



MAMMOTH TRUMPET

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First American roots—literally

The bulbs of these camas plants, which grow wild in large parts of the West and Northwest, have been a staple of American hunter-gatherers for more than 9,000 years because they found that the bulbs will keep for years if properly cooked. That means steaming them for 24 to 48 hours! What's more, they found a simple way of cooking up a batch. It's called an earth oven, a stone-lined depression like the one TAMU Anthropology professor Alston Thoms and his students are building here in the mid-1980s in the Calispell Valley, Washington, while Kalispel Indian advisors look on. After the rocks are fired red-hot, bulbs and vegetable matting are piled on and the bulbs are left to cook. A sediment-filled pit lined with fire-cracked rocks is the archaeological evidence of past cookouts. Dr. Thoms is investigating diet for its role in shaping the lifestyle of primitive cultures, and also for its possible effect on animal and human cranial morphology. His story starts on **page 4**.



BOTH: ALSTON THOMS



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 the Department of Anthropology at **Texas A&M University**, promotes interdisciplinary scholarly dialogue among physical, geological, biological and social scientists. The **Mammoth Trumpet**, news magazine of the **Center**, seeks to involve you in the peopling of the Americas by reporting on developments in all pertinent areas of knowledge.

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Ted Goebel

Second in command at CSFA

GIVEN A SCIENTIST with Ted Goebel's impressive résumé, you'd expect a crusty, grizzled veteran, not a soft-spoken fellow who's disarmingly modest and isn't even graying at the temples. Editor of *Current Research in the Pleistocene* since 2004, Dr. Goebel (pronounced Gable) recently joined Texas A&M University as Associate Professor of Anthropology and Associate Director at the Center for the Study of the First Americans.

When prodded, he admits his expertise in the study of stone tools complements the skills of CSFA Director Mike Waters. "My expertise in archaeology has to do with lithic artifact analysis," he explains. Since Dr. Waters is first and foremost a geoarchaeologist, "we approach the problem of the peopling of the Americas from different perspectives and different spe-

cialties." Goebel's experience in Siberia, Alaska, and the far western U.S. also nicely dovetails with Waters's prodigious research in the eastern and southern U.S.



Kelly and Ted at Glacier National Park, August 2005.

INSIDE

4 A new subsistence strategy

With the disappearance of megafauna, early Americans had to find a new food source and invent a way of cooking it.

7 Precisely dating the end of the megamammals

We have to revise our thinking on when Ice Age animals died out and how big a part human predators had in their demise.

10 Looking for Paleo immigrants on the Oregon coast

Maybe not all First Americans made the crossing on foot. Perhaps some arrived in boats—and explored up rivers, not down.

13 Spirit Cave Man still in limbo

Court decision doesn't fault BLM's finding, only its procedures.

14 A look at famous early South American sites

Ruth Gruhn concludes her guided tour of the southern continent with a visit to sites that leave Clovis-first boosters dazed.

Goebel forfeited his executive directorship of the Sundance Archaeological Research Fund when he left the University of Nevada, Reno (UNR), to come to TAMU. Sundance is one of five Archaeological Research Funds endowed by Joe Cramer, a retired petroleum geolo-

gist, specifically to find new evidence of the first Americans (**MT 18-1**, "A Campaign to Find the First Americans"). The area Sundance ARF is chartered to explore is the Great Basin. As much as Goebel enjoyed that position, he says the opportunities at TAMU are broader and more challenging.

Back to First Americans research

His move to TAMU brings him back to his roots of specialization. As a graduate student he studied Peopling of the Americas archaeology in Alaska and Siberia. After receiving his Ph.D. in Anthropology from the University of Alaska-Fairbanks in 1993, Goebel was an assistant professor at Southern Oregon University from 1994 to 1998. He then moved to the University of Nevada. For 14 years his work has focused on the western U.S. He found himself gradually drifting away from Bering Land Bridge archaeology, noting it has become increasingly difficult over the last several years to get to Alaska or Siberia to do research. He is excited to focus again on the question of the origins of the first Americans, "the kind of research I initially set out to do when my career started 20 years ago."

Time off from Beringian archaeology wasn't wasted time. "I've learned a lot working in the Great Basin and Nevada," Goebel tells us, "and really enjoy that country and will never quit working there. But I will have more freedom to do the other archaeology that I was initially trained to do back in the old days when I was just a young pup. . . . I have a good while before I'm old enough to retire, so I have lots of years to spend working on these problems."

A focused career and lifestyle

In graduate school, Goebel learned to read Russian. He says it is more a research tool than a measure of his linguistic ability. Although he admits being fairly fluent in matters related to archaeology, he isn't confident of his ability to speak or compose a paper in Russian. He dismisses his language skills with the bland statement that "it's something you've got to do when you are working in an international context. You have to bite the bullet and learn the language of the region you are interested in."

His determination and dedication are unwavering, extending even to marriage. His wife is archaeologist Kelly Graf, who is a co-director of the research being done at the Bonneville Estates Rockshelter (**MT 18-3**, "A Beachfront Getaway in Nevada"). "We get to do field work together and spend time together during the summer," says Goebel. "We're not separated like a lot of archaeologists and their spouses."

Things are still "in a state of flux" for Goebel, who is busy tying up loose ends

from UNR. When we spoke, he was preparing to host a workshop at TAMU on the archaeology of the Bering Land Bridge and northern Siberia. Colleagues attending, drawn from Russia, Canada, Alaska, the lower 48 states, and even France, share an interest in discovering how and when the north of Asia and eventually Alaska and the Yukon Territory were colonized. Goebel excitedly expanded on the 4-day symposium, deliberately kept small (about 40 people) to encourage focused discussion. "The



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Mammoth Trumpet, Statement of Our Policy

Many years may pass between the time an important discovery is made and the acceptance of research results by the scientific community. To facilitate communication among all parties interested in staying abreast of breaking news in First Americans studies, the **Mammoth Trumpet**, a science news magazine, provides a forum for reporting and discussing new and potentially controversial information important to understanding the peopling of the Americas. We encourage submission of articles to the Managing Editor and letters to the Editor. Views published in the **Mammoth Trumpet** are the views of contributors, and do not reflect the views of the editor or **Center** personnel.


—Michael R. Waters, Director

goal is first of all to get everybody up to speed on what we know about the archaeology of Beringia," he explains. "Second is to define what we need to know to understand how it was that people colonized the Americas from this Beringian perspective." Goebel hopes the symposium, which is funded by the National Science Foundation and International Quaternary Association, will spawn an international long-term priority statement, "a document that funding agencies like the United States National Science Foundation or the National Geographic Society would find useful to help them define how they want to provide funds for this kind of research."

Reaching out with our yearbook

As editor of *Current Research in the Pleistocene*, Goebel is working to regenerate its international content. Last year there was a series of papers from Russia. This year's issue has 16 articles from Japanese scientists, and the number of submissions from South America has also increased. Goebel hopes the inclusion of Japanese papers in this year's *CRP* will "get the word out that Paleolithic archaeology in Japan is not dead and there are really some quality scientists doing some really interesting things." Goebel recounts the devastating blow Japanese archaeology took about six years ago with the Shin'ichi Fujimura scandal. Fujimura was a public hero, an amateur archaeologist who almost single-handedly pushed back the antiquity of humans in Japan hundreds of thousands of years. "Politically this sort of thing can become really important," says Goebel. "It may not be obvious but there is strong nationalism in Japan. . . . Fujimura became very popular. It became obvious about six years ago that he had been 'salting' the sites, and Japanese Paleolithic archaeology was thrown into mass confusion. Any site Fujimura had anything to do with, even if he just visited the place, became suspect. Everyone had to go back and reevaluate their work. It took five years to define what was fabricated and what was real. Fujimura was stripped of his position and reputation and socially disgraced." Goebel frankly admits that "it is not quite clear why it took them so long to figure out what was going on." Fujimura was

exposed as a fraud when a major Japanese television network hid cameras across his archaeological site and captured him on film planting artifacts at sunrise, then later showing the artifacts

Now that we have him captive, we can hold him to his promise to keep *Mammoth Trumpet* readers informed of the results of his research. 

—Dale Graham

The Biggest One Ever!

At 226 pages long, yearbook 23 in the series has more information than we've ever packed into an issue.

New this year in the "Special Focus" section is the opus of 16 contributions by Japanese scientists on the Paleolithic archaeology of Japan. Professor emeritus Charles Keally of Sophia University, a veteran of 40 years' work in Japanese archaeology, frankly discusses how the Japanese scientific community has come

to terms with a protracted hoax spanning 25 years and affecting 186 sites.

We visit sites as distant as the Russian Far East, South Africa, Chile, and Alaska. Articles by Latin American scholars examine Folsom points in Mexico, extinct faunal remains in a Patagonia rockshelter, and a new mammoth locality in Mexico. In North America we'll update you on such familiar sites as Hiscock, Topper, Blackwater Draw, and La Sena, and introduce you to a new Paleoamerican site in Nebraska, an elk kill with associated fluted point in Wisconsin, Paleoamerican quartz points collected from Minnesota and Ontario. . . .

If you haven't pre-ordered vol. 23, *Current Research in the Pleistocene*, use the form inside the rear cover to order your copy.

CURRENT RESEARCH IN THE PLEISTOCENE

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A Peopling of the Americas Publication

being dug up. In Goebel's words, "He was caught red-handed."

Goebel will be developing immediate joint projects with Russian colleagues. He plans to wrap up UNR business by next summer and start new projects in Alaska, and he hopes to get back to Siberia in the next couple of years.

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Fire-cracked Rocks *and the* Carbohydrate Revolution

ARCHAEOLOGISTS have long looked at large fire-cracked rock (FCR) features, like those of the earth oven described by our Archaic mother in "Changing Ways." Some FCR features are as much as 9 ft in diameter, and the stones in them weigh more than 2,000 pounds. They are found all across North America in every type of climate, and they date anywhere from 9000 RCYBP to as recently as 400 years ago. So why haven't many of us heard of them? According to Alston Thoms, professor of Anthropology at TAMU, "Pieces of fire-cracked rock are not nearly as exciting to most archaeologists as, say, a Clovis point or a mammoth tusk." Okay, so maybe FCRs aren't very sexy. Nevertheless archaeologists have known for a century that the sudden appearance of large ovens filled with FCR in the archaeological record had something to do with changes in the way people ate or in the way they cooked their food. Dr.



Thoms proposes that this evident change, which appears to have been quite pronounced, fits perfectly with evolutionary science of today from the standpoint of both cultural and physical adaptability of humans to changing conditions.

Physical characteristics of FCRs and earth ovens

The size, shape, and weight of FCRs vary. Some FCRs can weigh over 30 pounds and measure 3 to 4 inches thick and a foot across, but many FCRs found are only about twice the size of a man's fist. Dense, homogeneous rocks make the most effective cookstones. Thermochemical weathering during the heating process makes the rocks porous and brittle, reducing their ability to retain heat. For this reason the rocks may not have

Changing Ways

ICAN HEAR MY CHILDREN as they run along the river bank. The sound of their shouts and games reaches all the way to the edge of the clearing where my sisters and I use antler-handled wooden digging sticks to dig camas bulbs. My children are collecting heavy, dense stones while their younger cousins collect brush and twigs. They all laugh and giggle; everything is still a game to them. But I worry for their future.

A hole has been dug in the earth near camp. After the hole is filled with the children's brush and twigs, and the newly collected stones are laid out on top of the brush, grandmother will light the fire. Everyone has great respect for fire. If we could not cook the camas, they would not be good to eat.

Long before the sun sets we return to camp. The fire has almost burned the brush down completely. We first spread a thick layer of fresh leaves on top of the hot rocks to protect the roots from burning, then quickly put the freshly cleaned roots into bags and layer them across the glowing rocks, alternating layers of fresh leaves and layers of the root-filled bags. Finally we cover the whole thing with a thick layer of earth. I love to watch the steam

and smoke rise eerily above the mound. While the children "hunt" each other they watch for their fathers to return. The women watch too, with furrowed brows. We wonder if there will be meat. The land has become crowded, and competition for game is fierce. For several weeks now my heart has been heavy with the loss of my brother, Anu. He was killed when he followed the buffalo into a neighboring territory. Grandfather tells stories of the days when he was a boy and the game was plentiful, when the great mammoth roamed the land.

Anu had always dreamed of being a great hunter like his grandfather, and of having exciting tales to tell his own grandchildren. Sadness fills my heart, and yet I feel so empty. The smell of the smoke from the cooking camas is very strong now.

The roots will not be ready to eat until the sun sets two more times, and most of them will have to be stored, but I can almost taste the slightly sweet smoky goodness of the bulbs already.



been reused many times. Thoms suspects that children and their mothers often had the job of gathering rocks and brush for the earth ovens, and of procuring and processing roots and other plant foods.

To make an earth oven a hole is dug in the earth. Local fuel is then laid down, and rocks are placed on top of it. The fuel might be wood, brush, or buffalo chips, depending on the ecology of the region. Once the fuel burns down, the rocks settle into the hole, acting like hot coals, but lasting much longer. Paleomagnetic studies reveal that the red-hot rocks reach temperatures of over 500°C.

FCRs in the field are identified by rocks out of place, perhaps embedded in fine-grained sediment. FCRs are also distinguished from ordinary rocks by sharply angular contours and often by a reddened, rusty appearance caused by oxidization of iron in the rocks. Oven rocks buried in the earth may still be coated with soot.

Camas, a favorite root crop

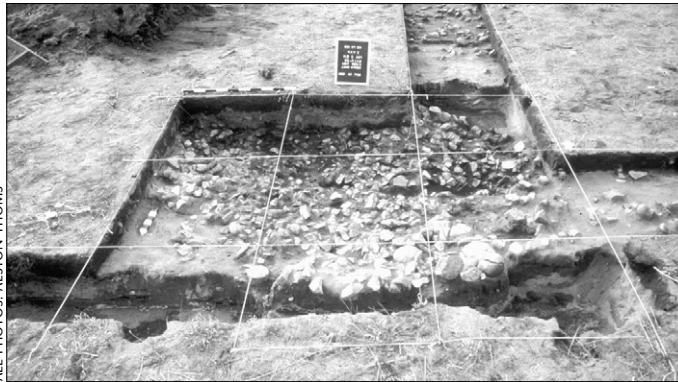
Prior to the 1980s scientists recognized that the period 8000–9000 RCYBP saw an increase in the number of FCR features. These features, however, were assumed sometimes to be related to the processing of meat, especially if a projectile point was found at the site. Many archaeologists today, however, agree that most earth ovens were probably used to bake plant foods, especially roots. Thoms notes that charred camas (*Camassia* spp.) bulbs were first recognized in the Pacific Northwest in the 1980s as the result of cultural resource management (CRM) practices. “It was the archaeologists out in the field, in front of dams and roads and bridges and power lines, that first recognized charred camas bulbs,” he explains. “You can imagine if you’ve been digging all day excavating cookstones that it would be easy to overlook a charred camas bulb.”

Thoms was among the field archaeologists working in the Pacific Northwest in the 1980s. As a Ph.D. student in the Department of Anthropology at Washington State University, Thoms studied and worked with Dr. Allan Smith, an ethnographer who documented Kalispel Indian lifeways in the 1930s. Importantly, Thoms also worked with Kalispel elders who still cooked camas in traditional ways. Ms. Alice O’Conner as a young girl had served as a translator for Dr. Smith; in the 1980s and 1990s she taught Dr. Thoms, his field crews, and field school students how to construct and use experimental camas ovens. Thoms was doubly fortunate to work in a valley containing thousands of rock-filled earth ovens,

and to hire archaeobotanist Nancy Stenholm, who specialized in charred plant remains. These new finds sparked further study, and by the early 1990s charred camas bulbs were being identified at sites as far away as Texas.

Although camas is a lily-family cousin of the onion, the enzymes in our digestive system can’t break down the inulin—a complex carbohydrate—in the raw camas bulb. In talking with Native Americans, scientists learned they cooked camas bulbs for 24 to 48 hours to render them digestible. Cooking the bulbs also liberates the sugar in the roots and brings out a sweet taste. Earth ovens with rock heating elements were ideal for cook-

**Intact earth oven (ca. 3460 yr B.P.)
in the Calispell Valley, Washington.**



ing camas because they could provide intense heat for extended periods. What’s more, in some locales the only fuel available may have been buffalo chips or brush fuel, which certainly wouldn’t burn very long.

Thoms found that camas was a staple in parts of the Pacific Northwest through the Holocene period. The roots could be procured and processed in large quantities; after being cooked in an earth oven, they could be stored for decades. The earth oven partially dehydrated them, and a thin sugary layer coated every surface of the bulb, including any punctures, working as a natural preservative. Thoms recalls the memoirs of David Thompson, mapmaker and explorer of the late 1700s and early 1800s, who wrote of eating cooked camas he had stored 30 years. Thoms himself can attest to the bulbs’ edibility 10 years after cooking.

Processed camas was the canned food of the Archaic period in various parts of North America from British Columbia to Texas. So why did early Americans start cooking this way?

Still a mystery

Humans had been living in North America for thousands of years, apparently doing perfectly well on diets consisting

largely of meat but presumably supplemented by raw or easily cooked plant foods. In an archaeological moment people all over the country were building large earth ovens and cooking root foods. It’s perplexing, since almost no evidence of



**Building a camas oven in
Montana with field school
students in the mid-1990s.**

this cooking technology is seen beforehand. It was a sudden revolution that radically changed eating habits.

Thoms, finding that this sudden upsurge in earth oven cookery occurred over large areas at essentially the same time,

began to look for a common thread. "Some of these areas are deserts," he notes, "some are Pacific maritime forests, some are the Great Plains, and here in Texas and California in savannah settings. So: hot, cold, warm, dry, forest, grassland, desert, shrub. What I think is in common in all of these places is that at about the same time the landscape becomes packed and pretty soon there can be too many people to live by hunting." Thoms calls the Archaic culture's response to this overcrowding *land use intensification*. He cites Louis Binford, who says that people in times of privation will move to smaller game, then to aquatic resources, and then to root foods. The considerable time and effort required to process camas bulbs seems to support Thoms's conclu-



Thoms with western camas bulbs in Washington State in the mid-1980s.

sion that something must have compelled people to adopt this more difficult method of cooking.

Is it possible the technology already existed? It makes sense that an increase in population could force people with limited resources to reach back into that store of knowledge for alternative methods of subsistence. Although camas bulbs took a long time to process, they were very abundant.

Have enough data been collected on FCRs to approximate the origin and spread of the technology? Thoms believes it probably spread too quickly for us today to determine a point of origin. He also points out that "cooking being as open and public an activity as it is, it is almost impossible to conceive of someone having control of a certain cooking technology and their neighbors not knowing about it."

Cranial morphology may give us clues

Around the time of this "carbohydrate revolution," the

Eastern camas (*Camassia scilloides*), also known as wild hyacinth, grows in Texas and areas east and north. Related plants are western camas (*C. quamash*), also known as blue camas and camas lily, which grows west of the Rockies, especially in the Northwest; and big camas (*C. leicitlinii*), which grows west of the Cascade Range primarily in Washington, Oregon, and northern California.



skull shape of natives of the new world changed from elongated (dolichocephalic) to more rounded (brachycephalic). One theory is that there was an influx around the time of this change of more round-headed people, who intermingled with the long-headed natives. Thoms argues that by 30,000 years ago, people throughout the world probably relied on cookstone technology.

The oldest earth ovens known, in Japan, date to about 32,000 RCYBP. France has earth ovens dating close to that, and some in the Middle East date to 20,000 RCYBP. Allowing the possibility that a subsequent wave of settlers to the Americas introduced round-headedness and cookstone technology, Thoms nevertheless argues that a forced change in their diet and subsistence strategies in general, evidenced by this change in cookery, may be related causally to these new head shapes. He points out that by 30,000 years ago fully modern humans had emerged in the Old World, and that paleoanthropologists studying *Homo erectus* and other hominid remains have suggested that changes in cranial shape and body morphology were coincident with if not triggered by dietary changes. Thoms insists that we shouldn't dismiss as coincidence changes in cranial shape seen around 30,000 RCYBP, and again around 8000 RCYBP, and changes in diet, especially given the archaeological evidence of new cooking technologies emerging around those times.

Although Thoms concedes that many current models cite migration as the probable cause for cranial morphology, with one shape dominating as the result of genetics, he posits another scenario, and his hypothesis has some solid assumptions behind it. He compares the modern buffalo to the now-extinct buffalo of late-Pleistocene North America, *Bison antiquus*, noting that paleontological evidence indicates that *B. antiquus* actually evolved into modern buffalo (**MT 16-2**, "Bison Aren't What They Used to Be"). "What became clear to me as a scientist was when I looked at

Bison antiquus, they were larger and their heads were differently shaped, their horns were much bigger, much longer. Those bison evolved into modern bison over a very short period of time. And migration is seldom invoked as a reason to explain that evolution. That evolution is really a dietary evolution that changes because the climate changes and bison have to take on new eating strategies." This same concept of adaptability, he maintains, is demonstrated by dwarfism on islands. An island is a restricted place. Not having great distances to travel, size is no longer an advantage, and as a result island animals become

smaller. On one Indonesian Island, there is now evidence that dwarfism affected humans as well. Says Thoms, "That shouldn't be a big surprise."

In his book *Skull Wars*, author David H. Thomas discusses issues of race and skull shape. He cites the work of Franz Boas,

continued on page 18

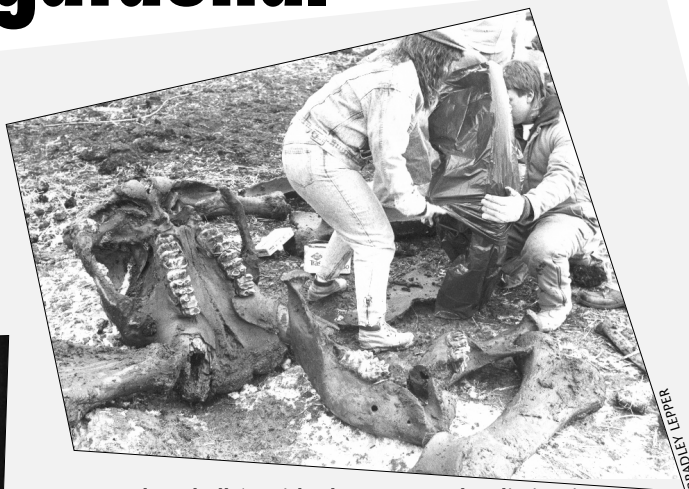
The Timing of Megafaunal Extinctions in North America

Earlier Than You Think



SMITHSONIAN INSTITUTION: TOMMY FULCHAM, PHOTOGRAPHER

Mammoth skull with tusks at the Lamb Springs site, Colorado. The mammoth and mastodon were the last of the megafauna to disappear from North America.



BRADLEY LEPPER

Mastodon skull (upside down, note the distinctive teeth) at the Burning Tree site, Ohio.



SMITHSONIAN INSTITUTION: ALISON WITTER, PHOTOGRAPHER

Bones of several hundred bison create a 'bone bed' at the Jones-Miller site, Colorado. Bison were heavily hunted by humans after the demise of the mammoth and mastodon. The bison at the Jones-Miller site were hunted by Hell Gap hunters. The bone bed is a result of repeated bison kills over one winter.

ONE OF THE MOST CONTROVERSIAL ISSUES in the First Americans arena involves megafaunal extinctions. At roughly the same time that humans were spreading across North America in significant numbers, many of the continent's larger mammals were vanishing utterly from the scene. To some researchers, it's always seemed obvious that humans must have had something to do with their demise, even if it was just to push already-stressed megafaunal populations over the metaphorical edge. This viewpoint is most eloquently expressed by paleoecologist Paul S. Martin, whose controversial overkill hypothesis postulates that humans have been responsible for most megafaunal extinctions worldwide for the past 50,000 years. Some observers, however, have been leery about putting the blame on humans for killing off New World megafauna. Given the results of a recent study led by geoscientist Russell Graham and radiocarbon expert Thomas

Stafford, those observers may have been on the right track.

It's well established that, from about 10,800 to 11,500 RCYBP, 33 genera of large mammals became extinct in North America. This seems awfully suspicious, since it was about that time that the Clovis people (the first widely distributed human culture in the New World) were proliferating across the American landscape. As on the other populated continents, there seemed to be a logical link between the widespread appearance of modern humans and the disappearance of many megafaunal life-forms.

However, no direct causal relationship between human predation and megafaunal extinctions has ever been proven. Some data, in fact, militate against this conclusion: Why was it, for example, that some species survived the appearance of humans and some did not? As Dr. Graham points out, "We have evidence, now, that bison numbers were not high during the late Pleistocene and early Holocene the way they were later. If

humans drove the other animals to extinction, why not bison?" Why not indeed? There are at least five known Clovis bison kill sites, and bison have been hunted with increasing pressure throughout the late Pleistocene and Holocene. Might the timing of the megafaunal extinctions and the peopling of the Americas be little more than coincidence? Is the apparent simultaneity of the events simply more apparent than real? Graham, Stafford, and their colleagues think so, and they've marshaled some impressive evidence to support their hypothesis.

A spurious correlation?

When examining a mass of data, it's possible to draw the wrong conclusions based on existing information. This is known as a spurious correlation. For example, if you collected information on all the fires in Chicago over the course of a decade, you'd quickly note that the amount of damage caused by a fire correlated directly with the number of fire engines at the fire. However, to conclude that the fire engines caused the damage is a spurious correlation, based on misreading the data. Correlation doesn't necessarily equal cause.

Just because humans seem to have appeared in North America just as megafauna populations began to decline precipitously doesn't mean that the two events are necessarily related. Recently, a research group consisting of a number of interested geoscientists set out to resolve the issue. Chief among them were Graham, director of the Earth and Mineral Sciences Museum at

Tom Stafford at the Topper site in South Carolina, 2002.

Pennsylvania State University, and Stafford, a geochronologist and biochemist who built the radiocarbon lab at the University of Colorado and now operates his own research lab. Also involved were Ernest Lundelius of the University of Texas, Holmes Semken of the University of Iowa, Greg McDonald of the National Park Service, and John Southon from the AMS ¹⁴C dating laboratory at University of California-Irvine.

The initial phase of the project involved isolating remnant collagen from the remains of animals that had died on or near the Pleistocene/Holocene interface. The team selected specimens based on their knowledge of faunal material in collections across the country—though in some cases, samples were collected in situ from the archaeological contexts in which they occurred. "We tried to select specimens based on their stratigraphic position, and tried to get the latest ones," says Graham. "We dated 17 of the 32 genera that went extinct in North America during the late Pleistocene." Since their initial round of dating, the number of individual radiocarbon dates has risen to over 200 and the number of dated genera to 18.

While their date estimates proved to be spot-on in most cases, there were a few surprises. One in particular that stands out is *Equus laurentius*, the cranial remains of what was originally

regarded as a new Pleistocene horse species. Graham, Stafford, and Co. soon discovered that the bone actually derived from two modern horses that had died in the 19th century. As early as 1926, W. D. Matthew suggested that this was the case; but his conclusions were ignored, although, as Stafford notes, "bit wear was evident on the teeth." *E. laurentius* was dethroned from its place in paleontological history, and the record was set straight.

New methods, better results

In order to obtain significant results without huge margins of error, the team needed radiocarbon dates with very tight margins of error, no more than ± 20 to 30 years. "It is only in the past five to six years that measurement precision, dating accuracy, and calibration curves back to 20,000 RCYBP and older dates have become suitable for unraveling very closely timed archaeological and geological events," Stafford explains. In order to maintain the study's integrity, they avoided any dates that did

not directly date the animal. Dates had to be on fossil bone of the extinct taxon in order to provide unquestionable evidence of the timing of the animal's death. They focused on species that had few, if any, associated radiocarbon dates. Most of the dated fossils were either from Clovis-age sites or from the oldest available late-Pleistocene deposits in a particular locality. To test the concept that a few isolated populations of otherwise-extinct megafauna had survived into the Holocene, the research group also located and dated megafaunal material purported to be from the early and middle Holocene.

Bone collagen was their best bet, now that new chemical purification techniques have overcome previous problems associated with collagen dates. Although the protein samples were sometimes quite small, with vastly improved accelerator mass spectrometry (AMS) dating them was rarely a problem. Once all the data were in and

they all took a hand in analyzing the data, an obvious pattern jumped out at them. While the date range for the first great extinction event overlaps the "Clovis Window" as now accepted, it also marks a time of major climate change. As Graham points out, "The timing of the event cannot be used to 'prove' either climate change or human interaction as the cause. They cannot be separated in North America."

Results with some surprises

The dating project revealed that in all but two cases, remains initially thought to date from the Holocene actually dated from the Pleistocene. The exceptions were mammoth remains from two Arctic sites, Wrangel Island and St. Paul Cave, Alaska, where isolated populations appear to have survived for thousands of years after their extinction everywhere else. Furthermore, the study found that the shift from terminal Pleistocene to Holocene was quite abrupt. "We know now that the transition between the Holocene and Pleistocene was less than 40 years—



DARYL P. MILLER, SCIAA-USC

less than a human lifetime,” states Graham, “and so the biota’s response was very rapid as well.”

While both discoveries will surely contribute to the revision of quite a few textbooks, they weren’t nearly as exciting as the primary revelation that emerged. The data make it clear that what most researchers think of as a single late-Pleistocene megafaunal extinction event was actually *two* events separated by almost 400 years. Both pulses of extinction took place within a century. The first event occurred about 11,200 RCYBP and involved everything except the proboscideans—mammoths and mastodons. This may explain why very early kill sites containing the remains of horses, camelids, bison, sloth, musk oxen, and other extinct large genera are vanishingly rare: Humans probably weren’t around in significant numbers to hunt them, since the initial extinction pulse more or less coincides with the first appearance of Clovis.

The second century-long extinction pulse, which occurred approximately 10,850 RCYBP, put an end to the New World proboscideans. Some observers suggest that this is conclusive proof that people had a connection to at least some megafaunal extinctions . . . but not so fast. While both Graham and Stafford concede that humans could have contributed to the extinction events in some small way, they’re convinced that human hunters weren’t solely responsible. As Graham points out, “Ecological change might have been sufficient. What I think happened was that the populations of the megafauna had reached critical levels—they had been very small and isolated to begin with, and the climate change was just a trigger of a threshold effect.” In other words, given the sudden transition from Pleistocene to Holocene, most of the megafauna, unable to adapt, quietly died out. Suddenly the North American landscape was biologically impoverished, forcing the growing human populations to hunt much smaller prey.

But wait: The traditional end date for the terminal Pleistocene is 10,000 RCYBP, while the Stafford/Graham team places the initial extinction pulse at about 11,200 RCYBP. How does this jibe with previous ideas about the Pleistocene-Holocene in-

continued on page 20


High Time at TOPPER

A CELEBRATION AND TOUR on October 21 exhibited the recently constructed pavilion over the deep Pleistocene terrace excavations at the Topper site in South Carolina (MT 21-4, “Clovis at Topper”). Some 150



people attended the event, which included artifact displays, a site tour, barbecue, and the presentation of awards. Two permanent outdoor signs were presented; one describes the significance of the Topper site in New World prehistory, the other lists the names of the donors whose financial assistance helped

build the pavilion. Signs installed down in the Pleistocene deposits show the stratigraphic position of Clovis and pre-Clovis occupations in the upper Pleistocene sands and Pleistocene terrace, including the location of the 50K radiocarbon dates.

The pavilion, constructed in spring 2006 to shelter the Pleistocene excavations from sun and rain, passed the May 2006 field season with flying colors. A viewing platform planned for the near future will safely admit visitors inside the building to witness the excavations. 

—Albert C. Goodyear
Director of Allendale Paleoindian Expedition



BOTH: DARYL P. MILLER, SEPAS

MARK TWAIN ONCE SAID, “It isn’t what you don’t know that gets you into trouble; it’s what you know that just ain’t so!” Five hundred years ago, European stargazers knew, with a complacent certainty, exactly how the universe worked—until an upstart named Copernicus brought their geocentric system of crystal spheres and epicycles crashing down around their ears. Just a few decades ago, most research-

the Pleistocene epoch, their collaboration has recently borne fruit. Two coastal sites, known as Indian Sands and Devil’s Kitchen, have yielded evidence that may, in time, challenge traditional concepts of the peopling of North America.

How certain is certain?

The earliest widely recognized human occupation in the New World was the Clovis culture, which appeared sometime after 11,500 RCYBP. Prior to about 1990, most researchers believed not only that the Clovis people (or their immediate ancestors) were the First Americans, but also that they got here by first trekking across the Bering Land Bridge from North-east Asia to Alaska, then sidling down an ice-free corridor into the continental interior. From there, they exploded across the fertile New World, peopling two continents in the space of 1,000 years or less. A few holdouts insisted that this picture was flawed; some even suggested that small populations of humans had entered the Americas before Clovis people arrived, occasionally from locations other than Asia. From this standpoint, the Clovis population was only the first widespread expression of humanity in the Americas. Finds like Kennewick Man, whose recon-

structed face looks more Caucasoid than Asian, lend credence to a “mosaic” theory of New World colonization. Furthermore, Monte Verde in Chile, where evidence of human occupation by

12,500 RCYBP is widely accepted, further undercuts the idea that people weren’t in the Americas until a thousand or so years later.

Even among those who agree that the First Americans came from Asia, two colonization models are popular. One is the standard Beringian model outlined above: People crossed the Bering Land Bridge and found their way into North America through a gap between the vast Laurentian and Cordilleran ice sheets. Then there’s the coastal migration theory, which posits that the First Americans immigrated along the

Late-Pleistocene Occupations on the Oregon Coast



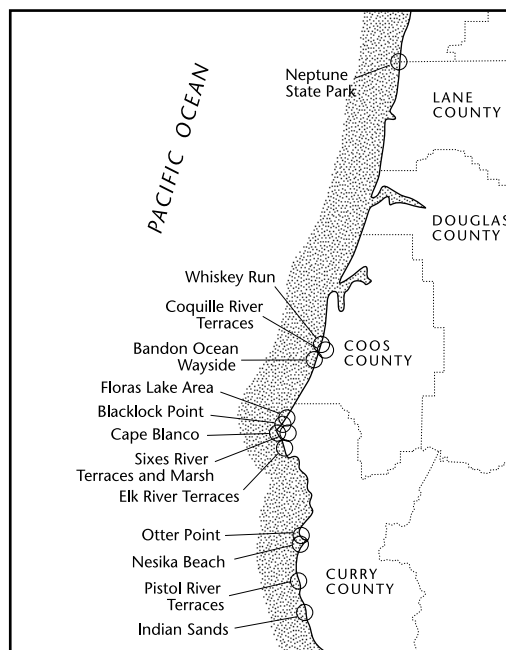
LOREN DAVIS

The Indian Sands site in Curry County.

New models and recent discoveries

ers interested in the peopling of the New World were confident they’d finally settled the general outline of who the First Americans were, and how and when they got here. But nowadays an increasing mountain of evidence suggests that it ain’t necessarily so. Nuggets of data recently added to the pile by Oregon State University researchers Loren Davis and Roberta Hall probably won’t change the status quo all on their own, but they do add fuel to the arguments of those who’d like to push the old paradigms aside—or bury them forever.

Both scientists hail from OSU’s Department of Anthropology. Dr. Hall is a professor emerita, a Boasian generalist who has been working on coastal issues for 15 years; Dr. Davis is a geoarchaeologist devoted to applying geological methods to the study of Pleistocene occupations. In recent years, Hall and Davis have been working, separately and together, to identify Pleistocene-age occupations along the modern Oregon coastline. Despite the problems involved in identifying periglacial archeological sites on landforms that would have been several kilometers inland during



AFTER MICHELLE PUNKKE

Coastal locations where sediments were studied.

Northwest Coast in Eskimo-style skin boats, taking refuge in ice-free havens along the way. According to this concept, coastal peoples ventured inland as the ice melted and provided access to the continental interior.

Although the Beringian theory remains popular, it does have its flaws. Recent evidence suggests that a traversable ice-free corridor didn't open up until about 11,000 years ago, and many Clovis sites are older than that. So are promising pre-Clovis sites like Topper in South Carolina and Cactus Hill in Virginia, not to mention Monte Verde. This makes the coastal option more attractive, especially since Northwest Coast refugia were accessible by boat as early as 16,000 years ago. By the turn of the 21st century, research by scientists like Canadian archaeologist Daryl Fedje and University of Colorado anthropologist E. James Dixon had demonstrated that people were exploiting coastal resources by late Clovis times and possibly earlier, at least along the Canadian and Alaskan coasts (**MT 20-4**, "Exploring the Northwest Coast: E. James Dixon and the Peopling of the New World").

Oceanfront property in Oregon

Enter Hall and Davis, whose research had left them dissatisfied with the traditional model of Pacific Coast settlement. Conventional wisdom had early Americans spreading from the continental interior westward down the river valleys until they reached the coast, where they eventually adapted to a marine environment. Experience and logic suggested to Hall and Davis, however, that travel might have been in the opposite direction, with coastal émigrés landing at the mouths of rivers and working their way east. "There's no obvious restriction to coastal migration," Davis points out. "We know people had to have used boats to get to remote places in the Pacific Rim, like Australia, so few people would claim that boats are out of the question here. Also," he adds, "it may be easier to go south along the coast, because it's not as necessary to master the different environments the way you have to when following an interior route. The environments on a coastal route are very similar, with only the species changing as you go south."

Hall came to the coastal perspective from a different route. She's been interested in coastal issues for 30 years, since helping the Coquille Indians salvage coastal burial sites in 1976. "A student, Lee Lindsay, who worked with me at the Coquille site

was a supporter, and a colleague who had volunteered with our archaeological work, Dee Baer, suggested that we look for locations where some older soils might exist," she says. "I owe to Lee and Dee the real beginnings of this idea. Then, as a human evolutionist and human ecologist, I began to think about what kind of environments people are comfortable in, and especially about breathing problems in the very dry and dusty Beringia region, so I decided to investigate this concept."

The problem is, sites older than 3,000 years old are extremely rare on the Oregon coast, owing principally to the sea-level rise associated with the melting of the ice sheets at the end of the Pleistocene. All Pleistocene coastal sites have long since been inundated, having been formed in locations that are now up to 6–8 km west of the current coast. The modern coastal margin has been stable for



DON HALL

The Devil's Kitchen site (Bandon Ocean Wayside) in Coos County.

about 6,000 years, but other geological processes have conspired either to erode away inland Pleistocene sites or to bury them so deep they're almost impossible to find. Those factors, along with urban development along the coast, have greatly obscured the archaeological record, particular in river valleys where archaeologists would typically look for such sites. "Since the sea-level rise," Davis explains, "river valley sites have been buried under meters and meters of alluvium—we recently found a 10,000-year-old site in a core sample from 29 meters below the surface." With the river valley sites inaccessible, as Hall points out, "That leaves the so-called bluff sites."

Davis concurs: "We really need to approach this from a ge archaeological view—that is, we have to limit the study to high-probability areas, where early deposits are accessible." Aside from the unaltered landforms of the right age, they had to look for sites with resources that might draw people inland several kilometers. Examples of these "interior attractions," as Davis calls them, include high-quality lithic materials and dependable food resources.

"Basically our plan was to



LOREN DAVIS

Davis in the field at Cape Blanco.

find locations on the coast where old sediments might exist," explains Hall. "Our thought was that although the margins were inundated, folks there in the late Pleistocene would have come up river valleys if they were foraging folks, so we studied the

geological and the archaeological literature to learn about what was known, and we did GIS studies to find out more about coastal features, oceanographic features, and estimated shoreline differences in the target times. Then we did on-the-ground surveys in public lands, did soil tests and various dating tests, and chose two sites for test excavations, both of which paid off."

The payoff

Hall and Davis identified very early artifact-bearing deposits at two bluff localities, Indian Sands (35CU67) in Curry County and site 35CS9 (fondly known as "Devil's Kitchen") in adjoining Coos County. Both sites are located within meters of the Pacific Ocean on state property: Indian Sands in Samuel H. Boardman State Park north of Brookings, and Devil's Kitchen in Bandon Ocean

Hall walks on a bluff a few miles from the Indian Sands site. This shot shows why the rugged Pacific coast attracts scientists seeking old sites—and why they're so difficult to investigate.



DON HALL

Wayside State Park, just south of the town of Bandon.

Indian Sands is actively undergoing severe eolian deflation. The deposits are mostly loess (windblown silt), and the site is too easily accessible for comfort. "It's called Indian Sands because there are artifacts everywhere—a carpet of them," says Davis. "It's completely open to the public, and if we're not careful we're going to lose it and all its data to human and natural agencies." This would be tragic, because Indian Sands has one of the oldest occupations thus far recorded on the Oregon Coast. In 2000–2001, a team led by Hall and Davis recovered cultural materials from a paleosol that was later dated to $10,430 \pm 150$ RCYBP. Analysis of the unmodified debitage from that paleosol ($n=134$) suggests that the material is chipping debris from late-stage lithic reduction activities. Most of the material was chert, though several pieces of obsidian and metamorphic rock were identified. Two of the artifacts, a core reduction flake and a utilized flake, show evidence of retouching. In addition to the debitage, fire-cracked rock and charcoal were also collected from the paleosol.

Unlike Indian Sands, Devil's Kitchen in Coos County is quite stable, and though they excavated only two small units there, the team found a wide variety of cultural materials at a depth of 215–225 cm below surface (bs). Charcoal from 235–245 cm bs was dated to 11,000 RCYBP, indicating a late-Pleistocene or early-Holocene occupation at the latest. Although 24 lithic tools and 1,239 pieces of debitage were collected from the sampling units, only one broken flake came from the earliest cultural level, with 5 more pieces of debitage found in the overlying level. "I don't even know if we've found the earliest material," admits Davis. "The small samples we do have have produced some exciting results. I think there's still a lot of work that needs to be done to nail down the ages of the materials and sediments there."

While Hall and Davis are buoyed by the fact that their model has had productive results, they are concerned about the future of these ancient sites. They have no current plans to conduct further work at either site, though they agree that additional work makes sense, particularly at Devil's Kitchen. "We've had conversations with the Oregon State Park Service about them," Davis says, "because something needs to be done to protect both sites, especially Indian Sands." Hall points out the fragility of the oldest Oregon coastal occupations. The biggest challenges, she suggests, include "the loss of these soils to erosion


(by wind as well as by water), inundation by rising sea levels, and burial of former river valleys. Also, there has been so much development along the Oregon coast that some potential areas have been destroyed or eroded." Furthermore, most of these sites lack shell, which helps to preserve organic cultural materials—so the sites aren't as visible as more recent occupations. As

Hall puts it, "We need to learn how to see these fragile sites."

Onward through the fog

Despite their recent successes, neither Davis nor Hall is wedded to the coastal-route theory. "I'm interested in looking at it," says Davis. "It's an interesting idea, but just like the interior route it requires a lot of basic investigation before we can make any conclusions about it. There's so much that we don't know."

Hall takes a similar stance. "Neither approach has any direct evidence in its favor, and so I am not dogmatic or rigid about this concept. To me, the coastal model is a productive working hypothesis."

Whatever the case, little additional progress is likely to be made on the question until more coastal archaeologists make a greater effort to incorporate the geosciences into their search models. "The topic of First Americans requires you to study geosciences," declares Davis. "The archaeology is very hard to find otherwise. Geoarchaeology used to be a neat thing to have in a project, but now it's impossible to make any substantial progress and draw any decent conclusions without it." 

—Floyd Largent

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Court Decision Leaves Fate of Spirit Cave Man Undecided

ON 21 SEPTEMBER 2006, U.S. District Judge Larry R. Hicks issued a ruling that will force the Bureau of Land Management (BLM) to reconsider its decision not to turn over the remains of the 9,400-year-old Spirit Cave Man to the Fallon Paiute-Shoshone Tribe. The ruling does not question the correctness of the BLM's original decision. It addresses only procedural questions regarding the BLM's handling of the case.

This decision is an important landmark in a case that, in some respects, may be as important as the Kennewick Man case (MT 19-1 and 19-2). The Friends of America's Past, in a press release issued January 2006, affirmed that "Kennewick Man now has company in testing the limits of the Native American Graves Protection and Repatriation Act (NAGPRA). The Spirit Cave Man, who lived a thousand years before Kennewick Man, is the subject of a lawsuit filed in Nevada Federal District Court." As in the Kennewick Man case, the key questions are, Is it possible for ancient human remains to be culturally affiliated with any particular modern tribe? And, if it is, what evidence is sufficient to sustain such a claim?

Background

Archaeologists Georgia and S. M. Wheeler uncovered the remains of Spirit Cave Man in 1940. He had been buried in a small cave in the Nevada desert, near the town of Fallon, covered by a large mat of woven tule. The human remains were remarkably well preserved as were the burial mat, a rabbit-skin blanket, and

some of the man's clothing, including leather moccasins.

The age of the burial was estimated to be 1,500 to 2,000 years old, but in the years before radiocarbon dating, this was little more than an educated guess. Fortunately, the remains were held in secure storage at the Nevada State Museum in the expectation that new methods of

study one day would reveal more about this man's life and times.

In 1996, R. Ervin Taylor, with the University of California Riverside's Radiocarbon Laboratory, analyzed samples from the burial, including bone, hair, and plant fibers from the mat. Instead of being a mere 2,000 years old, Dr. Taylor determined that this man lived and died near the end of the Pleistocene epoch—9,400 radiocarbon years ago (MT 12-2), or about 8700 B.C.

Because the remains were so well preserved, researchers hoped to be able to conduct genetic tests on the skeleton, but at this point the Northern Paiute tribal governments began to raise objections. In March 1997, the Fallon Paiute-Shoshone Tribe claimed the remains under the terms of NAGPRA. They wanted to halt any scientific tests and rebury the skeleton. Mervin Wright, chairman of the Pyramid Lake Paiute Tribe, said in an interview with the *Las Vegas Review-Journal* that it wouldn't matter if the Spirit Cave Man

continued on page 15


Arlington Springs —The Story Isn't Over Yet

Is Arlington Springs Woman really Arlington Springs Man (MT 21-4, "First Lady of the New World: Arlington Springs Woman"), as Phil Orr originally speculated? In the continuing effort to define the prehistory of Santa Rosa Island, Dr. John Johnson and his team pursued geoarchaeological investigations during the 2006 summer field season. Their work was supplemented by forensic analysis



Lambert at the Hrisbrú site in the Mosfell Valley of Iceland, 2002.

of the human remains discovered by Orr in 1959 at the Arlington Springs site, done with the assistance of physical anthropologist Patricia Lambert of Utah State University. Dr. Lambert re-measured the bones and compared the measurements with those of known male skeletal remains from a nearby site. Her reanalysis places the Arlington Springs 13,000-year-old remains back in the male domain.

While it is important that we know the correct gender of the human remains from Arlington Springs, this study also demonstrates the need for proper curation of archaeological materials so that collections can be reanalyzed, using new ideas and modern technologies to reveal more about the past. 

—Deb Dandridge



View of the Toca do Boqueirão da Pedra Furada from the east, 1984.

The Earliest Reported Archaeological Sites in South America

ALAN BRYAN

IN MY PREVIOUS ARTICLES I have shown that by 11,000 radiocarbon years ago, every major environmental zone in South America was occupied by well-adapted Paleo-american populations following varied subsistence systems, and utilizing different technologies. An earlier arrival on the southern continent can safely be assumed, but how much earlier?

I've described a number of archaeological sites reporting radiocarbon dates significantly older than 11,000 RCYBP—Pikimachay, 13,000–15,000 RCYBP; Taima-taima, 13,000 RCYBP; Lapa do Boquete, Los Toldos, Piedra Museo, Telarmachay, Guitarrero Cave, 12,000 RCYBP; Tibitó, Alero Tres Arroyos, Pachamachay, ca. 11,800 RCYBP. There is also the site that I did not include in previous articles because it is already so well known, the Monte Verde II occupation dated at ca. 12,500 RCYBP. In this final article, I shall review several reported South American archaeological sites that have produced even older radiocarbon dates.

Monte Verde I

The 12,500 radiocarbon year-old settlement at Monte Verde in the temperate rain forest zone of south-central Chile is now well established in the archaeological record. A 10-year field project led by Tom Dillehay, involving many experts in diverse sciences, revealed the remains of a complex communal structure

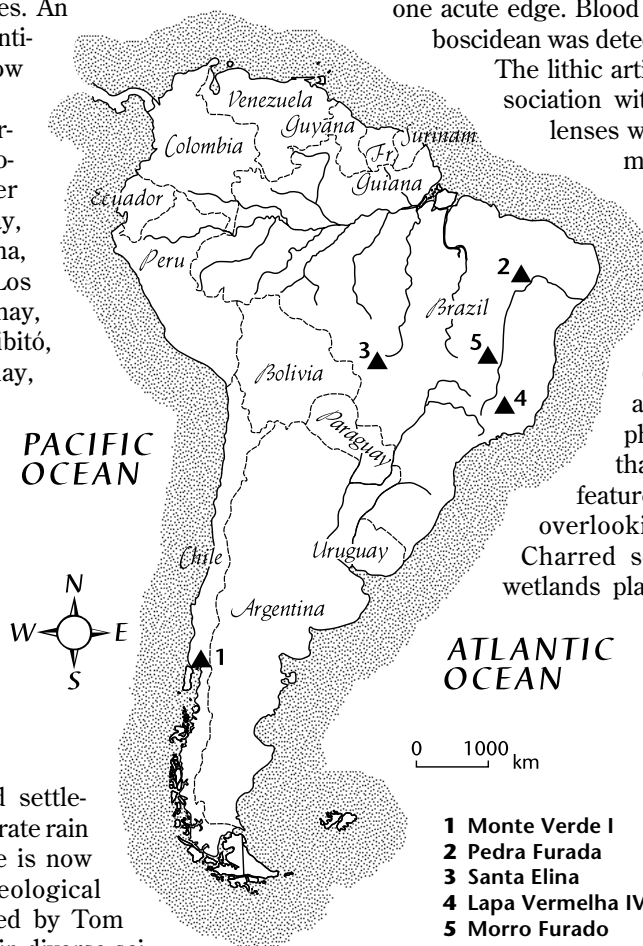
including a basalt core tool, two hammerstones with battering marks, three percussion-struck flakes, and six utilized fractured pebbles. The basalt core tool features 10 prominent flake scars on the face, and small use-wear flakes have been detached from one acute edge. Blood residue identified as possibly proboscidean was detected on the piece.

The lithic artifacts were recovered in direct association with three small shallow clay-lined lenses with ash streaks and charcoal fragments, possibly remains of hearths.

Dates of $33,750 \pm 520$ RCYBP and $>33,020$ RCYBP from samples of burnt and charred beech wood correspond with previously published radiocarbon dates on the particular geological stratum (basal MV-7) in which the artifacts and features were found. Geomorphological reconstruction indicates that the Monte Verde I artifacts and features were situated on a promontory overlooking an ancient marsh or pond. Charred seeds of the reed *Juncus* sp., a wetlands plant with edible stalks and seeds, were recovered in the hearth-like features.

Usually, severe critiques follow reports of really early archaeological sites; but few questions have been raised about the quality of the Monte Verde I evidence. Dillehay himself believes that some of the recovered evidence is valid, but by itself it is insufficient at the present time to establish con-

clusively a human occupation of the Americas this early.



- 1 Monte Verde I
- 2 Pedra Furada
- 3 Santa Elina
- 4 Lapa Vermelha IV
- 5 Morro Furado



Ash smear and charcoal fragments exposed on the Monte Verde I occupation level, with a lithic artifact associated. Charcoal from this occupation level was dated ca. 34,000 RCYBP.

Pedra Furada

The site now commonly known as Pedra Furada (full name: Toca do Sitio do Boqueirão da Pedra Furada) is a large rockshelter in the *caatinga* zone of the northeast Brazilian uplands. The entire overhang is ca. 40 m high, with the sheltered area (within the drip line) extending ca. 12 m south from the curving back wall of an eroded cliff of consolidated sandstone. On this back wall are pictograph panels, prompting archaeologist Niède Guidon to begin excavations in 1978 in hopes of being able to date the rock art. The sandy deposits within the shelter proved to be much older than first thought. After Pleistocene radiocarbon dates were obtained from hearth features associated with lithic artifacts in the lower

deposits, extensive excavations were carried out by Guidon and her associates in 10 field seasons.

Researchers present during the course of the excavations observed that the natural deposits within the sheltered area at Pedra Furada consist of coarse sand particles and angular fragments of sandstone derived from gradual disaggregation of the sandstone cliff. Ten natural stratigraphic units within the 5 m of sandy deposit inside the shelter were determined on the basis of geomorphological and granulometric analyses. Over 50 charcoal samples from the various stratigraphic levels have been dated by radiocarbon. Dates on the upper cultural complex at the site, the Serra Talhada complex, range from $10,400 \pm 180$ RCYBP to 6150 ± 60 RCYBP, indicating a Holocene age. The radiocarbon dates on the Pedra Furada complex in the underlying Pleistocene deposits extending to bedrock range in a consistent series from $14,300 \pm 210$ RCYBP back to $32,160 \pm 1000$ RCYBP; and there are even older radiocarbon dates, with very large margins of error, below that level. Most of the dated charcoal samples were in association with features constructed of sandstone blocks and quartz cobbles. Thermoluminescence analysis has shown that stones associated with some of these features have been differentially heated to at least 200–250°C, supporting the interpretation of these features as hearths.

As no bone has been preserved within the acidic sediments at

Court Decision on Spirit Cave Man

continued from page 13

was “50,000 years old, 1 million years old or just put in the ground yesterday.” The Tribe considered the remains to be sacred and unquestionably related to the Paiute. In December 1999, the Tribe submitted to the BLM various reports and a memorandum setting out the evidence, which they believed supported its claim to the remains.

On 26 July 2000, the BLM issued the results of its own detailed study of the Spirit Cave Man. It considered all the lines of evidence permitted by NAGPRA: geographical, kinship, biological, archaeological, anthropological, linguistic, folklore, oral tradition, historical, and expert opinion. The BLM concluded that “the preponderance of the available evidence” demonstrated that “the remains from Spirit Cave are unaffiliated with any modern individual, tribe, or other group.”

The Fallon Paiute-Shoshone Tribe disputed the conclusions of the report and claimed that the BLM had not considered all the evidence supporting their claim of cultural affiliation. The BLM gave the Tribe until October 2000 to submit whatever additional evidence they wished to offer. The tribe requested an extension until January 2001, but the BLM denied this request. In October 2000, the BLM issued its final determination reaffirming that the Spirit Cave Man was not culturally affiliated with any modern

tribe. If the tribe had additional concerns, the BLM suggested they take them up with the NAGPRA Review Committee.

The NAGPRA Review Committee consists of seven members appointed by the Secretary of the Interior. Three are appointed from nominations submitted by Native American tribes, three are appointed from nominations from national museum organizations and scientific societies, and one is appointed from a list of nominees developed by the other members of the committee. Among its primary responsibilities is to “ensure a fair and objective consideration and assessment of all available relevant information and evidence” in repatriation claims and to review and make findings “relating to the identity or cultural affiliation of human remains, funerary objects, sacred objects, and objects of cultural patrimony, or the repatriation of such items, upon the request of any affected party.” The Fallon Paiute-Shoshone Tribe asked the Review Committee to review the Spirit Cave Man case, which it did at its November 2001 meeting. The Review Committee criticized the BLM for not fairly considering the evidence offered by the Tribe. It also rejected the BLM’s conclusions and declared its determination that the Spirit Cave Man was, in fact, culturally affiliated with the tribe. The BLM, not persuaded to reconsider its decision, declined to give any weight to the Review Committee’s findings, claiming it was only an advisory board with no authority to enforce decisions.

The Tribe filed a complaint in the U.S. District Court for the District of Nevada in September 2005. It accused the BLM of violating NAGPRA and asked the court to set aside the BLM’s

Pedra Furada, archaeologists have focused their attention upon the flaked-stone pieces recovered throughout the Pleistocene deposits. There is a large cone of quartz cobbles (derived from an overlying conglomerate formation at the top of the cliff)

Two hammerstones from the Monte Verde I occupation level, showing marks of use as battering tools. Each is about 13 cm in diameter. ►

A basalt core tool, 9.4 cm long, from the Monte Verde I occupation level. ▼

at the base of a vertical chute in the cliff face situated ca. 10 m to the east of the edge of the sheltered area, and anyone camped at the shelter would have collected good toolstone there. A comparative study of a sample of naturally fractured cobbles from this

debris cone to the east of the site was made by Guidon's associate Fabio Parenti, who found significant differences from the flaked quartz pieces recovered within the sheltered area, thereby defining artifacts. Applying stringent criteria to the lithic collection from the sheltered area—including the observation of more than three flakes removed in series from a cobble, evidence of bifacial flaking, and evidence of marginal retouch—Parenti then identified ca. 600 stone artifacts from throughout the Pleistocene deposits, classified as choppers, scrapers, denticulates, and pointed tools.



BOTH: TOM DILLEHAY

natural forest fires; the stone features described were only arbitrarily distinguished from the surrounding sedimentary matrix; and the flaked-quartz pieces classified as artifacts were likely geofacts formed by the natural flaking of quartz cobbles and pebbles which had fallen down the vertical chute to the east and struck the debris cone at its foot, then rolled into the site area, to be flaked further in a postulated high-energy fluvial environment within the shelter.

As these natural explanations were advanced by some leading North American researchers, many archaeologists have now dismissed Pedra Furada as a Pleistocene site. However, Guidon and her associates have countered these specific hypotheses in several publications. Parenti's dissertation, presenting detailed analyses of the stratigraphy, the radiocarbon chronology, the structures or features, and the lithic artifacts, became available in 2001; it is in French, published in France; and to date few North American archaeologists

finding that the Spirit Cave Man was not affiliated with the Tribe. The BLM, in turn, filed an answer denying the Tribe's claims, and both sides subsequently submitted cross-motions for summary judgment.

A variety of individuals and groups offered statements of support in "Friend of the Court," or *amicus curiae*, briefs. The Ethnic Minority Council of America, the Friends of America's Past, the Ohio Archaeological Council, Drs. Yves Goddard and Lyle Campbell, and Dr. Harry Glyn Custred, Jr. supported the BLM, at least on the issue of cultural affiliation. Some of these parties disputed the BLM's determination that the Spirit Cave Man was "Native American" under the terms of NAGPRA. The National Congress of American Indians, the Association on American Indian Affairs, the Morning Star Institute, and the Medicine Wheel Coalition on Sacred Sites in North America supported the Tribe's position.

The decision

After reviewing the history of the case, Judge Hicks ruled that the BLM mostly did everything right. He acknowledged that "NAGPRA can be a surprisingly difficult statute to implement properly" and this case, in particular, had become a "difficult procedural morass." He agreed that "the findings and conclusions of the Review Committee are merely advisory and are not considered binding on any party" and that the "BLM did not

violate its duty to consult with the Tribe regarding [cultural] affiliation."

Nevertheless, Judge Hicks ruled that the BLM had not fulfilled its obligations under NAGPRA to provide a clear explanation for why it did not accept the supplemental evidence that the Tribe sought to submit in support of its repatriation request after October 2000. Moreover, the BLM had offered no explanation for why it essentially ignored the findings of the NAGPRA Review Committee. For these reasons, Judge Hicks found that the "BLM's decision not to repatriate the Spirit Cave Man remains is arbitrary and capricious and must be vacated."

Clearly, the BLM erred. The errors, however, were largely procedural and did not affect the substance of the BLM's determination. Judge Hicks stated explicitly that "this order does not determine that BLM's initial determination of non-affiliation is wrong and should not be read to mandate a finding of affiliation by BLM." In fact, in a footnote Judge Hicks seemed to suggest that he supported the substance of the BLM's determination. He mentioned the District Court's opinions in the Kennewick Man case, which he referred to as "the primary, and most complete prior treatment of issues arising under NAGPRA," and stated that he "finds all aspects of that case which have not been overturned on appeal persuasive."

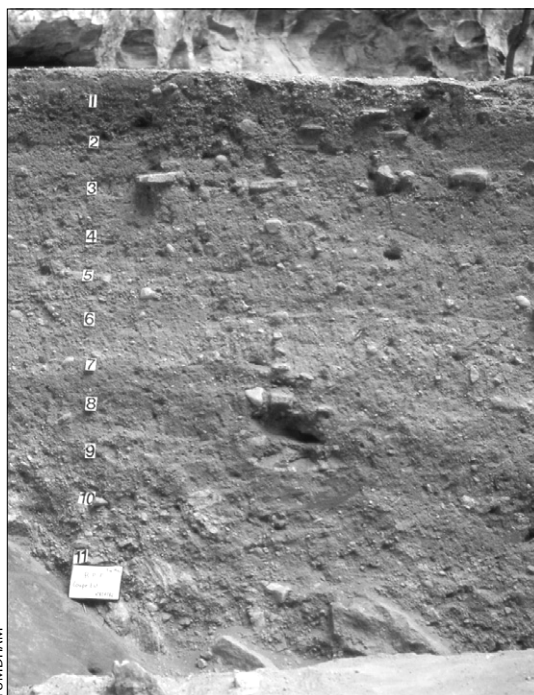
Not only did Magistrate Judge Jelderks determine in that case that Kennewick Man was not culturally affiliated with the

have read it. Guidon and her associates continue their research. Microscopic use-wear studies of Pedra Furada artifacts, involving high-powered magnification of flaked edges, are to be carried out in France.

Santa Elina rockshelter

Another Brazilian site, the Santa Elina rockshelter, located in central Mato Grosso state, has produced early radiocarbon and thermoluminescence dates on stratigraphic levels containing remains of *Glossotherium* (a giant ground sloth) and associated lithic artifacts. This large limestone rockshelter is currently under excavation by Agueda and Denis Vilhena Vialou; and only preliminary reports are presently available (cf. the article in *Where the South Winds Blow*, the 2003 CSFA publication edited by Laura Miotti, Mónica Salemme, and Nora Flegenheimer).

To date, three major units have been identified in the known stratigraphic record. Unit III, a 60-cm-thick sandy deposit with rock rubble, is subdivided into four subzones. Bones of one individual *Glossotherium*, together with thou-



Sediments within the sheltered area of Pedra Furada exposed in 1982.

sands of osteoderms (small spherical bones within the skin of a ground sloth), were found clustered within a limited area in subzone III-4/3, in association with 27 retouched tabular pieces and percussion flakes of limestone or flint. Notched or denticulate tools are common in the assemblage, and some pieces show use wear. There are also ca. 50 unmodified percussion flakes. Also found on this level were several small quartz crystals and a hematite fragment. Two of the sloth osteoderms feature smooth circular perforations, and the faces of one of these show abrasion.

Radiocarbon dates of $22,500 \pm 500$ RCYBP and $23,320 \pm 1000$ RCYBP have been obtained on wood recovered by flotation from stratigraphic subzone III-3/2, just above the level of the lithic artifacts and sloth remains in subzone III-4. A sample of osteoderms from

subzone III-4 was dated at $27,000 \pm 2000$ yr B.P. by the uranium/thorium method. Further AMS dating of charcoal and OSL dates on sandy sediments in subzone III-4 are reported to range around 25,000 years ago.


The III-4 subzone is at a depth of ca. 3 m within the rockshelter fill. One meter above, separated by virtually sterile deposits, is a younger occupation level (in Unit II-2) with *Glossotherium* bones and ca. 200 lithic artifacts. This level has

coalition of tribes who sought to rebury this 9,000-year-old skeleton, but he also decided that the government had erred in determining that the skeleton was subject to the terms of NAGPRA. The mere fact that human remains found in the United States are found to date to the period before documented European contact is not sufficient to make them "Native American" for the purposes of NAGPRA (MT 19-1). The Ninth Circuit Court of Appeals agreed, holding that the NAGPRA applies only to remains and objects that have a special and significant cultural relationship to modern-day Native Americans (MT 19-2). If the BLM had followed the precedent established in the Kennewick Man case, and adopted the position that the Spirit Cave Man was not "Native American" for the purposes of NAGPRA, then all the alleged violations of NAGPRA's procedures would be moot and the tribe's motion likely would have been dismissed.

Judge Hicks noted that the issue of whether the Spirit Cave Man properly should be regarded as a Native American had been raised by the Friends of America's Past in its *amicus* brief, but cited a previous court decision establishing that such briefs "ordinarily cannot inject new issues into a case which have not been presented by the parties." Nevertheless, Judge Hicks left the door open for the BLM by stating that since "the parties have chosen not to contest the designation of the remains as Native American at this time" [emphasis added], he would not "conclude that NAGPRA is inapplicable to the current situation."

What's next?

The BLM now must reconsider the evidence for and against the Fallon Paiute-Shoshone Tribe's claim that it is culturally affiliated with the Spirit Cave Man under the terms of the NAGPRA. The BLM has the opportunity to change its previously stated position that the Spirit Cave Man is "Native American" and assert that the NAGPRA does not apply to this case. The decision in the Kennewick Man case provides strong support for such a change in position, and the Friends of America's Past brief sets out strong reasons for adopting it. Minimally, as Judge Hicks stated in his decision, the "BLM needs to compare its findings with the evidence and explain why its determination is, or is not, still the most correct finding available." No specific time frame has been set for this process and the BLM has given no indication as to how it plans to proceed.

For up-to-date information on the Spirit Cave Man case, including copies of all the relevant court documents, see the Friends of America's Past Web pages: <http://www.friendsofapast.org/spirit-cave/>, which also include information on the Kennewick Man case and other NAGPRA-related issues. 

—Bradley T. Lepper

The opinions expressed in this article are those of the author and do not necessarily reflect those of the Ohio Historical Society, with whom he is employed as a curator of archaeology.

produced a radiocarbon date of $10,010 \pm 60$ RCYBP on charcoal from a hearth.

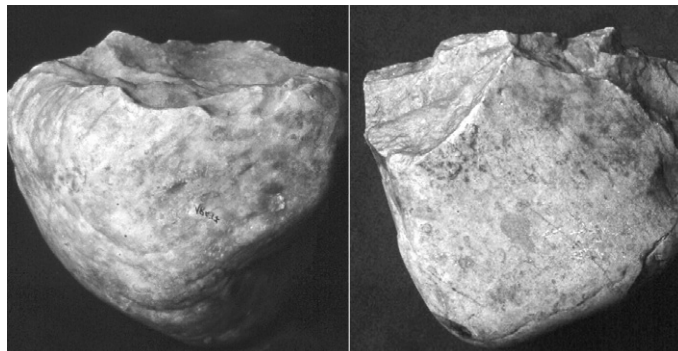
Research at the Santa Elina rockshelter continues, so we must await final results. As of the 2003 report, bedrock had not been reached.

Other Brazilian sites

Not far north of the city of Belo Horizonte in central Minas Gerais state is the large lime-

Front and back views of a bifacially flaked cobble tool from the lower zone of the Pleistocene deposits at Pedra Furada.

0 5 cm



stone rockshelter known as Lapa Vermelha IV. Excavations in the early 1970s by Annette Laming-Emperaire and associates recovered the skeletal remains of a female nicknamed "Luzia" from a deep narrow sediment-filled solution fissure at the back wall of the rockshelter. Associated charcoal dated the human remains between 11,600 and 10,200 RCYBP. An older fill in the solution fissure, comprising a cemented zone of yellow clay, silt, and rock rubble, is preserved along the outer edge of the fissure. Within this old cemented deposit, a few minimally retouched quartz flakes and cores, and a unifacially flaked sidescraper of limestone were recovered in association with charcoal dated ca. 22,400 RCYBP and >25,000 RCYBP.

In the rural *município* of Corimbe in southwestern Bahia state is a limestone cave called Morro Furado, excavated by Pedro Schmitz in the 1980s. There is very little information available on this site, but it is intriguing. The upper deposits are Holocene in age, dated back to ca. 9000 RCYBP. Below that, under a zone of heavy rock fall, are deposits of Pleistocene age. Thick zones of ash containing small fragments of charcoal and numerous shells of the giant terrestrial gastropod *Strophocheilus* were uncovered. A few flakes and cores of limestone and a few possibly modified shells were found in the ash and shell deposits. I am reminded of a communication from André Prous, who has studied the human utilization of *Strophocheilus*. Prous learned that the easiest way to extract the edible and nutritious snail is to place the shell near a fire, and the heat will force the snail to emerge. For the ash and shell zones at Morro Furado, two radiocarbon dates on shell were ca. 27,000 RCYBP;


and three dates on charcoal ranged from 16,200 RCYBP to 21,000 RCYBP.

Implications

Researchers understandably have exercised great caution in considering the evidence from these very early dated sites in

South America. Validation would mean that people must have entered the Americas before the Last Glacial Maximum, much earlier than presently accepted models maintain. North American archaeologists have been especially doubtful, as no sites of comparable age are as yet generally recognized on the

northern continent, as would be expected for an initial entry through the Bering Straits area. Yet the archaeological record now shows that all inhabitable areas of both American continents were occupied by at least 11,000 RCYBP; and the earliest population must have entered and dispersed before that time.

Overall population density in the Americas may have remained very low until the end of the Pleistocene; and archaeological traces of the earliest people may be scant, as illustrated by the earliest reported South American sites. The cultural material recovered from these earliest sites is sparse, suggesting very small groups and transitory cultural events at each location. Thus the remains of earliest human presence in the Americas may be difficult for archaeologists to detect and to demonstrate conclusively; but now with the demise of the Clovis-first model and its time barrier, archaeologists are accepting the challenge, and the search for earlier sites is underway. I expect that more really early archaeological sites will in time be reported on both continents, and a more complete picture of Paleoamericans will emerge. 

—Ruth Gruhn

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Fire-cracked Rocks

continued from page 7

a scientist whose career spanned the 18th and 19th centuries and who is aptly called the father of American anthropology. Working with several of his students, Boas conducted an extensive sampling of cephalic shape of various populations in the New World and Europe. He claimed his findings showed that American children born of broad-headed immigrants to

the New World became long-headed in a single generation. This led him to propose the concept that skull size was not determined by ancestry but instead was changeable, and that such changes could be witnessed in a span of less than 200 years. This proposition that human physical characteristics could be more a result of environment than of race was a completely new idea.

It's worth noting that Boas's original studies are viewed with suspicion today by many scientists, especially those who do extensive work in craniometrics (MT 17-4, "Shedding Dead

Weight of the Past”). Craniometrics authority Richard Jantz, for example, agrees that the skull shape of Americans is changing; the reason, however, may not be obvious and is unlikely as simple as relocating a population. Diet may in fact be an

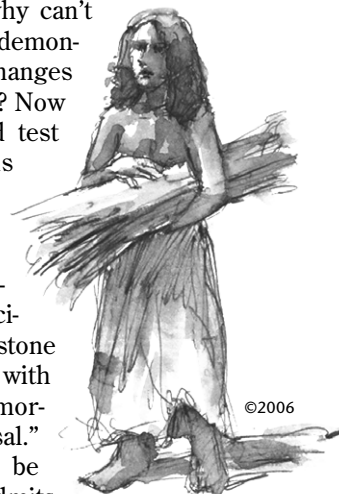
10,” he says, “that means there are 150 infants that would have died today but now survive.”

What lies ahead?

Thoms sums up, “If climate and what is eaten can change animals, nonhuman animals, the shapes of their skeletons and the shapes of their heads, why can’t changes in diet, that we can demonstrate are profound, lead to changes in human cranial morphology? Now someone has to set out and test that.” He suggests that his theory should be testable using scientific data. “We just haven’t gotten to that stage yet. . . . I have posited the concept that it may not be a coincidence that the onset of cookstone technology roughly coincides with changes in human cranial morphology. It may in fact be causal.”

How can Thoms’s theory be scientifically tested? Thoms admits ignorance regarding the details, but suggests that biological anthropologists could test the hypothesis that changes in subsistence strategies from mobile *hunters* and gatherers to more sedentary *gatherers* and hunters produced changes in cranial morphology. He also points out that human bone holds information about a person’s diet and contributions made by different food sources. Thoms realizes his theory is likely to be controversial, but maintains that “it is a more parsimonious explanation than migration.”

In addition to the research Thoms has already done over the



Cooking Camas in an Earth Oven



A pit of the appropriate size is dug, filled with firewood and rocks, then burned; the result is a layer of red-hot rocks on the bottom and sides of the pit.



Moist, green plants are placed over the hot rocks, then fresh camas and perhaps other foods are put into sacks of woven vegetal fibers, stacked on top of the layer of green plants, and covered with another layer of plants. Sometimes several layers of camas are separated by green packing material; sometimes a fire is built on top of the mound.



After the camas has cooked for a day or more, the layers of hot coals, earth, and packing materials are pulled back and the sacks of steam-cooked camas are removed, leaving a shallow rock-filled depression, which eventually fills with surrounding sediments.




Earth oven (8200 yr B.P.) at the Wilson-Leonard site in Texas.

important factor, Dr. Jantz asserts (which adds weight to Thoms’s argument), but it probably isn’t the sole reason. As a candidate Jantz points to genetic changes influenced by natural selection. “If infant mortality was 160 in 1850 and now it’s

past 20-plus years, he is now working with his students on identifying starch grains and inulin in cooking features spanning the Holocene epoch at the deeply buried Richard Beene site near San Antonio, Texas. This research focuses on analyzing changes in the nature of microscopic plant food remains through the millennia. Substantial differences could be further evidence that dietary changes, which were in place by 10,000 years ago, may have been integral to molding the human skull

into the shape it has today. He further asserts that “if we could project forward another 10,000 years I suspect we will look different.”

Could the cranial morphology of the early Archaic period be

linked to this “carbohydrate revolution”? Without scientific analysis, we’ll never know. In the meantime, watch what you eat—you could be shaping the heads of future generations! 

—Dale Graham

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The Timing of Megafaunal Extinctions

continued from page 9

terface? According to Graham, “The conventional boundary was set at 10,000 RCYBP, but that was done years ago as a matter of convenience. It’s beginning to look like 11,000 RCYBP is probably the real boundary, because that’s when everything happens: extinctions, human colonization, major landscape changes, etc.” This revelation adds another fascinating facet to the terminal-Pleistocene extinctions story—and will likely generate an additional round of controversy.

This far, and no farther

The research findings of Stafford, Graham, and their collaborators have drawn a pair of lines in the chronological sands of North America that can’t be ignored. The sheer mass of data and the solid science that backs it up aren’t easily dismissed, so the primary challenge to their conclusions comes from interpreting the data. Some researchers who still champion a human cause for megafaunal extinctions point to mounting evi-

Russ Graham in Parker’s Pit in the Black Hills of South Dakota, 2004.



ERIC C. GRIMM

dence that humans were here well before Clovis and suggest they may have had something to do with the initial extinction pulse. While Stafford agrees that a few humans could have been in North America as early as 16,000 RCYBP, he doesn’t think there were enough of them to push any species into extinction. “I think that pre-Clovis peoples probably hunted any animal available,” he says, “but that human population density was so low that these people had negligible to no effect on the soon-to-be-extinct taxa.” Similarly, given the rapidly changing climatic conditions, Graham sees no need to invoke pre-Clovis peoples as an extinction trigger.


If the two-pulse extinction model is correct, then the terminal Pleistocene extinctions in North America were caused by factors other than human predation. That said, humans obviously hunted megafauna whenever they encountered them, particularly mammoths and mastodons. “Clearly, they could have had impacts on the proboscideans—we have really good evidence they were hunting and killing those animals,” says Graham.

“There’s a possibility that this predation was the *coup de grâce* that drove the proboscideans to extinction. But I have a real problem with assuming that overkill had anything at all to do with the other extinctions.”

Stafford agrees. “I feel that Clovis-era hunters probably killed off the last of the dwindling numbers of mammoths and mastodons,” he opines, “but that humans were not the determining factor in the proboscideans’ extinction.” He flatly denies human involvement in the earlier megafaunal extinctions. “I think the peoples termed Clovis, or rather the humans present at 11,200 to 10,900 RCYBP in North America, probably never saw or physically encountered the non-proboscidean taxa.” He cautions scientists against hubris, however, since he estimates that we now

have less than a tenth of a percent of the data we need to truly understand Pleistocene extinctions.

“We should revel in what we do not know or understand, rather than convincing ourselves that we are the sages of our field,” he concludes philosophically. “We should view our endeavors as small contributions to asymptotically approaching ‘truth,’ and realize that humility and enthusiasm are

the only way to unravel 4½ billion years of nature’s experiments in a few human decades.” 

—Floyd Largent

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