



MAMMOTH TRUMPET

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Center for the Study of the First Americans
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Find the Clovis site

Sea shells aren't the only thing people find on this Gulf Coast beach. Somewhere, out under the waves, Paleoamerican artifacts and bones of extinct mammals are gradually being eroded and cast up onto the shore. Now construction plans are focusing a new attention on the McFadden site (article, page 7).



BRYAN L. GLEVIN, U.S. ARMY CORPS OF ENGINEERS

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

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Oregon State University, Corvallis, OR 97331

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COOPER'S FERRY SPEAR CACHE ONE OF NW'S OLDEST SITES

Stemmed Points on Idaho's Salmon River Could Predate Clovis

Near the end of the last Ice Age, Paleo-Indian hunters placed four stemmed stone spear points and a stone scraping tool in a pit dug into river cobbles along Idaho's lower Salmon River. Archaeologists who uncovered the cache, near Grangeville, Idaho, during the 1997 field season now have radiocarbon dates from bone and charcoal associated with the artifacts suggesting the Cooper's Ferry site was occupied more than 11,000 years ago.

"The date establishes this site as one of the oldest with a definite human association in the Pacific Northwest," says David Sisson, archaeologist for the Cottonwood Resource Area of the Federal Bureau of Land Management, which manages the land containing the site. Excavation and analysis of the site were part of a cooperative partnership between the Bureau and the University of Alberta aimed at reconstructing changing environments in the canyon and exploring human adaptation to those environments. From such exploration scientists hope to create predictive models for potential archaeological sites that can help the Bureau better protect the resource.

"Discovery of this cache is intriguing, particularly in light of its age," says Loren

Davis, project director of the Cooper's Ferry excavations. "The stemmed points discovered here appear to be of similar age with or could even predate Clovis-age fluted points [11,500 years B.P.], which makes this a significant discovery. This work will shed new light on the nature of human settlement in North America and will help define the unique nature of early prehistory in the Far West."

Davis, a doctoral candidate in anthropology and earth and atmospheric sciences (geoarchaeology) at the University of Alberta, said in a telephone interview he considers Cooper's Ferry a particularly rich site because it contained a wide range of artifacts from the surface to the bottom of the cache at about 3.2 meters. Radiocarbon samples taken midway between the surface and the bottom of the deposits date to 8,400

years ago, suggesting repeated use of the site, which sits on a riverine terrace about 15 meters above the Lower Salmon River near the confluence of Rock Creek.

The overall site is not a new find, Davis said. It's part of a series of riverine terraces along the river that archaeologist B. Robert Butler first excavated during the 1960s. During those excavations Butler found

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LOREN DAVIS

One of the points from the cache.

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Next issue:

The Pacific Rim Hypothesis

Leading proponents of the theory that the first people came to the Americas along the Pacific Rim gathered in Portland, Ore., on August 22 to share their ideas and research.

In our next issue, **Mammoth Trumpet** will report on the presentations of eight scientists featured at the symposium:

- Robson Bonnicksen, CSFA director, "An Introduction to the Pacific Rim Hypothesis"
- Rolf W. Mathewes, Simon Fraser University, "Paleoecology of a Lost

World: Late-Glacial Development on the Continental Shelf of Northwest Canada"


- E. James Dixon, Denver Museum of Natural History, "Late Ice Age Maritime Adaptation in Canada"
- Daryl Fedje, Parks Canada, "Shifting Shores: Archaeology and Paleoecology in Haida Gwaii"
- Michael Moratto, California State University-Fresno, "Peopling of the Americas: The Evidence from Ice Age California"

- Ruth Gruhn, University of Alberta, "Early Cultures of the Pacific Coast of South America"

- C. Loring Brace, University of Michigan, "Reflections on the Faces of Native Americans"

- Knut Fladmark, Simon Fraser University, "The Coastal Route: A 38-Year Retrospective."

More than 200 people attended the Peopling of the Americas Symposium sponsored by the Oregon Museum of Science and Industry and the **Center for the Study of the First Americans** at Oregon State University.

Don't miss our report; make sure your subscription to the **Mammoth Trumpet** is current. 

Correspondence

Energy Gain from Wapato Clarified

I want to thank you for the great review of the paper I presented in the Paleo-American session at the SAA's 63rd Annual Meeting this spring. I'd like to make a couple of corrections. The first regards the gross caloric gain in a 30-minute harvest period in late October of last year. You mentioned that the gain in kilo-calories was 5,480, but actually it was 2,707 calories of energy. Following is the passage from the paper relating to this harvest:

In October while treading in the silty mud in a wapato patch in water just above my knees, 113 tubers were released from the substrate and floated to the surface within a 30-minute time period. Keely has calculated that there are 3.6 calories per dry gram of wapato (**Readings: Keely**). During this trial, I collected 1,505 grams (fresh) of wapato. Since the dry weight of wapato is about half the weight of fresh tubers, there was gross caloric gain of 2,709 calories of energy.

Though I don't know how many calories I expended in the cold 45

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Cooper's Ferry Spear Cache

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stemmed projectile points corresponding to what are known as Lind Coulee points. Archaeologist Richard D. Daugherty discovered the Lind Coulee, Washington, site in the 1950s and described its artifacts. The find was considered important to the understanding of Northwest archaeology. Archaeologist David G. Rice, who addressed the validity of the Windust Phase in his Ph.D. dissertation published in 1972, and who also did some investigation of Cooper's Ferry, found that some of the projectiles Butler discovered there strongly resembled Windust phase.

Davis says he considers Lind Coulee points stylistically similar to Windust points. Windust, which Rice and Frank Leonhardy defined in 1970 as representing the oldest culture on the lower Snake River region, was believed to be approxi-

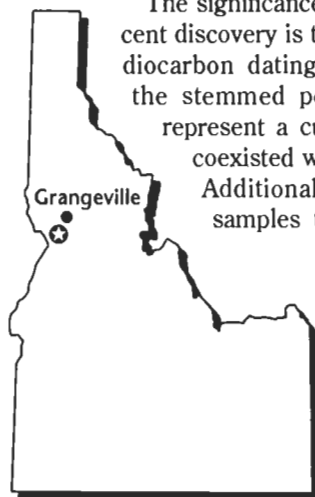
mately 8,000 to 11,000 years old or older. Butler did not find enough charcoal or other material to date the finds radiometrically, however, but he also hypothesized that the stream gravels underlying the site represented the end of the last Ice Age at about 12,000 years ago, a hypothesis that Davis's finding supports.

The significance of the recent discovery is that the radiocarbon dating suggests the stemmed points may represent a culture that coexisted with Clovis. Additional charcoal samples that Davis

is submitting for radiocarbon dating should shed further light on its antiquity. The additional dates will provide a broader database for the project and more firmly establish the age of the artifacts.

Davis wasn't surprised that the Cooper's Ferry site is a very old one. "Butler was the one who really defined this as an early site," he says. He had sought an old site for his doctoral dissertation, and became familiar with Cooper's Ferry while working on his master's degree at Oregon State University, and while working as an archaeological technician for the BLM in nearby Cottonwood, Idaho. It was a natural choice for him as part of his research on geological and archaeological data along the lower Salmon River examining the way people had adapted through time to the changing river environment.

"This offered an opportunity for further exploration. From Butler's research, we knew this was an old site. We just



LOREN DAVIS

The Salmon River Canyon with the mouth of Rock Creek at the right. The area is only a few dozen miles upstream from the Salmon's confluence with the Snake River.



The pit cache is pictured from above after all the sandy fill had been removed during the 1997 excavation. At the right, stratigraphy of Cooper's Ferry is revealed in a wall of the excavation.

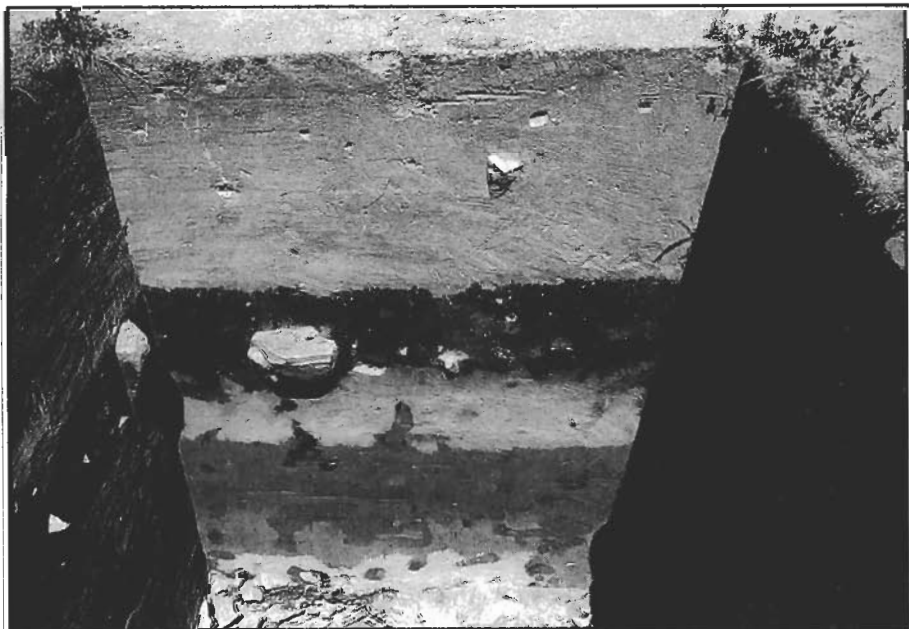
didn't know how old." Armed with maps of Butler's excavations, Davis's corps of archaeological field school students from the University of Idaho and University of Alberta spent two months sinking a two-meter by two-meter unit into a likely, yet previously unexcavated, section of the terrace. At a depth of 2.5 meters, the crew hit river gravel, but at about 2 meters below their surface datum, they began noticing the outlines of a pit-like structure. The circular pit, about 80 centimeters in diameter and extending to a total depth of 120 centimeters, contained

clues. There was a palm-sized scraper of chalcedony, some stone tool-making flakes, deer bone and other mammal-bone fragments, and charcoal scattered throughout the sandy pit fill. One deer bone contained a V-shaped cut Davis suspects humans made while butchering the meat.

The crew also uncovered "four Lind Coulee-like stemmed spear points in the same stratigraphic level, all horizontally placed in the pit," Davis said. The points are about eight to 10 centimeters long, with bases rounded and formed into stems. Three of the four points had been resharpened, Davis said. One point was made from locally available Salmon River greenstone, one was fine-grained basalt, one was cryptocrystalline silicate colored like a calico cat, and the fourth was made from a brownish opal frequently found in the Salmon River canyon. He also found a "blade-like flake" similar in size to the finished points he theorizes might have been slated for use as a blade, or was a tool blank ready for finishing.

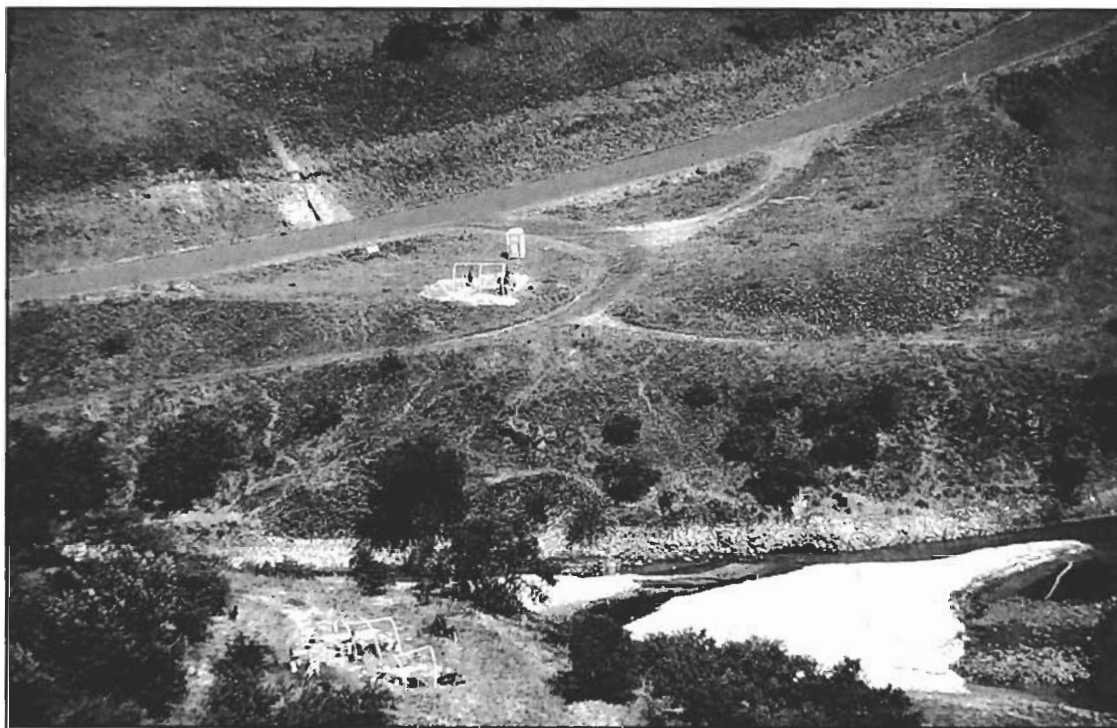
"We haven't done any use-wear analysis yet," he said. "But three of the points found have obviously been used many times."

Analysis of purified bone collagen by the accelerator mass spectrometry (AMS) technique, using one bone sample from the pit on a horizontal level with the projectile points, showed the bone to be $12,020 \pm 170$ radiocarbon years old (Beta 114806). Another charcoal piece



LOREN DAVIS

LOREN DAVIS



DAVID SISSON

Excavations in 1997 were part of a cooperative partnership between the Cottonwood Resource Area, Federal Bureau of Land Management, and the University of Alberta, aimed at reconstructing changing environments in the canyon and exploring human adaptation to those environments. The Cooper's Ferry site itself is just left of center. The team's portable toilet is visible nearby.

Davis plucked by tweezers from collected sand samples associated with the projectile points yielded an AMS-produced age of $11,370 \pm 70$ radiocarbon

years (Beta-224949). Davis said he also got another date of 7,300 radiocarbon years from charcoal in the same strata as the points, but considered the date to be

an anomaly created by contaminated charcoal improperly processed during the wet weather that the crew encountered throughout the dig. Higher up in

Energy Gain from Wapato

continued from page 2

degree water just above my knees, the caloric gain is impressive for a wild food. It is productive as well, growing in a monoculture in dense patches in ponds and wetlands. The 1,505 grams I harvested were from a 2 meter by 2 meter area, in a patch about 100 meters square on the edge of a farmer's field."

During my talk I made the point that no proof exists now that points to wapato use by the first Americans, in part because stone tools are not indicators of its use, and neither is fire-altered rock. That is part of the enigma of wapato, and plant use in general. Can we say that the first Americans were not making extensive use of plant foods, including roots, because there are no stone tools found in paleo sites? I am questioning that paradigm in light of the fact that wapato does not need to be processed with stone tools or baked for long periods of time in order to make it palatable.


Further, pollen evidence suggests that *Sagittaria* species were very prolific during the time the ice was melting; further still, this species is cost-effective to harvest, easy to dry, stores well, and provides adequate amounts of carbohydrates.

I wanted to put wapato on the radar screen of those who study Paleolithic diet so that we may now be able to look for evidence of its use. *Sagittaria* tubers have been found in boggy deposits at Calowanie, a 9,000-year B.P. site in the Polish Plain (Readings: Kubiak-Martens). This is the first evidence for the possible use of plant foods other than hazel nuts or water-chestnuts, in the diet of hunter-gathers in the North European Plain during the Paleolithic and Mesolithic. There may have been a similar pattern in North America.

Closer to home, tuber fragments of *Sagittaria* species have also been found in coprolites from Dryden Cave, Nev., and similar tuber fragments which may be wapato were found in Lovelock Cave (Readings: Neumann). There is

potential evidence in starch grain analysis, more pollen analysis, and perhaps phytolith analysis. Though not specific to wapato, relative components of ancient diets can be estimated utilizing stable carbon isotopic analysis to determine presumed dietary intake, ($^{13}\text{C}/^{12}\text{C}$), and perhaps strontium calcium ratios can also shed some light on dietary components of ancient diets (Readings: Lee-Thorp; Sillen).

The last correction I should make is that Barbie was not wearing a "paleo-costume," but rather a pink tutu with a shiny fabric at the bodice and matching pink hose which got ripped during the demonstration. She harvested wapato in a fish bowl full of clear marbles.

Well, thanks again for the review. If anyone wants a copy of the paper or my thesis, "Wapato for the People," let me know. To those who are studying paleosites: look for wapato use, and let me know the results. 

Melissa Darby
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the excavation, about 75 cm above the top of the cache pit, Davis got two more dates of around 8,400 radiocarbon years old for other charcoal samples, further supporting the older aged samples from the lower-level pit and supportive of his conclusion that the younger cache-related date was an anomaly.

The charcoal finds remain curious to Davis. He said that at the top of the cache pit there appears to be a geologic surface that people could have walked around on. The surface contains a small bowl-shaped oxidized stain (but no charcoal) from what appears to have been a campfire made on the surface of the sand, but, Davis said, there's no evidence indicating early people built a fire ring or pit to contain their blaze. The archaeologists found five such features, all of which "seem to be associated with higher densities of cultural material," Davis said, helping him rule out the possibility of wildfire.



Four stemmed points from the pit cache.

LOREN DAVIS

man occupation of the Lower Salmon River canyon. Finding non-fluted points as old as the fluted points commonly associated with the Clovis culture could signify many things. Few Clovis-type points have been found in the Pacific Northwest, he said, "and we really don't understand the earliest cultures in the Pacific Northwest very well." But he suggests that perhaps the Clovis model doesn't work as well in the Pacific Northwest as it does elsewhere.


"Maybe we should begin thinking more about multiple migrations of people into the New World—maybe different groups embracing different technologies," Davis said. "Perhaps the people who developed the unfluted technologies were different culturally than the fluted peoples, or perhaps this is a local manifestation of early culture without a need to develop a fluted technology. Or maybe a fluted technology just wasn't as useful in the Pacific Northwest as it was on the Plains or back east. At the very least, we need to be asking if the models we have been handed really work in the Pacific Northwest. Maybe they don't. Maybe we are dealing with something entirely different and we are just touching the tip of the iceberg."

If the Cooper's Ferry site is taken alone, he added, it might not be so significant. However, other sites—such as the Mill Iron site in eastern Montana, and Smith Creek Cave in northern Nevada—have unfluted points approaching 13,000 years old, adding to a growing body of

evidence supporting alternate migration theories.

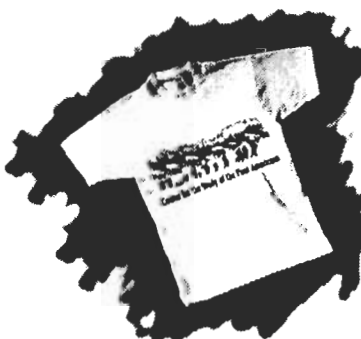
But for now, Davis will continue to analyze the mounds of material collected during the 1997 project, including a nearby site that yielded an 8,600-year-old date and the remnant of a 1,400-year-old pithouse examined during the excavation. He will also be examining geologic data he has collected along 17 miles of the lower Salmon River corridor during more than two years of research. "It would be nice if more work on the site could be done," he said. "It would be nice to open up some larger areas so we could get a broader picture of activities on the site."

As part of his work, Davis also is studying stable isotope geochemistry of the region, examining the geochemistry of carbonates found in river clams, land snails and soils to eventually create what he calls a "tape recording" of paleoclimates. From this research, he hopes to gain a better perspective on the world in which Paleoindians lived. This environmental "frame" will enable him to study more closely how Paleoindians adapted to the changes—how they "painted the picture" within that frame, which may contain small "ecostemic niches" that their particular adaptive technology allowed them to more fully exploit.


As part of his overall research, Davis said, he hopes to find other Cooper's Ferry sites that he believes remain along the river. 

—George Wisner

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He suspects charcoal from the fires blew around and spread from their original locations, contributing to charcoal scatter he found in sand filling the cache pit.

Davis says his finds present as many questions as they answer about early hu-



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Texas Highway 87 is the coastal route between Galveston and Port Arthur.

Clovis Site on Gulf Coast Yields Booty Only to Waves



Highway Project Focuses New Interest on McFadden Beach

ONE OF TEXAS'S most significant Clovis sites is also its most mysterious. Over the decades it has yielded dozens of artifacts and well-preserved bones of extinct animals, but its exact location has never been seen because it lies somewhere under the surface of the Gulf of Mexico. The McFadden Beach site is officially a section of the beach east of Galveston that extends from the town of High Island to Sabine Pass. Its horde of archaeological and paleontological materials have all been secondary deposits collected on the beach.

The sources of the materials are a series of offshore Pleistocene landforms. "During hurricanes and winter storms, artifact material is eroded from these offshore bars and quickly deposited along the adjacent shore of McFadden Beach," explains Bryan L. Guevin, staff archaeologist with the U.S. Army Corps of Engineers in Galveston. "Since no formal investigation or testing has yet been conducted on these offshore bars, the exact extent and nature of the offshore archaeological deposits have not been established." However, Guevin adds that it is well known that the source of the artifact deposits is offshore.

Though storms may be the primary

excavators of the site, each tide raises the possibility of a new discovery. By careful beachcombing, collectors have accumulated an impressive assemblage of artifacts and faunal material. "People have been collecting at McFadden Beach forever," says Guevin, and it was not until after the publication of a monograph on

the materials by Russell J. Long in 1977 that the beach—several miles of it—was registered as archaeological site 41JF50.

The site has yielded 14 Clovis points and dozens of other projectiles and stone tools, most dating to the Paleo period more than 10,500 years ago, but several are from the Archaic, less than 10,500.

Just as remarkable is the faunal material, which includes these extinct species: saber-tooth cat (*Smilodon floridanus*), bear (*Tremarctos floridanus*), capybara (*Nechoerus pickneyi*), giant ground sloth (*Eremotherium* sp.), giant armadillo (*Chalmytherium septentrionale*), mastodon (*Mammuth americanum*), mam-

Erosion and redeposition are continual along the upper Texas coast. Source of the archaeological materials is believed to be the Pleistocene-age Beaumont Formation just offshore, but the same formation can be found on the beach. Ebbing waves (right) have exposed a thin exposure; camera's lens cap, the black circle lower right, provides a sense of scale. In the view below, waves erode a Beaumont deposit.



BRYAN L. GUEVIN, U.S. ARMY CORPS OF ENGINEERS



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moth (*Mammuthus cf. columbi*), flat-headed peccary (*Platygonus cf. Cumberlandensis*), long-nosed peccary (*Mylohyus cf. nasutus*), llama (*Tanapolama mirifica*), tapir (*Tapirus excelsus* and *T. copei*), and horse (*Equus cf. fraternus*, *E. complicatus*, and *E. cf. pacificus*). There is at least one radiocarbon date from the site—11,100 ± 750 years B.P. taken from a sample of elephant tusk collected on the beach.

Remarkably, the faunal material is well preserved and the stone tools are not eroded by wave action. Guevin says that the excellent preservation of materials is attributed to the close proximity of the Pleistocene-age offshore bars. The material is not being constantly subjected to wave action, he explained, but for the most part it remains in situ in the Pleistocene landforms offshore until it is eroded. Then both the bones and the tools are quickly deposited on the beach, where low-energy wave action may cover the beached materials with sand. The sand itself tends to be fine, silty material that is not very abrasive, and consequently, materials from the McFadden Beach site are in good condition.

Because they are not found in primary context, high-quality archaeological materials are likely to occur anywhere on the beach area, which is the route for Texas Highway 87, the coastal route between Galveston and Port Arthur. Though artifacts and bones found on the beach tend to be in good condition, the highway hasn't fared as well. Storms, especially hurricanes, cause considerable erosion and the road frequently has to be rebuilt. Storms occasionally cause closure of the route. As a result, the Texas Department of Transportation is planning to relocate and reconstruct 16.8

A shack stands on pilings in the marsh immediately inland from McFadden Beach (upper). The marsh consists of Holocene-age deposits, less than 3 m thick, resting on the Pleistocene-age Beaumont Formation. The land is slowly subsiding and the ocean rising about 1 mm a year. Across the road on the beach (lower), a key case provides scale to illustrate the size of typical McFadden Beach material. Immediately left of the key case is a fragment of bone, probably of Pleistocene age.



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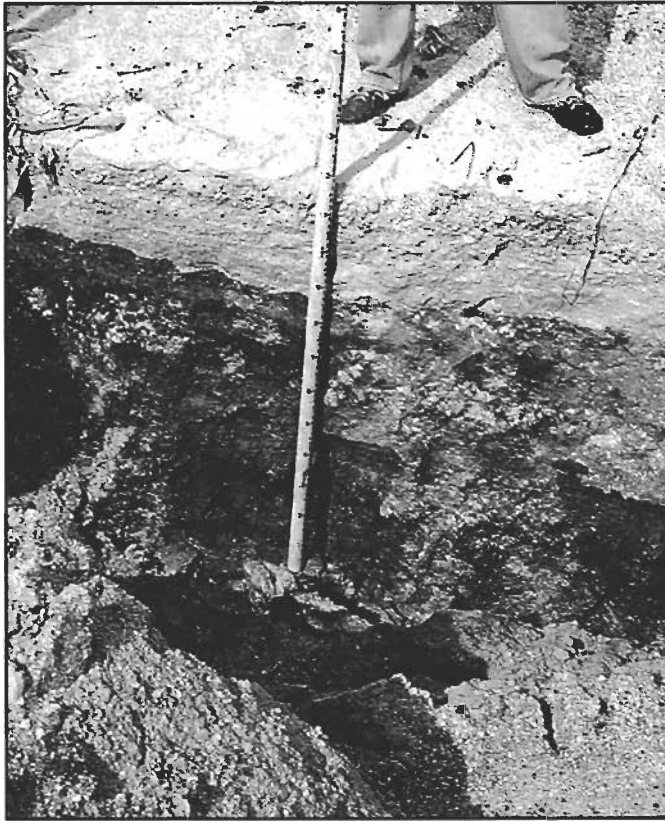


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A 1983 project in connection with a pipeline project investigated stratigraphy at the site by digging a trench from the marsh onto the beach. Any investigation of offshore deposits would likely be a consequence of offshore environmental protection efforts by the petroleum industry, which has wells and pipelines in the area.



BRYAN L. GUEVIN, U.S. ARMY CORPS OF ENGINEERS

miles of the highway on a 120-foot right-of-way 300 feet inland from the existing route.

The proposed route will be atop a four-foot-high embankment along the beach and there would be a series of 200-foot-square parking areas at two-mile intervals. The project requires an environmental permit from the Corps of Engineers under the federal Clean Water Act, so cultural resources must be addressed by the Corps, as well as by the Texas State Historical Preservation Officer and the Advisory Council on Historic Preservation.

Potentially, any part of the highway excavation could disturb Clovis-era archaeological material, but due to the scope of the project, it would be difficult for archaeologists to scrutinize the movement of every bit of the recent beach deposits that might conceal archaeological material.

"We will make every effort to adequately mitigate any proposed impacts to site 41JF50 as a result of the highway construction," says Guevin, who will be coordinating archaeological efforts in connection with the project. The project will not involve offshore investigations of parent paleo-landforms, because the highway realignment will have no impact there. "We will probably concentrate on the beach right-of-way," he told the **Mammoth Trumpet**, adding that the work will follow up on an initial 1983 investigation of the site. Guevin hopes to confirm archaeologists' assumptions about the beach formations and gain a thorough understanding of the landward portion of the site.

During Clovis time, the coast is believed to have been about 120-140 meters lower and 80 kilometers south of



BRYAN L. GUEVIN, U.S. ARMY CORPS OF ENGINEERS



where it is now. Geologists think that during lowered sea level late in Pleistocene time, the region's major rivers, which include the San Jacinto, Trinity, Sabine, Neches, Calcasieu, and Mermentau, flowed together in a valley that was about 32 kilometers south of the site.

The faunal remains washed up from those long-submerged landscapes suggest a variety of environments, possibly representing various time periods. Remains of capybara, jaguar and giant armadillo suggest tropical forest, as in South America, and mastodon, too, indicates forest. But the horses, mammoth and bison indicate grassland, and prairie dog remains suggest it was semi-arid. The remains indicate that there were two paleo-environments or mosaics of environments—grasslands and woodlands—dominated mainly by extinct or extirpated animals. Two other habitats, brackish freshwater and riverine marsh, were dominated by species that still live

in the area. A total of 21 different extinct and extirpated fauna have been identified, and scientists believe that most of the faunal remains are from the same deposits as the archaeological materials.

The principal authority on McFadden Beach artifacts is Russell J. Long, a retired biology professor at Lamar University. His monograph, *McFadden Beach*, was published by Lamar University's Spindletop Museum in 1977. Dr. Long reported in the monograph that more than 166 artifacts, most of stone, had been collected between Sabine Pass and

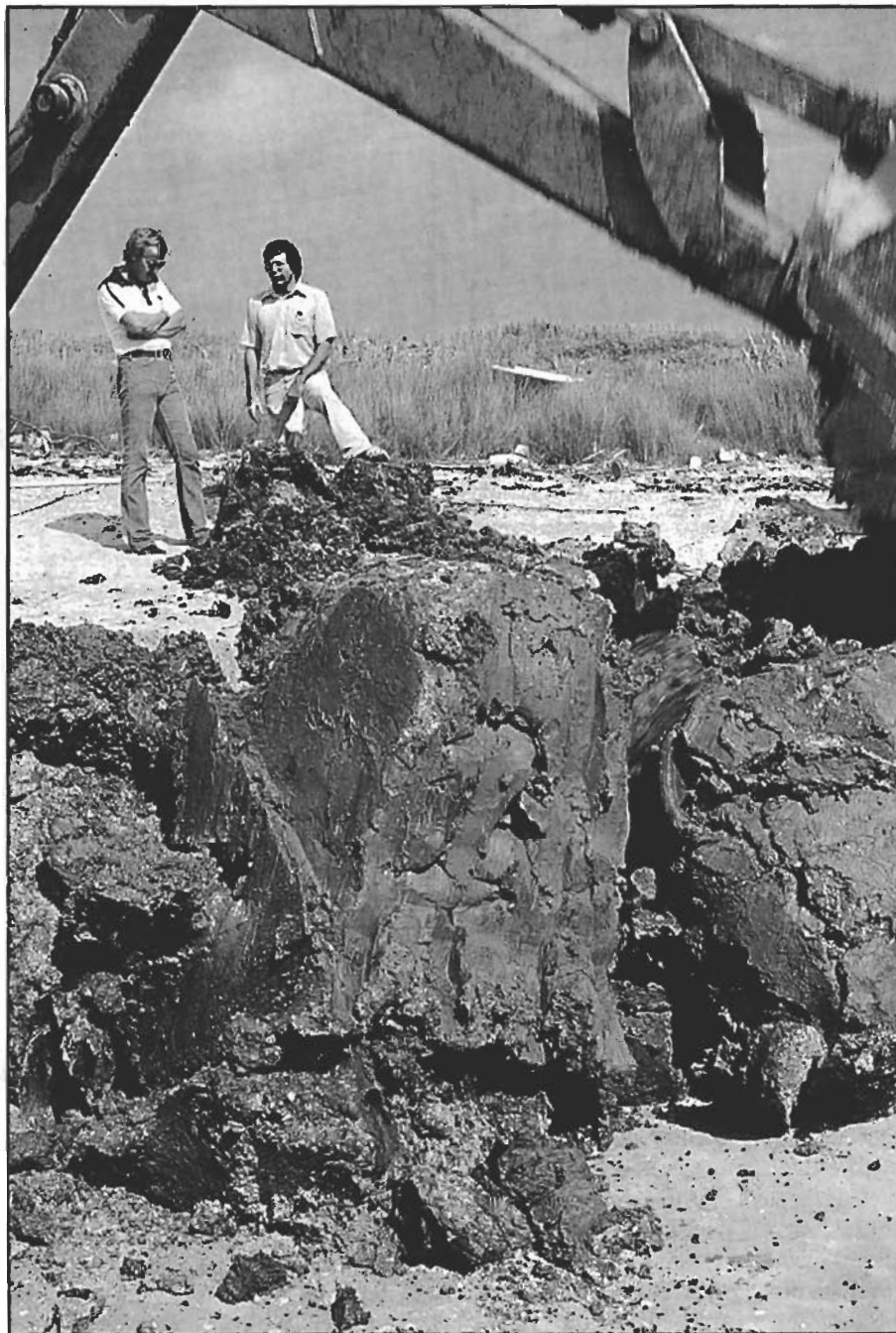
High Island. He said that the assemblage represents many Paleoindian tool types, in addition to the 14 Clovis points.

Dr. Long, who, in retirement, taught short courses on avocational archaeology, has described many of the more interesting discoveries. His own initiation to McFadden Beach collecting was the discovery of a 51-mm Clovis point of dark brown flint that he believes came from central Texas. "It was in the edge of the water and actually moving as the waves broke on the sand," he wrote. A Clovis point more than twice as long was



BRYAN L. GUEVIN, U.S. ARMY CORPS OF ENGINEERS

This backhoe work in 1983 provided much of the paleogeographic information that is known about the McFadden Beach site. Archaeological materials have been redeposited from Pleistocene deposits somewhere offshore.



BRYAN L. GUEVIN, U.S. ARMY CORPS OF ENGINEERS

found by an 8-year-old boy. Long wrote: "He was going to throw it to see if it would skip out on the water when his sister . . . told him she thought it was an Indian stone."

While a family was digging a partially exposed mastodon tooth from the sand, the son exclaimed "Look, Daddy, here's an arrowhead," and Long identified it as another Clovis point. The mother was ultimately involved with the discovery of three Clovis points. Long tells of the discovery of another handsome Clovis point: One Sunday afternoon when the beach was covered with cars and people, a man helping his small daughter gather shells picked up the precious artifact from between two beer cans and a sand castle.



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The assemblage contains a thin tapering tool of greenish tan chert identified as an expanded-base drill. More than 90 mm in length, it was found, Long wrote, by a woman on the upper beach beside tracks indicating that a car had barely missed breaking it.

Dr. Long's monograph lists typologies of many of the tools. "All paleo-groups are represented excepting Folsom." Besides Clovis points of both "east" and "west" types, he described Scottsbluff, Pryor, Dalton, Greenbrier, San Patrice, Pedernales, Tortugas, Absolo, Marshall, Hardin, and Woodland points, as well as blade and spall tools, unstemmed lanceolates, and stemmed points, which he noted as the most common found on the beach. A few bone tools have been recovered, too.

He suggested that all the tools must represent hunting losses because no campsite chipping debris has been found. He thinks that the tools were lost near the present shoreline by hunters who lived farther seaward.


Guevin says that the closest deposits of Clovis-age material are only 10 to 25 meters offshore. These landforms are accessible during certain extreme conditions, for example when Arctic



BRYAN L. GUEVIN, U.S. ARMY CORPS OF ENGINEERS

These fossil bones and archaeological material were gathered on the beach during one survey in 1983. The hundreds of McFadden Beach artifacts are preserved in at least 27 private collections.

"Northers" push tides seaward. Such windows of opportunity, he adds, are very short in duration. "Traditional surveys and investigations cannot respond in time." Thus even though some primary sites might actually be above the waves on rare occasions, the primary sites, whether kill sites or camps, represent a daunting challenge to archaeologists.

For the foreseeable future, archaeology at the McFadden Beach site will mean careful monitoring of highway construction and continued beachcombing, while nearby, under the Gulf of Mexico, one or more Paleoamerican sites lie as an invitation to underwater archaeologists. 

—DAH



BRYAN L. GUEVIN, U.S. ARMY CORPS OF ENGINEERS

McFadden Beach's secrets remain somewhere beyond the beach.

THE FALL OF THE CLOVIS BARRIER did not provoke the excitement at last April's 67th annual meeting of the American Association of Physical Anthropologists (AAPA) in Salt Lake City as it had weeks earlier at the Society for American Archaeology in Seattle ("The Americas After Monte Verde," *Mammoth Trumpet* 13:3). Many physical anthropologists, human biologists, and geneticists had long inferred pre-Clovis entry of people into the Americas. However, those studying questions of peopling of the Americas remain far from consensus on the origins and relationships of the first Americans, according to AAPA participants.

Research presented at Salt Lake City suggests that there was considerable variation in the physical appearance of Paleoamericans, and that the peopling of the Americas was a complex process. New studies of the biological features of ancient people, as well as those of contemporary people, continue to provide valuable, though perplexing, new clues to origins of the First Americans. The research is in the distinct but complementary disciplines of human morphology, genetic studies based on ancient remains, and the genetics of living peoples.

In the latter field, investigators at the University of Arizona's departments of Anthropology, and Molecular Systematics and Evolution, described new findings in their continuing work with linked genes, known as haplotypes, on the Y-chromosome, which is inherited only through men. Their research provides different data than the more-frequently studied mitochondrial DNA (mtDNA), which is inherited through women. Mitochondrial DNA studies have suggested the Americas could have been peopled by Asians 20,000 or even 35,000 or more years ago. Y-chromosome research provides parallel lines of evidence to mitochondrial DNA.

Two Possible Founder Markers Widespread

Tatiana Karafet of the Institute of Cytology and Genetics of Novosibirsk, Russia, and the University of Arizona, traced the origins of Native Americans using Y-chromosome haplotypes. Her paper, "Worldwide Distribution of Y Chromosome Haplotypes: Implications for the Origin(s) of Native Americans," reported that two of

New World Migration Research Paints Increasingly Complex Picture

Physical anthropologists find conflicting clues to origins of Americans

five possible founder haplotypes in the New World are widespread, and account for 91 percent of a sample of 1,678 men from 47 populations around the world. The research, carried out with co-authors Steven Zegura and Michael Hammer of the University of Arizona, suggests that the origins and migrations of ancient Americans were complex—more so than scientists have believed.

Their theme of greater complexity of

the origins and migrations of modern humans was enlarged on by Michael Hammer in his AAPA luncheon address "Genetic Approaches to Modern Human Origins: Perspectives from the Y Chromosome." Research by Hammer and his colleagues points to an African origin for modern humans, something also postulated by mtDNA studies. However, their work suggests migration from Africa to Asia, where subsequent genetic changes

What's a Haplotype?

Geneticists frequently study haplotypes because they are looking for combinations of genetic variants that extend back across many generations. The simplest way to do this is to focus on those chromosomes or sequences of DNA that are haploid rather than

diploid. Haploid chromosomes are present in single dose in an individual, while diploid chromosomes are present in double dose, with information provided from both the mother and the father in each generation. Haplotypes consist of several genes or DNA variants inherited as a linear cluster. On the Y chromosome they pass down through the male lineage, while those in mitochondrial DNA are inherited through the female lineage.



occurred, and return to Africa where further genetic changes have been tracked.

Theodore G. Schurr of Emory University presented a paper which reported complexities in data from a number of ethnic groups. The paper, titled "Genetic Associations Across the Bering Strait: Continuities and Discontinuities," with Emory University colleagues J. T. Lell and D. C. Wallace, and R. I. Sukernik and E. B. Starikovskaya of the Institute of Cytology and Genetics of Novosibirsk, Russia, used both mtDNA and Y-chromosome data. Their data support the accepted theory that populations from northern Asia expanded to populate North America. It suggests that ancestral Siberian and New World populations arose from common genetic stocks which had come from east-central Asia before the last glacial maximum. Since that time, native Siberians have experienced multiple genetic influences that Native Americans were isolated from.

Ancient DNA

Papers describing mtDNA and Y-chromosome research were based on genetic data gathered from living subjects, but some presentations at the Salt Lake City meetings involved research on ancient DNA. Connie Kolman and N. Tuross, of the Smithsonian Institution's Conservation Analytical Laboratory, discussed problems in using ancient DNA. Though the submitted title of the paper was "Pitfalls of Ancient DNA Analysis in New World Human Populations," Dr. Kolman said that in the months after title and abstract were submitted, it had become possible

to provide a slightly less negative view of ancient DNA. She said that some successes had been achieved in avoiding contamination by modern DNA.

The sample of human remains on which Kolman and Tuross based their analysis was from South Dakota and ranged in age from around 150 to 2,000 years old. Although far from Paleoindian age, these samples raised the same problems of analysis that are faced by workers studying much older skeletal remains or mummified tissues, including naturally shed hair. Kolman described the excruciatingly detailed analysis necessary for dealing with ancient DNA.

Scientists emphasize that ancient DNA is an important supplement to study of DNA from living people. British evolutionist Robert Foley, for example, has often said that studies of modern people may be used to make inferences about past peoples who left descendants, but studies of ancient remains can tell about those who did not leave descendants, as well as those who did.

Morphological studies, analyses of measurements of human skeletal material, continue to be important to the understanding of human origins and migrations. Todd Fenton, of the University of Arizona, presented a slightly different twist to traditional morphological analysis in a paper on the Buhl woman, a partial Paleoindian skeleton discovered during a construction project in Idaho several years ago that has been reburied on the Fort Hall Indian Reservation (**Mammoth Trumpet** 7:2 "Idaho Burial Suggests Life of Hardships, and

COMING CONFERENCES

Oct. 1-4 10th Mogollon Archaeological Conference, Silver City, New Mexico.

Contact: Cynthia Ann Bettison, Western New Mexico University Museum, PO Box 680, Silver City, NM 88061. 505-538-6386 e-mail: bettison@iron.wnmu.edu.

Oct. 8-10 26th Great Basin Anthropological Conference, The Riverhouse Hotel and Convention Center, Bend, Ore.

Contact: Dennis Jenkins, UO Museum of Natural History, University of Oregon, Eugene, OR 97403-1224.

Oct. 14-17 56th Annual Plains Anthropological Conference, Bismark, ND.

Contact: Fern Swenson, State Historical Society of North Dakota, 612 E. Blvd. Ave., Bismark, ND 58505. 701-328-3675 e-mail: ccmil.fswenson@ranch.state.nd.us.

Nov. 2-8 IV Jornadas de Arqueología de la Patagonia, Río Gallegos, Argentina.

Contact: INAPL, 3 de Febrero 1370 (1426), Buenos Aires, Argentina. e-mail: rafa@bibapl.edu.ar.

Nov. 11-14 55th Annual Southeastern Archaeological Conference, Hyatt Regency, Greenville, SC.

Contact: Ken Sassaman, SRARP, PO Box 600, New Ellenton, SC 29809. 803-725-1130 e-mail: sassamank@garnet.cla.sc.edu.

Nov. 12-15 31st Annual Chacmool Conference, University of Calgary, Calgary, Alberta.

Contact: Conference Committee, Dept. Archaeology, Univ. of Calgary, Calgary, AB T1N 2N4. e-mail: nicholls@acs.ucalgary.ca

March 24-28, 1999 64th Annual Meeting of the Society for American Archaeology, Sheraton Chicago.

Contact: SAA, 900 Second Street NE No. 12, Washington, D.C. 20002-3557. 202-789-8200. Fax 202-789-0284. e-mail: meetings@saa.org.

April 7-10, 1999 Northwest Anthropology Conference, Holiday Inn, Newport, Oregon.

Contact: Karen Mills, Dept. of Anthropology, 238 Waldo, Oregon State University, Corvallis, OR 97331. 541-737-3847.

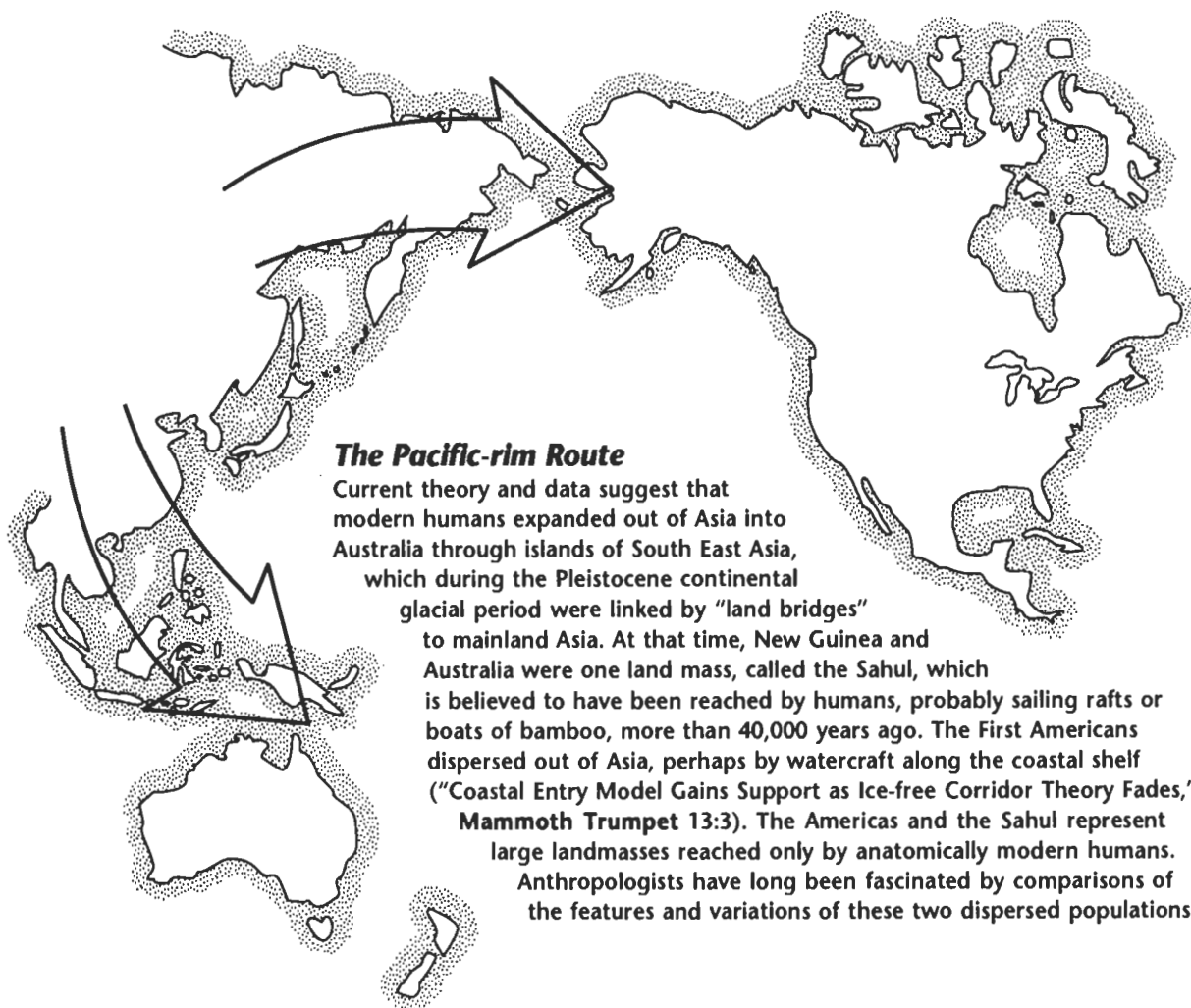
May 16-20, 1999 2nd International Mammoth Conference, Natuurmuseum Rotterdam, The Netherlands.

Contact: Natuurmuseum Rotterdam, PO Box 23452, NL-3001 KL Rotterdam, The Netherlands. Fax 31-10-436-43-99. e-mail: mammoth@nmr.nl.

Oct. 28-Nov. 1, 1999 Conference: Clovis and Beyond, Santa Fe, NM. Sponsors: Center for the Study of the First Americans, Museum of Fine Arts, and Laboratory of Anthropology of the Museum of New Mexico.

Contact: Clovis and Beyond Conference. 505-982-8520. 

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



The Pacific-rim Route

Current theory and data suggest that modern humans expanded out of Asia into Australia through islands of South East Asia, which during the Pleistocene continental glacial period were linked by "land bridges" to mainland Asia. At that time, New Guinea and Australia were one land mass, called the Sahul, which is believed to have been reached by humans, probably sailing rafts or boats of bamboo, more than 40,000 years ago. The First Americans dispersed out of Asia, perhaps by watercraft along the coastal shelf ("Coastal Entry Model Gains Support as Ice-free Corridor Theory Fades," **Mammoth Trumpet** 13:3). The Americas and the Sahul represent large landmasses reached only by anatomically modern humans. Anthropologists have long been fascinated by comparisons of the features and variations of these two dispersed populations.

MT 7:3 "Forensic Methods Focus on Paleoindian"). In collaboration with A. R. Nelson of the University of Michigan, Fenton provided an AAPA session with additional analysis of the Buhl woman by applying standardized measurements to scaled photographs of the skull so as to get data that could be compared with a University of Michigan cranial database. That database includes 24 separate measurements of the skulls of more than 7,200 individuals worldwide, more than 2,000 of them from the Americas. The Fenton and Nelson analysis, "Biological Affinities of the Buhl Woman: the Oldest Paleoindian Skeleton," indicates closest similarities with other American Indian samples and a weak association with samples of Ainu, the aboriginal inhabitants of Japan, and no association with European samples.

Conflicting Conclusions

In a separate paper, "Craniofacial Form and Regional Population Affinities: a Comparative Approach to Paleoindian Origins," Nelson used the same University of Michigan database to assess groups that Paleoindians most closely resemble. His study included Spirit Cave Man and Wizard's Beach Man from Nevada, Brown's Valley Man and Minnesota Woman from Minnesota, and the Buhl Woman. He found regional variation

within the Americas and some similarities between Paleoindian samples and those of somewhat later Archaic samples. He said the results of this study are broadly comparable with recent mtDNA and Y-chromosome work, and indicate clear ties between Paleoindian and Archaic morphologies.

Research that focused on an ancient Brazilian skeleton reached a very different conclusion. In direct contrast with Nelson's findings, a paper "Lapa Vermelha IV Hominid 1: Morphological Affinities of the Earliest Known American," by Walter Neves of the Universidade de São Paulo, reported that the skeleton recovered by a French-Brazilian team in the central Brazilian state of Minas Geras in 1974-75, and subsequently found to be more than 11,000 years old, does *not* closely resemble later Native Americans. Dr. Neves and his co-authors, André Prous of Museu de História Natural, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil, and Joseph Powell and E. G. Ozolins of the Department of Anthropology, University of New Mexico, reported that by one statistical analysis the Brazilian most closely resembled Africans and South Pacific populations. By another it showed the closest similarities to early Australians and an early modern human from Zhoukoudien Upper Cave, China.

"The results confirm the idea that the Americas were first



colonized by a generalized *Homo sapiens* population that inhabited East Asia in the late Pleistocene before the definition of classic Mongoloid morphology," said Neves.

A related study presented in the same AAPA session also found regional morphological variation in Paleoindian skeletons. That paper, "How Many Populations of Early Americans Were There?" by Richard Jantz of the University of Tennessee and Douglas Owsley of the Department of Anthropology of the Smithsonian Institute, analyzed the crania of 11 ancient Americans, most from the Paleoindian era. They reported substantial variation, but some clustering, which suggests three to five distinct populations. They concluded that "the history of American populations is much more complex than has generally been supposed."

Australian Parallels Examined

The Neves et al. and Jantz-Owsley papers were part of a symposium, "Biological Variation and Population Origins in the Americas and Australia," which examined parallels between studies of the earliest settlement of the Americas and those of Australia. Organized by Roberta L. Hall of the Department of Anthropology at Oregon State University, the session followed up on a 1972 symposium in Sydney, Australia, at which Smithsonian anthropologist T. Dale Stewart discussed features and problems common to the study of the peopling of Australia and the Americas.

Hall presented an introductory paper updating Stewart's paper and reviewing the many subsequent developments ranging from technological breakthroughs that allow more detailed genetic analyses to new discoveries and theories concerning the antiquity of anatomically modern humans. These, she argued, have reinforced the importance of looking at and comparing the peopling of the Americas and Australia.

In the same session, Joseph F. Powell, of the Department of Anthropology of the University of New Mexico, and Neves used dental rather than cranial data to contribute to the body of evidence reporting diversity among ancient North Americans. Their paper, "Dental Diversity of Early New World Populations: Taking a Bite out of the Tripartite Model," supported earlier findings that biological variation of recent Native Americans can't fully explain the process of peopling of the Americas.

Denise A. Donlon of the Department of Anatomy and Histology of the University of Sydney, in a paper read by Judith Littleton of Australian National University, addressed data on the many bones that do *not* comprise the skull. In her paper, "The Value of Postcranial Nonmetric Variation in Studies of Modern *Homo Sapiens*; an Australian Focus," she analyzed bones that human morphologists tend to overlook. Dr. Donlon compared traits of Australians and other populations through the use of non-metric traits that likely are less susceptible to environmental variation than measures of size that respond to changes in nutrition and exercise. She found regional variations that could indicate linkages among ancestral groups.

Intriguing Bones from Mexico

At the same AAPA session, Joel Irish of the University of Alaska's Department of Anthropology described intriguing



STEVE OWSLEY

Participants of an AAPA session, "Biological Variation and Population Origins in the Americas and Australia," pose for the camera after the symposium last April in Salt Lake City. From left are Michael Crawford, University of Kansas; Joseph Powell, University of New Mexico; Walter Neves (front), Universidade de São Paulo; Roberta Hall, Oregon State University; Richard Jantz, University of Tennessee; Theodore G. Schurr, Emory University; Alan J. Redd, Pennsylvania State University; Judith Littleton, Australian National University; and Joel Irish, University of Alaska-Fairbanks.

fragmentary human remains from a desert playa area near Zacualco, Mexico, that have yielded a wide variety of Pleistocene faunal material. The human bones are mineralized and appear quite old, although no dates have as yet been achieved. The paper, "Potential Early Prehistoric Human Remains from Jalisco, Mexico: a Revised Assessment," had several co-authors: J. E. Lobdell, of the Department of Biology of the University of New Mexico, Stanley D. Davis, of the U.S. Forest Service in Sitka, Alaska, and F. A. Solórzano, of the Museo Regional de Guadalajara. The scientists reported that human bones from the site represent three or more individuals. One adult had an extremely rugged cranium with massive supra-orbital ridges and other attributes that the authors said are unusual in the New World. The researchers said that in spite of heavy mineralization, organic matter found in a molar may be radiocarbon dated by accelerator mass spectrometry, though a date was not yet available. The site presumably dates to the Pleistocene.

At a Society for American Archaeology session on Paleoamerican studies a few weeks before the Salt Lake City session, Davis had described scientists' examination of the sites of the Jalisco region. He said that there is evidence of human modification on 34 animal bones, all petrified with silica, from the region's sites. He said a radiocarbon sample taken from the tooth of a swamp deer dated to 18,200 years ago.

The Irish and Neves presentations each reminded physical anthropologists of the importance of re-examination of museum collections from important sites, in light of new interest and new techniques in dating, excavation, and analysis.

Australia and New Guinea

Two presentations in the Americas-Australia symposium used genetics data from living populations to describe and analyze

continued on page 20

Symposium Asks:

What Happened 11,000 Years Ago?

THE MOST COMPELLING ENIGMA about the peopling of the Americas is the mystery of the enormous changes that ended the Pleistocene and brought on the Holocene. A symposium at the Society for American Archaeology's 1998 Seattle meeting focused specifically on this question, with several scholars giving their perspectives of the events that resulted in extinction of megafauna from the Americas and gave rise to widespread human adaptation to the land and its resources.

More precise radiometric dating and new understandings of how radiocarbon dates correspond with events that have left marks on stratigraphy, combined with a much better understanding of faunal distributions over time, are opening new windows to researchers. Further, recent climatological research is showing how radically and abruptly the climate changed at the beginning of the Holocene.

Among the symposium's presenters were Russell Graham, of the Denver Museum of Natural History, who reviewed the FAUNMAP electronic database that can track range and abundance of mammal species over the past 40,000 years; Gary Haynes, University of Nevada—Reno, organizer of the session, who postulated explanations for Clovis—the Paleoamerican culture identified with this transitional period—and the role of mammoth hunting in Clovis ecology; and C. Vance Haynes, of the University of Arizona, who reviewed stratigraphy at several well-studied Paleoindian sites.

Graham presented evidence of animal populations from the computer database that documents changes in distributions of individual North American mammal species for seven time periods over the last 40,000 years. FAUNMAP incorporates data from more than 3,000 faunal

sites in the United States. Analysis of the database allows researchers to study the distribution of animals ranging in size from voles to elephants, over time.

Pleistocene animals, Graham said, were organized into definable "faunal provinces," but he emphasized that these were quite different than Holocene faunal associations. There are no modern analogs for the communities of animals that existed in the Pleistocene.

But there are modern analogs to mammoths and mastodons, and Gary Haynes employed what he has learned of African elephants to explore the impact of Clovis hunters on mammoths and mastodons. His SAA presentation drew foraging theory together with knowledge of African elephant herds, Clovis sites, and megafaunal extinctions in North America.

He argued that it was advantageous for Clovis people to prey on the elephants, and he referred to evidence from earlier presentations in the symposium

stress behavior such as fighting; also, profiles of the animals' ages at death suggest they were in a stress situation, possibly living in high densities. Megamammals were gathering in refuges where they could find food and water. Studies of African elephants have shown that in time of die-offs and stress, such refuges are temporary. But such refuge "patches" leave the animals highly vulnerable and easily locatable by human hunter-gatherers. "Animals do create trail systems that competent hunter-gatherers can read." He stressed that such trails would not be hard for Clovis-era people to follow.

Hunters, said Gary Haynes, can read the trails and determine that there are animals under stress, how long the trails have been used, what the animals are feeding on, and the ages and sexes of the animals. Elephants, he said, leave "lots and lots of signs indicating that something is at the end of the trail."

African observations indicate that places where die-offs occur tend to be patchy and not evenly distributed. "But they are predictable," he said. Hunters can readily find them. These refuges tend to have decreased biotic diversity, with many animals clustered around sources of food and water, and that situation creates more bad news in that animals already under stress are actually making it worse. "We can see this in studies of modern African elephants and rhinoceroses."

Elephants in such conditions, he said, begin to behave in ways that make them better targets for hunters. Reproductive success declines so that although the population levels may be relatively high, reproductive potential is relatively low. "You cannot predict how successful the population will be based only on density of numbers," said Haynes. There is later maturation and certain animals succumb to feeding competition. Again, he said that there are signs of stress in North America's fossil record that are in accord with research on African elephants, and his presentation included considerable discussion of theories of foraging that he related to Clovis hunters preying on American elephants stressed by changing climate.

By contrast, he contended that foraging theories based on ethnographic evi-



citing changing climate and the breakup of long-established Pleistocene biotas. The effect of the change was to force mammoths and mastodons into insular or isolated groups whereas those species had been single breeding populations linked genetically across vast portions of the continent.

The paleontological record, Gary Haynes suggested, contains evidence of both the isolation of populations and

dence may not be applicable to America at the time of the Clovis drought. He suggested that resource distribution would not have been homogenous as theory requires.

"If they're dispersing foragers looking for food," he said of Paleoamerican hunters, "they're not necessarily randomly searching. And if they can find a trail at the end of which they know there's some animal that's under stress, they are going directly to the resource patch without a random search." He also suggested that the theory that the longer foragers stay in a food "patch," the lower their rate of return becomes, may not have applied at the end of the Pleistocene.

Complicating the consideration of diet reconstruction and foraging theory is the question of competing co-traditions. Competing with others for food, he noted, has an impact on what foods are chosen, and lack of competition has an impact on the spread of style or type of artifact.

Another question Gary Haynes raised about Clovis people, who evidently ranged across much of North America, is why they would have ever left areas of abundant food—refuges for elephants—and traveled on. Were they killing off every last mammoth or mastodon in a patch? Were they out exploring? It's not clear, he said, but with few, if any, competitors Clovis people had the option to explore with the certainty that trail systems, leading to concentrations of mammoths or mastodons, were a safety net that would always take them back to food. In drought, he noted, elephants have to tether themselves to water. Evidence for drought stress among North America's mammoths and mastodons includes broken tips of tusks from fighting, as well as the wells, described in the symposium by Vance Haynes, that they apparently dug in their quest for water.

"Even if other animals are dead and it's only the mammoths and mastodons left," Gary Haynes told the SAA audience, Clovis people enjoyed optimal return on their foraging because the drought made the elephants easy to find. There would have been, he said, "less search time and possibly less effort needed to kill the animals." The risk is also minimized.

"The Clovis decision," he said, "is to follow where the food resources ought to be found." Haynes suggested that the sites they left behind for archaeologists were rather cursory ones, with bones of their kills left mostly articulated. With an overabundance of meat, such as at a multiple-elephant kill, carnivores tend not to use carcasses as fully as when they kill one animal at a time.

If Clovis people were instrumental in finishing off North

America's mammoths and mastodons, shouldn't there be many more elephant-kill sites? "We're talking about tens of thousands or a million of them," he said, noting that there may be as few as 53 or as many as 86 known mammoth and mastodon sites associated with Clovis. "Where are all the sites?" he asked the SAA symposium, then proposed that they have simply disappeared.

Recalling his experience looking for sites in Zimbabwe where thousands of elephants were culled, he said that approximately 250 sites that existed in the 1980s are no longer in existence because the animal bones have been destroyed by weathering and perhaps trampling and burial. Further, where approximately 200,000 elephants were shot a little over 100 years ago, not a single site can now be located. "All those skeletons have weathered away in the last 100 years." Though weathering in the tropics is faster than in temperate North America, Haynes concludes that the most likely explanation for the relatively small number




DON ALAN HALL

Gary Haynes, University of Nevada-Reno, was the organizer of the session.

of known mammoth and mastodon sites is that they simply weathered away.

Geoarchaeologist Vance Haynes described the time of drought that preceded the advent of Clovis hunters before 11,000 (uncalibrated) years ago. He painted a picture of the last mammoths gathering at the sources of spring-fed streams and, when necessary, digging into beds of dry streams to find water. Clovis people interacted with the mammoths in these refuges.

"Termination of the megafauna occurred at the end of the Clovis drought at the same time the Clovis hunters appear to have been most active, and immediately before a sudden return to glacial conditions," he said. Vance Haynes illustrated his presentation with slides of several well-studied Clovis sites. Some depicted evidence of depressions dug into the drying landscape by mammoths or other animals searching for water, and he pondered the likely result of bitter cold on the heels of such a drought. Haynes quoted Ed Lehner, the rancher who discovered the Clovis mammoth site on his land in southeastern Arizona. Lehner posed the question of what would happen to the megafauna if an extended period of bitter cold froze their already scarce water holes so that not even mammoths could get water. Obviously, large animals, already under stress of drought, would be further stressed. And this scenario occurred at the same time Clovis people, who were digging their own wells for survival, were hunting them.

The evidence of dramatic climatic change occurring at the time mammoths died out is compelling, but Vance Haynes isn't confident that scientists yet have all answers to the mystery of Pleistocene extinctions. "My gut feeling is that something happened dramatically at 11,000 B.C. [calibrated years] that we still don't understand." 

—DAH



DON ALAN HALL

After an SAA symposium, C. Vance Haynes, University of Arizona, discusses Paleoamerican archaeology with Robson Bonnicksen, Oregon State University.

SEVERAL PRESENTATIONS at the Society for American Archaeology's 1998 meeting in Seattle focused on extinctions of Pleistocene animals. Some papers gave evidence of calamitous and sudden changes in climate, and others focused on human involvement in the extinctions.

At a symposium on peopling of the Americas, Elin Whitney-Smith of George Washington University presented a hypothesis she calls Second Order Overkill, and she urged SAA colleagues to experiment with models of it. Reviewing two principal extinction theories—climate change and overkill by human hunters—Whitney-Smith discounted the climate-change theory by pointing out that mammoths, sloths and other animals that went extinct had survived previous warm interglacial periods. She further noted that horses went extinct in the Americas at the end of the Ice Age, but are thriving today in the same climate that presumably led to their extinction. Then, referring to overkill, Whitney-Smith said that predators that wipe out their food source aren't able to maintain their own populations. Further undermining overkill as an explanation, she pointed out that ground sloths and other animals not believed to be prime prey species of humans also went extinct.

Having discounted the two basic Pleistocene extinction theories, she went on to illustrate her own theory with graphs depicting populations of animals, humans and plants through the time of the Pleistocene-Holocene changes.

Whitney-Smith suggested that her model can explain the extinctions of elephants and other non-ruminant grazers as well as changes in patterns of vegetation. The model distinguishes between ruminant and non-ruminant grazing animals, browsing animals, carnivores or non-human predators, and humans. It also considers four classes of vegetation communities—tall and short trees, and high- and low-quality grass.

A key to the hypothesis is the proposition that Paleo-Americans slightly reduced the population of carnivores. She suggests that reducing carnivore populations reduces competition and, further, that New World carnivores were easier to kill. Her hypothesis requires that carnivore populations be reduced slightly—no more than 2 percent.

That reduction of predators, according to the model, changed the ecological balance and brought on a boom in the population of herbivores.

Herbivores, then, ate vegetation into the ground and starved. Species such as mastodons that specialized in trees, the slowest-growing plants, died first; then non-ruminants such as horses and mammoths died. Carnivores that depended on these animals would have followed them to extinction.

Species that made it through into the Holocene were ruminant herbivores, such as bison, that could get maximum nutrition from poor forage; small animals that required less food; generalist carnivores and scavengers like wolves and smaller cats; and humans, who were willing to alter their life-style.


Whitney-Smith's graphs showed the theoretical results of the Second Order Overkill simulation starting with the

entry of approximately 200 humans into the New World around 15,000 years ago and their subsequent population growth, and the reduction of the carnivore population. She says the actual dates of the events aren't as important to the model as the spacing between the dates.

She graphically depicted one scenario of the effects of Second Order Overkill. Without carnivores:

- The population of browsers boomed, but within a few thousand years crashed to extinction.
- The number of mixed feeders declined slowly before plunging to extinction shortly after the browsers.
- Ruminant numbers increased before going into a gradual decline that became precipitous and then recovered.
- Non-ruminants declined initially, but recovered to a sharp peak in population before declining to extinction.

The computer simulation starts with the entry of approximately 200 humans into the New World around 15,000 years ago.

Whitney-Smith urged colleagues to run her program on their own computers, experimenting by changing the numbers in the population columns or by altering the time scales. She said the model is available to scholars on CD ROM by contacting her by e-mail (elin@tmn.com) or through her Worldwide Web site, www.well.com/user/elin/extinct.htm. 

—DAH

Computer Model Offers New Twist to Explain Pleistocene Extinctions



New World Research

continued from page 16


differences in living populations and to develop possible origin and migration models. "Origins and Affinities of Aboriginal Australian and Papua New Guinean Populations as Revealed by Mitochondrial, HLA, and Y Chromosome Genetic Data" by Alan J. Redd and Mark Stoneking of the Department of Anthropology of the Pennsylvania State University was a companion to their paper "The Peopling of Sahul: A Genetic Perspective" (by Stoneking and Redd) given in a different Salt Lake City session.

Sahul is a term for the landmass that included both New Guinea and Australia, and lands now submerged that existed between them in Pleistocene times. There is evidence that humans settled the Sahul at least by 40,000 years ago, and many anthropologists believe settlement probably came much earlier. Most scholars estimate the oldest definitely dated human fossil remains do not exceed 40,000 years' antiquity.

Genetic data presented at AAPA in the two papers by Stoneking and Redd indicate great differences between the peoples of New Guinea and Australia. Physical anthropologists aren't surprised that there are morphological, cultural and language differences between aboriginal peoples of Australia and New Guinea. First, Sahul was first settled at least by 40,000 B.P., and, further, rising sea levels separated New Guinea from Australia 10,000 years ago, and finally, the two landmasses have very different climates. However, genetic data, which have the ability to establish links that span long periods of time, are valuable for confirming the more apparent differences.

A Living Model of Migrations

Anthropologists who analyze population expansions and dispersals know that while some colonizing events are successful, others are not, and populations die out. For example, they are aware that in historic times Viking settlements in northeastern North America failed, probably at least partially because of

changing climate. Though most of the models of migration and population origins presented at the AAPA symposium focused on data at least 10,000 years old, Michael Crawford of the Department of Anthropology of the University of Kansas used data from the historic era about a known migration and population expansion to develop a model of population success and failure. In "The Dynamics of Colonizing Populations of the Americas: Black Caribs of Central America," Dr. Crawford explained that historical events, cultural practices, and health-related genetic adaptations all played a part in the origin of the Black Caribs, whose ancestry includes Native American and African peoples. His presentation put human faces on the story of population origins, and also provided a rich historical context that affirmed complexities that other papers dealing with more ancient migrations and settlements events had discovered but, at least for the present, can only guess what the details meant to the people involved. 

—Don Alan Hall

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ON Idaho Spear Cache

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ON McFadden Beach site

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Sillen, A. et al. 1995 Strontium Calcium Ratios and Strontium Isotopic Ratios of *Australopithecus Robustus* and *Homo Sp.* from Swartkrans. *Journal of Human Evolution* 28:277-85. 