte Verde has 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 metates, that Dr. Carter believes deserve further attention.

George F. Carter, formerly full professor and department head of the Jibsos, Hopkins University Department of Geog- raphy, 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 ethnology from the Univer- sity 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 specialization in plants caused Carter to pay special attention to the metates—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 of the Americas and throughout the world. Carter says metates were used 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 ex- posed above water in what can be referred to as flints 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 a 300-foot level are last lowered sea level that exposed the coastal shelf.

Manos and metates were found di- rectly on top of the shell beds that under- lie Crown Point at Mission Bay in San Diego. A huge granite mass 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 last lowered sea level that exposed the coastal shell beds. Metates, and metates were found di- rectly on top of the shell beds that under- lie Crown Point at Mission Bay in San Diego. A huge granite mass 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 last lowered sea level that exposed the coastal shelf.

And they gave deeper meaning to the phrase "no problem."—George Wisner
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 California prehistory: Malcolm 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 Canallito Period. These people were skilled fishermen 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 Canallito site at Little Harbor on Catalina Island that dated to 3,680 years ago ± 200 years. Carter describes this soil as black, loose, fluffy, and with no discernible soil horizon. 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 Canallito at the surface and the soil flaky, 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 metate 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 package. 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 close 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 uncomining 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.

Carter notes that 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 mammoth 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 geochronologist 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 1980 he and a San Diego Museum of Man party spent five weeks on San Nicolas Island...
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-hopper quartars, occur in several sub-marine sites along the Southern California coast, says Carter. To create a basket-hopper 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 in the late onshore sites.

—Carol Ann Lysek

**COMING CONFERENCES**

| Sept. 9-10 | 4th Rocky Mountain Anthropological Conference, Hotel Colorado, Glenwood Springs, Colorado. Contact: Marcel Korbel, University of Wyoming, P.O. Box 1431, Laramie, WY 82071-3431; 307-766-3548. Abstracts due July 1. e-mail: aspro@uwyo.edu. Oct. 4-8 | XII Congreso Nacional de Arqueologia Argentina, Cordoba, Argentina. Contact: Caixa de Correo 1082, Correo Central 5000, Cordoba, Argentine. Fax: 54-55-69-069. e-mail: 12casa@flyh.ly.is.co.ar. For information: www.filosofia.unq.edu.ar. |

**New Books**

continued from page 3

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 602, Hot Springs, SD 57747; e-mail: mammoth@mammothsite.com. This book uses the model proposed by T. Dale Guthrie of the University of Alaska-Fairbanks for the "Mammoth Steppes" biome to trace the evolutionary history of the mammoth-rhinoceros 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 steppes 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. Falots in a paleontologist/geo- | lologist 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 taxonomic, he book covers carnivores, including wolves, foxes, mustelids, bears, hyenas and cats; mammoths, horses; rhinoceroses; and artiodactyl, including deer, musk, boar, bison, and musk oxen. He discusses the fossil records, geographic origins, chronology of origin and dispersal, essential adaptive mechanisms, ecological development, and preursors of the late-Pleistocene fauna. The book includes an extensive bibliography and a number of range-dis-

**Suggested Readings**


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