MAMMOTH TRUMPET

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Center for the Study of the First Americans
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Excavation Inside the Museum

One of California's biggest recent archaeological discoveries occurred not in the field, but in the Santa Barbara Museum of Natural History, where this block of earth from a site on Santa Rosa Island had been in storage since 1960. Bones sealed within the sediments have proven even older than the site's original investigators suspected (Page 1).

SANTA BARBARA MUSEUM OF NATURAL HISTORY

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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CHANNEL ISLAND WOMAN MAY BE OLDEST YET

Bones Archived Within Sediments Yield New Dates

Human bones and mouse bones stored for 40 years in the Santa Barbara Museum of Natural History are providing new information regarding the antiquity of humans on California's Channel Islands.

Scientists examining bones of what is now being called the "Arlington Springs Woman" believe they may be the oldest found in North America—approximately 13,000 calendar years old. The find also bolsters the Pacific Rim hypothesis that humans may have come to the New World by boat rather than by an inland route.

"I believe these could be the oldest skeletal remains, at least among the oldest, found in the New World," says Thomas W. Stafford, the Colorado scientist considered a foremost authority on dating bone.

John R. Johnson, curator of anthropology at the Santa Barbara Museum of Natural History, who has headed the research team examining materials from the Arlington Springs site, calls the new information highly significant. "It demonstrates that the earliest Paleoindians had the watercraft necessary to cross the Santa Barbara Channel." Drs. Johnson, Stafford, and colleagues presented their findings in a paper March 30 at the Fifth California Islands Symposium held at the Santa Barbara museum.

Though he is excited by the new information, Johnson says it is but another chapter in a story that began in 1959. That's when Phil C. Orr, former curator of anthropology at the Santa Barbara Natural History Museum, found three bones (two femora fragments and one humerus) that had been buried 11 meters in the sidewall of Arlington Canyon on Santa Rosa Island, about 25 miles seaward of Los Angeles urban sprawl. The site is now part of a maritime wilderness administered by the National Park Service as Channel Islands National Park.

Realizing the significance of his find, Orr gathered a group of scientists to examine the site and verify the stratigraphic context of the bones, which were near the prehistoric spring that gave the site its name. Charcoal from the stratum containing the bones, and a fragment of one bone itself, were radiocarbon dated at 10,000 years old, making them the oldest human remains that had been found in North America. Researchers initially concluded the skeletal remains were those of a male, so Orr labeled his find "Arlington Springs Man." (Recent reexamination of the bones has indicated that they mostly likely were those of a woman.)

In the years following Orr's initial discovery, researchers grew to doubt the antiquity of the human bones because they had come from an eroded stream channel. Possibly the human bones were younger than the

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INSIDE

CSFA BOARD REVIEWS RESEARCH, WELCOMES THREE NEW MEMBERS

The **Center for the Study of the First Americans** Advisory Board met this spring at Oregon State University to review the research and outreach projects and to plan fundraising efforts. Three new members were elected to the board and officers were chosen for another year. Joining the board were Cheryl M. Bongiovanni, a cardiovascular physiologist from Keno, Ore.; Robert E. Hogfoss, an environmental attorney from Atlanta, Ga.; and Mark Harvey Mullins, an avocational archaeologist from Colorado Springs, Colo.

Dr. Bongiovanni, whose deep interest in archaeology has involved her in **CSFA** field work, is author of dozens of technical scientific articles. She is director of Vascular Laboratories in Klamath Falls, and is an adjunct professor of vascular technology at the Oregon Institute of Technology.

Hogfoss, who studied anthropology at Reed College and the University of Chicago before pursuing graduate studies in forestry at the University of Washington and Oregon State University, and then earning a doctorate in jurisprudence from Northwestern School of Law in Portland, is with the firm Hunton & Williams in Atlanta. He is a partner in the Administrative Law Group.

Mullins, a businessman who studied anthropology, archaeology and environmental science at Southwest Texas State University and the University of St. Thomas, is an active member of several regional archaeological societies. He has a fine collection of Clovis artifacts and is involved in the sponsorship of the "Clovis and Beyond" conference that will be presented in October in Santa Fe, N.M.

"Clovis and Beyond," which will bring together leading scientists studying the question of the initial peopling of the Americas, is involving several **CSFA** members, among them **CSFA** Director Robson Bonnichsen, who is organizing the conference's two days of scientific presentations. Board members Sandy and Larry Tradlener of Cortez, Colo., Jo Ann Harris of New York City, and Anne Stanaway of Boulder, Colo., are active in planning the Santa Fe conference.

The board elected Sandy Tradlener as secretary and reelected Marvin Beatty, Madison, Wis., and Gerry Fritts, Kalispell, Mont., as chair and vice-chair, respectively.

Board members heard extensive reports on **CSFA** research projects including a multi-year science education endeavor that will involve 120 high school teachers over the next four years and may impact as many as 10,000 college-bound students. The community-based Mammoth Park Project in Woodburn, Ore., will be the site for training and field work. The Pleistocene peat-bog site on Woodburn School District property contains extensive deposits that will involve archaeologists and paleoecologists with high school teachers in two weeks of field work starting July 26. Teachers will learn excavation and analysis techniques from professionals and later they will involve their students with work on analyzing plant and animal remains, pollen, diatoms and other materials.

The board also heard reports on recent research in molecular archaeology from **CSFA** scientist Walter Ream of Oregon State University's Department of Microbiology. Dr. Ream and his colleagues have demonstrated their ability to replicate DNA recovery and analysis from the hairs of a bighorn sheep that died nearly 10,000 years ago. Dozens of the animal's hairs were recovered from a Great Basin archaeological site, proving the reliability of the team's procedures. They are continuing to develop new procedures for recovering and analyzing biological residues from stone tools.

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CAA Symposium Spotlights Eastern Beringia Research

Canadian scientists recently took a new look at the environment of the northwestern Yukon and growing evidence that it was home to people when much of North America was covered by glacial ice. As part of the Canadian Archaeological Association's 32nd Annual Conference in April in Whitehorse, Yukon, a symposium of interdisciplinary research on Beringia was chaired by archaeologist Jacques Cinq-Mars of the Canadian Museum of Civilization in Hull, Quebec. The symposium, which we hope to report on in a future **Mammoth Trumpet,** included paleontologists, glacial geologists, paleoecologists and archaeologists.

"We're at a turning point in terms of what eastern Beringia has to say about the peopling of the Americas," said Cinq-Mars, who says the past 30 years have produced seminal research into the environment of eastern Beringia that has profoundly changed the view that the area was an isolated refugium. In fact as part of a subcontinent that linked Asia and North America it facilitated a massive movement of plants, animals and people.

"In this larger archaeological context, it is important to revisit past Beringian work, look at new evidence, and take stock," Cinq-Mars said. "My view, and that of numerous colleagues, is that there is no question that there were people in eastern Beringia 40,000 years ago, and this view has to be taken into serious consideration if you want to discuss the peopling of the New World."

Though there is scientific debate about the peopling of eastern Beringia much earlier than 12,000 years ago, the CAA symposium described research that shows that, contrary to the view 30 years ago, the region was definitely habitable. Fossil evidence reveals an environment with more than 25 species of grazing and browsing animals from woolly mammoths to saiga antelope and steppe bison. Paleontologist Richard Harington, a symposium participant and leading authority on eastern Beringia, said, "The productivity of this steppe-like grassland was relatively high, certainly much higher than it is now."

Eastern Beringian researchers say that one of the reasons for success of investigations in the area has been the excellent support and involvement of the Yukon's First Nations peoples. One of the goals of the symposium was to advance this positive relationship. Two researchers and two Vuntut Gwitchin elders received special recognition for their contributions to Beringian research and public awareness. Elders Charlie Peter Charlie and Charlie Thomas of Old Crow, and scientists Richard Morlan of the Canadian Museum of Civilization and John V. Matthews of Ohana Productions were awarded short-faced bear plaques for "contributions to the preservation and understanding of the history of First Nations and ancient landscape, landscape history and paleoecology." Both Morlan and Matthews were praised for involving Vuntut Gwitchin people of Old Crow in their research work.

Jeff Hunston of the Yukon Heritage Branch said that the CAA's Eastern Beringia Symposium is important to identifying research priorities for the future.

Scientists Chart 'Clovis and Beyond'

Looking to Future of 1st American Studies After 6 Decades

A WHO'S WHO OF SCIENTISTS who are actively studying the peopling of the Americas will gather in Santa Fe, N.M., this October to examine "Clovis and Beyond." They will discuss how far First Americans studies have come in the past six decades, and will consider where future research is going.

The goal of the conference is to present an overview and synthesis of the latest scientific developments occurring in the field of First Americans studies. The conference, open to all interested persons, will focus on changing scientific perceptions about how the Americas were peopled and what we know about those earliest inhabitants.

After more than 40 years of debate, the Clovis-first model has fallen out of favor. Now the scientific community is actively rethinking the foundation of American prehistory. The possibility that the Americas were peopled not once but several times by different human groups during Holocene and late-Pleistocene times has major implications for the future of First Americans studies and American prehistory.

Emerging scientific trends concerning the origins, adaptations, and dispersions of the First Americans throughout the Western Hemisphere suggest important new directions for the future of scientific research and the development of public policy, both of which will be discussed in detail at the conference.

The conference will feature speakers from a wide range of pertinent disciplines who will gear their presentations to include the interested amateur as they present well-illustrated lectures on key topics.

Two important synthesizing panel discussions will close the conference with a focus on the future. Dennis Stanford, Chair of the Department of Anthropology, Smithsonian Institution, will lead a panel of scientists who will discuss future directions of research. Jo Ann Harris, professor of law and former Assistant Attorney General of the United States, will lead a panel discussion on the future of public policy. Public-policy issues will be viewed from the perspectives of government agencies, the Society for American Archaeology, Native Americans, avocational archaeologists, scientists, and legal specialists.

Conference organizers hope that these two panels will open a continuing dialogue among all groups interested in the future of First Americans studies.

The Clovis and Beyond Conference will be Oct. 28–31 at Santa Fe's Sweeney Convention Center, 201 West Marcy St. Conference sponsors include the **Center for the Study of the First Americans,** Smithsonian Institution, and Museum of New Mexico Laboratory of Anthropology. Advance registration is $100 and registration forms must be postmarked by Sept. 15. After that date all registration will be on site at the Museum of Fine Arts located at 107 East Palace Ave., Santa Fe, N.M., and will cost $125.

You'll find a registration form on the back page of the wrapper of this issue. For additional forms and information on places to stay in Santa Fe, contact Clovis and Beyond, P.O. Box 8174, Santa Fe, NM 87504, 505-983-8461, fax 505-989-8446. Conference information, including agenda and hotel information, can also be found on the **CSFA** web site www.peak.org/csfa/csfa.html

Friday's Program

The conference will open on Friday with an introduction and perspective on the conference by Robson **Bonnichsen,** Director of the **Center for the Study of the First Americans** at Oregon State University. Archaeology will be the focus of Friday's presentations. The following day will

58 Years Ago In Santa Fe

It was in Santa Fe just 58 years ago that "Clovis" came into the language of American prehistory to describe a particular type of artifact that archaeologists had been finding. The years before that initial Santa Fe Clovis conference saw a number of important developments in American archaeology.

Beginning in 1932, a number of important sites were excavated near Clovis, N.M., in a flat, arid elevated plain known as the Llano Estacado (staked plains). In her highly regarded book *Ancient Man in North America* published in 1939, the late H. Marie Wormington described grooved points, later known as Clovis fluted points, found directly associated with mammoth remains in a sand deposit overlying bedrock gravels. (The Folsom fluted point type had been confirmed near Folsom, N.M., in 1926 and 1927 in association with the remains of extinct bison.)

Discovery of these remarkable artifacts in the 1920s and 1930s led the University Museum of Philadelphia and the Laboratory of Anthropology of the Museum of New Mexico to propose a conference that would bring together the foremost scholars studying the earliest American prehistory—"Early Man in the New World," as it was referred to in those days. That conference was held in 1941 in Santa Fe.

According to Ken Tankersley, an archaeologist known widely for his interest in the earliest Americans, the purpose of the 1941 conference was "to bring some resolution to the fact that there was greater time depth in the archaeological record than previously acknowledged."

Says Tankersley, "The symposium participants decided that the term 'Clovis' would be used to describe arti-

bring discussions on human biology and the future of research and public policy.

C. Vance Haynes, Jr., University of Arizona geoarchaeologist, begins the morning presentations with a discussion of "Clovis and Clovis Environments." Following that, the conference will take a look at "Clovis and Related Traditions West of the Mississippi," presented by Bonnichson and the husband-wife team of Margaret "Pegi" Jodry and Dennis Stanford. Jodry is completing a doctorate in paleo-American studies at American University; Stanford is Director of the Smithsonian Institution's Paleoindian/Paleoecology Program and chairman of the Department of Anthropology at the National Museum of Natural History.

Presenters of the next topic, "Are We Sure It's Clovis? Clovis East of the Mississippi," will include Kenneth Tankersley, a geoarchaeologist at Kent State University; Bradley Lepper, an archaeologist with the Ohio Historical Society; and Chris Ellis of the University of Western Ontario's Department of Anthropology.

Later that morning George Frison, professor emeritus at the University of Wyoming, will talk about "Cultural Patterns That Overlap Clovis." Alan L. Bryan from the University of Alberta will conclude the morning session with a look at "The History of Pre-Clovis Research in the Americas."

The Friday afternoon session will begin with Albert Goodyear, an archaeologist at the University of South Carolina, speaking on "Pre-Clovis Sites in Eastern North America." Then Dan Fisher, a paleontologist at the University of Michigan at Ann Arbor, will discuss "Did Mastodon Meat Have Freezer Burn?" Steve Holen, an archaeologist with the Nebraska State Museum, will follow with "Recognizing Flakebone Artifacts." Mike Waters, a geoarchaeologist at Texas A&M University, will complete the afternoon program with "What Makes You Think It's Pre-Clovis?"

Saturday's Program

To begin the morning program, Ruth Gruhn, University of Alberta archaeologist, will discuss "Evidence for Pre-Clovis Man in Central and South America." Then David Madson, with the Geological Survey of Utah, will speak on "China-American Connections."

The program next moves to human biology with Theodore Schurr of the Foundation for Southwest Biomedical Research in San Antonio, Texas, who for the past eight years has been investigating the peopling of the Americas from a molecular genetic perspective. His talk is titled "Modern and Ancient DNA: the Peopling of the Americas."

Next, Walter Ream, associate professor of microbiology and director of the Genetics Program at Oregon State University, will present "Advances in Molecular Archaeology," assisted by Orin Shanks, a second-year Ph.D. candidate in genetics at Oregon State University, and CSFA Director Bonnichsen, followed by "Late-Pleistocene Modern Humans in Asia and the Peopling of the Americas" by Richard Jantz of the Department of Anthropology at University of Tennessee, and Douglas Owsley, Curator and Division Head for Physical Anthropology at the National Museum of Natural History, Smithsonian Institution.

The conference will continue with "Ice Age and Recent Skeletons in North America and South America." Presenters are Joseph Powell, physical anthropologist at the University of New Mexico at Albuquerque; Gentry Steele, physical anthropologist at Texas A&M University; and Walter Neves, physical anthropologist at the Institute of Biosciences, University of São Paulo, Brazil. The afternoon is taken up with two panel discussions, the first on the future direction of scientific research, the second on the future direction of public policy.

"The Future of Research: Where Do We Go from Here?" panel will include Tom Dillehay, University of Kentucky archaeologist and expert on early South American peoples, who investigated Chile's Monte Verde site; David Meltzer of Southern Methodist University; James Adovasio, an expert in the analysis of perishable fiber artifacts and director of Mercyhurst Archaeological Institute, Erie, Pa.; Michael Collins, archaeologist at the Texas Archaeological Research Laboratory at Austin, Texas; Richard Jantz, physical anthropologist at the University of Tennessee; Theodore Schurr, anthropological geneticist with the Foundation for Southwest Biomedical Research at San Antonio, Texas; and Alan L. Bryan, archaeologist at University of

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facts that were older than Folsom and had the characteristics of bifaces recovered from the deepest levels of the Dent [Colorado] and Blackwater Draw [New Mexico] sites."

Before the 1930s American archaeology was very much in a formative phase. Data-collection standards were far from uniform in those days. Stratigraphy was incompletely understood and systematic comparisons between sites were not regularly done.

In the 1930s techniques of digging and record keeping were greatly improved. Also in the 1930s Ernst Antevs developed the 4-step method of dating archaeological finds through geologic studies: 1) study beds and geologic features, 2) interpret climatic context of beds and features, 3) assign a bed with a human record to a particular regional climatic age or phase, and 4) correlate the regional relative chronology with a dated climatic history.

Prior to 1940 American prehistory was thought to fit into a timeline covering only the previous 3,000 or 4,000 years. Those attending the 1941 Santa Fe Conference saw that mounting archaeological evidence dictated a broader time frame, but it wasn't until the development of radiocarbon dating in the 1950s that the actual timespan was shown to be much longer than previously thought. Radiocarbon dates of 11,500 to 11,200 years B.P. are commonly ascribed to Clovis; Folsom dates run generally 11,000 to 10,500 radiocarbon years ago. Correcting radiocarbon dates for variations in radioactive carbon over the years remains a complex issue, especially for the Clovis era, but scientists believe that the Clovis phenomenon is approximately 13,000 calendar years old.

Although American archaeology has come a long way since the 1941 Santa Fe Conference, all aspects of human movement into North America, including answers to the basic questions of who, when, where and how, are still eluding a scientific consensus.

–Carol Ann Lysek

Alberta. Summation statements will be made by Dennis Stanford of the Smithsonian Institution and Pegi Jodry, archaeologist and taphonomist known for her analysis of Folsom sites.

"The Future of Public Policy: How Do We Go from Here?" will hear panel members voicing different perspectives: Frank McManamon, chief archaeologist of the National Park Service, for the government and cultural resource management; Joe Watkins for Native Americans; Ken Kintigh for the Society for American Archaeology; Lois Schiffer for the Department of Justice; Jim Warnica for avocational archaeologists and collectors. Alan Schneider, lead council in the Kennewick Man case, will discuss the future of law and archaeological science. Jo Ann Harris, lawyer and former head of the Criminal Division of the U.S. Department of Justice, will make a summation statement. This will end the formal conference presentations.

Other Activities

In addition to attending symposia, there will be lots of other things to do in Santa Fe. On Saturday evening a banquet (limited to 375 people) is scheduled at the Hilton Hotel; cost is $25.50 per person. Tours are available on Saturday to Taos and on Sunday to Bandelier National Monument or San Lazaro Pueblo archaeological site for $75 each.

Thursday evening, before the conference begins, there will be a cocktail reception at the Museum of Fine Arts. In addition to the symposium, Sweeney Auditorium will have an area set aside for conference exhibits and sales tables.

Exhibits will include a number of well-known Clovis caches, possibly the most extensive group of caches ever gathered under one roof. Included will be artifacts from archaeological contexts much older than Clovis. Bonnichsen, co-organizer of the conference, says the exhibits will include two academic poster sessions. One featuring 12–15 posters on Clovis Variability is being organized by Michael Collins of the Texas Archaeological Research Lab, and another featuring about 10 posters on Paleoamerican biology is being organized by Cleone Hawkinson, a physical anthropologist from Portland, Ore.

–Carol Ann Lysek

AAPA Symposium Offers New Analyses and Varied Perspectives Concerning First Americans

Latest Human Biology Research Shares Podium With Linguistic, Archaeological, Cultural Views

A symposium at the 68th annual meeting of the American Association of Physical Anthropologists in Columbus, Ohio, in late April brought together recent research on the origins and evolution of Native American populations. The 12 presentations in the half-day session examined the issues of the number of colonizing migrations, the origin and timing of those migrations, and the nature of evolutionary changes in genetics, morphology, and language that occurred after the first people arrived in the Americas.

Though the papers covered genetic research on DNA both from living peoples and ancient remains, it also considered linguistics, skeletal biology, archaeology in Siberia, and cultural perspectives. "It's been a long time, if ever, that a meeting of AAPA has had such a holistic symposium," said discussant Emöke J. E. Szathmary, veteran Canadian anthropologist ("A Geneticist Looks at the Peopling of the Americas," **Mammoth Trumpet** 8:2 and "Assessing Eskimo and Indian Affinities," **Mammoth Trumpet** 2:3).

Powell's data led him to favor the Continuity hypothesis over Replacement

In summarizing the symposium, "Population Origins and Evolution in the New World," organized by Connie J. Kolman and J. C. Long of the National Institutes of Health, Dr. Szathmary emphasized the importance of ancient DNA research that indicates regional differentiation of people existed far into the past, before the time of initial contact with Europeans. "Furthermore, there was continuity over time—modern people look like those ancestors 4,000–5,000 years ago." She cautioned her colleagues not to overlook the likelihood that Siberian peoples have moved about as much as people anywhere. "Who knows if the current picture in Siberia is related to the Peopling of the Americas," she said. "Things were fluid."

The Opening of the Gates

Introducing the symposium, Dr. Kolman noted that presentations represented differing perspectives and hypotheses. Kolman noted that various genetic researchers infer different numbers of migrations—some as few as one and others as many as four—often called "waves." The first speaker, University of Michigan geneticist D. A. Merriwether, defined "waves" as the "opening of the gates" between Asia and North America, and implied that at this point in the research it is necessary to be somewhat vague about the meaning of such terms. Dr. Merriwether compared mtDNA haplotypes (genetic markers) of samples between North and South America, noting divergence between the two hemispheres and considerably more sharing of haplotypes between populations of Central and South America than with North America.

Using nuclear DNA markers, Judith Kidd of Yale University reported the likelihood that so-called "Amerind" speakers originated from a single population, but one that probably did not pass through a genetic "bottleneck." Dr. Kidd and coauthor K. K. Kidd inferred that the American populations diverged from ancestral groups before the current East Asian populations developed, and that the divergence probably occurred in Asia. Their research also suggested that genetic drift due to small population size occurred in American Indian populations, which show different patterns of linkage disequilibrium than do contemporary populations in Africa and Europe.

T. D. Schurr presented research done with colleagues at Emory University and Siberia on mtDNA and the Y-chromosome from modern populations in Siberia that implies the colonization of the Americas through Siberia was a very complex process and not unidirectional as the earliest models assumed ("Genetic Research Suggests People Were in Beringia by 34,000 B.P." **Mammoth Trumpet** 14:2).

Two Primary Migrations Suggested

Michael F. Hammer of the University of Arizona presented Y-chromosome research of his multi-university team suggesting that there were two primary migrations across northeastern Siberia to the Americas and that both may have originated in southwestern Siberia around Lake Baikal. He also discussed three major and three minor candidates for a founding Y-chromosome haplotype; the major one is distributed from Alaska to Argentina, while the others are distributed in a patchy fashion.

J. A. Knowles of Columbia University described research at Columbia and the University of Kansas examining Native American genetic diversity by using 377 genetic markers, a number they expect to increase to 400 with the goal of reconstructing migrations across Beringia. Their research methodology pools individual blood specimens into group samples and provides group frequencies, a method that could allow many more loci to be studied by optimizing time and cost. Dr. Knowles, using the analogy of blind men describing an elephant differently, argued that different phylogenies have been developed concerning North American and Siberian populations because investigators examine different parts of the genome.

Variation Among Native Americans

Dennis O'Rourke presented University of Utah research with ancient DNA recovered from remains of people who lived in the Southwest, Great Basin, and the Aleutian Islands 2,000 to 4,000 years ago. He compared mtDNA haplogroups from these groups with published mtDNA data from modern populations in the same areas. He said that these data indicate that there was considerable genetic variation among Native Americans a few thousand years ago. "The population substructure of native America is of considerable antiquity," he said, because ancient DNA is like DNA from living Native Americans. He also said that depopulation events did not disrupt these DNA patterns, and noted that more ancient samples are needed, including some from Siberia and Asia, to better test migration models.

Johanna Nichols, linguist at the University of California—Berkeley, described her continuing research on American languages ("Linguist Finds Evidence for Early Peopling of Americas" **Mammoth Trumpet** 7:3). Her analysis of linguistic markers among American languages indicates that a Pacific Rim linguistic population, dating roughly to 12,000 years ago, extends the length of the Americas. She finds inland linguistic populations half again as old, roughly 18,000 years. R. A. Rogers of the U.S. Department of Agriculture's National Resources Conservation Service presented linguistic and environmental evidence indicating that people were living south of the last Pleistocene glacier ("Non-Archaeological Evidence Suggests People South of Ice," **Mammoth Trumpet** 13:3).

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New Books

The Fenn Cache: Clovis Weapons and Tools, by George Frison and Bruce Bradley. One Horse Land & Cattle Co. Santa Fe. 116 10 x 10-inch pages. 58 color plates and 58 drawings. 1999. $45 plus $4.75 postage (hardcover). Order from the publisher at P.O. Box 8174, Santa Fe, NM 87504.

This book features the beautiful Fenn Clovis Cache, a collection of 56 artifacts of uncertain provenience made of obsidian, Green River Formation chert, red jasper, quartz crystal, and Utah agate. Each is featured in a life-sized color photograph by Pete Bostrom, who used his large-format, triple-exposure technique ("The Art of Preserving Ancient Skills," Mammoth Trumpet 13:2) and also depicted in line drawings by Sarah Moore. Text by University of Wyoming archaeologist Dr. Frison and Dr. Bradley, the Colorado archaeologist known for his flintknapping skills, goes beyond the artifacts of this cache to discuss what is known about Clovis, Clovis archaeology, Clovis caches, mammoth and elephant hunting, elephant meat, projectiles, Clovis flintknapping, and transportation of flint.

Old Tools—New Eyes: A Primal Primer of Flintknapping, by Bob Patten. Stone Dagger Publications, 1999. 160 7 x 10-inch pages. $13.95 (softcover). Order from the publisher at P.O. Box 28018 #16, Lakewood, CO 80228. Add $3 for postage.

Bob Patten shares 40 years of flintknapping experience and practice in this book explaining the principles and concepts of making stone tools. After retiring from a career of mapping with the U.S. Geological Survey, he produced this, the book he wished he'd had as a boy when he first got interested in making stone tools. The book is extensively illustrated by the author and Richard Jagoda. Further information is available from Patten's web site: www.idcomm.com/personal/knapperbob.

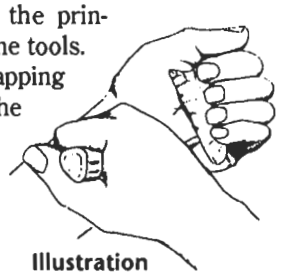
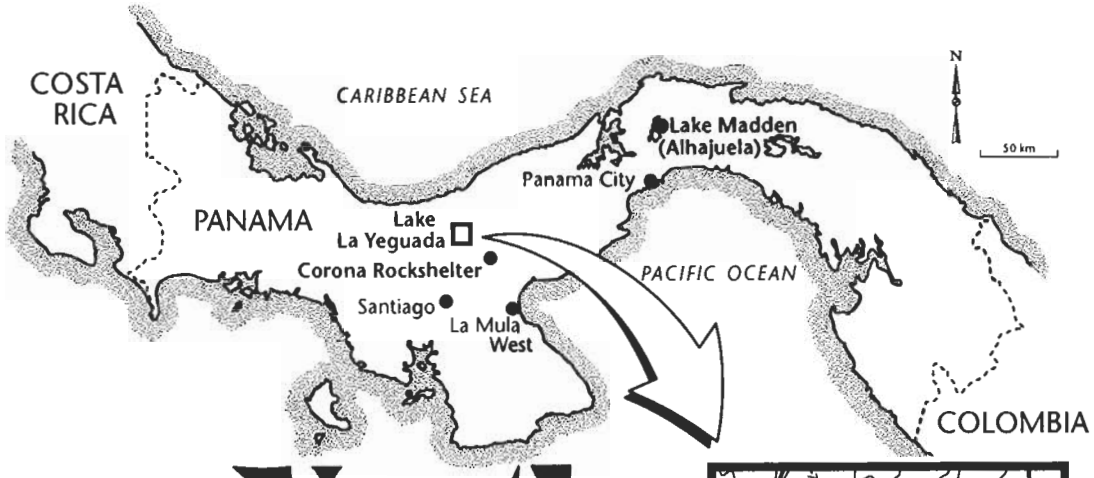


Illustration from the chapter on pressure flaking.

Cultural Resource Laws & Practice, by Thomas F. King. AltiMira Press, 1998. 303 6 x 9-inch pages. $46 (hardcover) $22.95 (softcover).

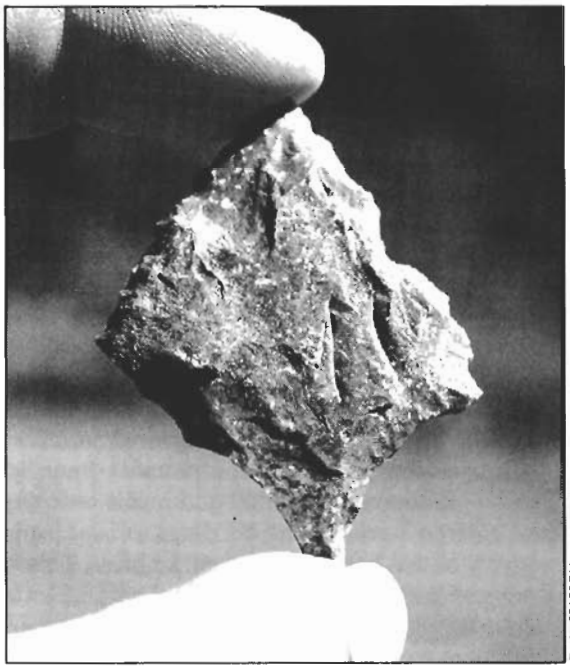
Subtitled an introductory guide, this book explains federal laws, regulations, and protocols and the agencies associated with the identification and protection of America's cultural resources. King, who has been actively involved in cultural resources management for almost 30 years, untangles the webs of regulations and provides frank, practical advice on how to ensure regulatory compliance in dealing with archaeological sites, historic buildings, urban districts, sacred sites and objects, shipwrecks, and archives. This insider's guide to cultural resources management is written for local historians, archaeologists, historic preservationists, environmentalists, tribal governments, agency managers, and students.



Where North Meets South

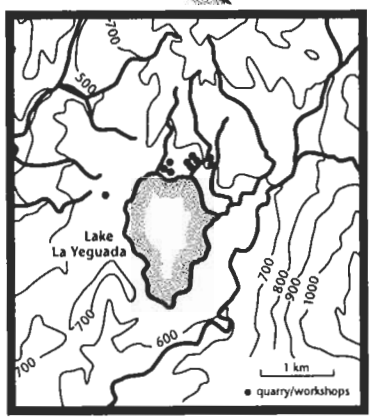
Seeking a "Unified Theory" in Panama

PANAMA, the presumed funnel for the first humans entering South America, is the location of a preliminary research project undertaken by archaeologists seeking evidence that will lead to a better understanding of the peopling of the New World. From January through March of this year, Georges A. Pearson of the University of Kansas and Robert A. Beckwith, a graduate student at the University of Alaska–Fairbanks, conducted the first thorough survey around Lake La Yeguada in Veraguas Province. The goal is to find evidence of the first Panamanians. "The isthmus of Panama is the most promising area in which to test colonization models between North, Central and South America," Pearson told the **Mammoth Trumpet.** He said Panama's geographical characteristics, as well as the fact that both Clovis-type and fishtail-type projectile points have been found there, make the area an ideal place to seek clues linking the Paleoindians of both hemispheres.



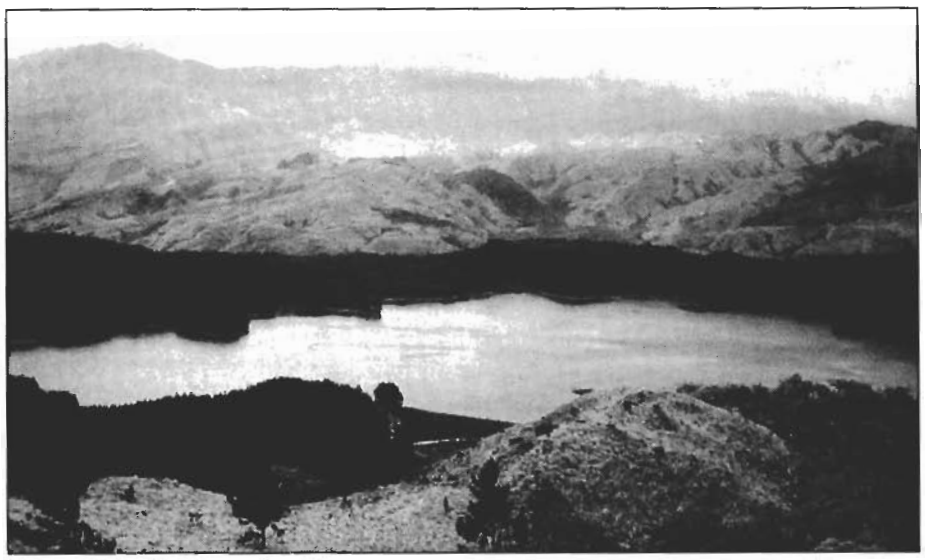
G. A. PEARSON

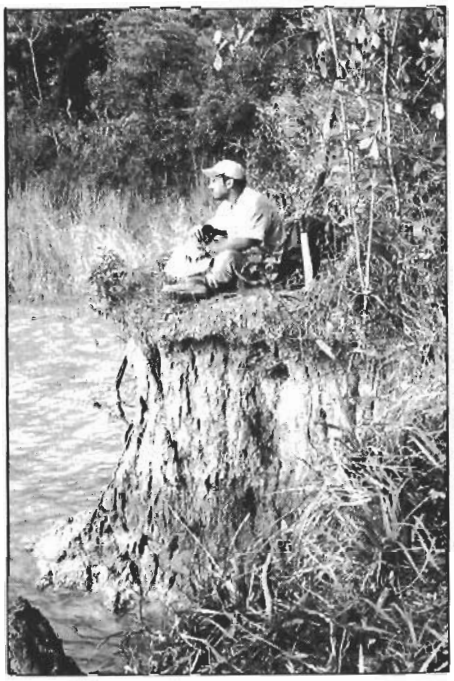
This almost complete stemmed projectile point shows a flute-like basal thinning on one side. Most of its base, which would have been on the lower left, is broken off. It was made from a large flake of local yellow jasper and is similar to fishtailed projectile points discovered by earlier archaeological investigations at La Elvira in Colombia and El Inga in Ecuador.



"Because human movements between North and South America were funneled through Panama, and since its archaeological record is confined to a narrow strip of land, it is the most logical area of research for this particular problem," said Pearson. Based at the Smithsonian Tropical Research Institute in Panama City, the research was made possible by a Smithsonian fellowship grant. Institute archaeologist Richard G. Cooke and phytolith analyst D. R. Piperno are supervising the project, which Pearson heads.

The 1999 Lake La Yeguada Paleoindian Survey focused on the basin of the lake, which is 650 meters above sea level on the Pacific side of the Continental Divide. The area's archaeological potential was initially tested in the 1980s by Dr. Cooke, who collected surface materials, including a bifacial projectile point with a broken stem, along the lake shore during their Santa Maria River survey project. The lake's past shorelines have been inundated because of levees built to raise the level of water, some of which is used by a hydroelectric plant. The lake, in a closed basin, is believed to have been formed about 14,000 years ago as the result of volcanism. Either the lake was





BOTH: G. A. PEARSON

Lake La Yeguada with continental divide in background. As the level of Lake La Yeguada gradually declines in response to the dry season, Georges A. Pearson takes notes while surveying the shoreline.

the result of damming by lava flows or it formed in a caldera. Now the lake is surrounded by a reforested pine plantation.

Pearson is confident that if people were present, the lake would have attracted them to the area. The survey consisted of an extensive reconnaissance around the lake shore and its immediate area. The goals, he said, were clear and defined. "One of these was to ascertain if a pre-Clovis basal culture, comparable to Monte Verde [Chile], spread along the Pacific coast and was present in this part of the Panamanian interior," he added, noting that Monte Verde has brought about a paradigm shift in American archaeology.

Another goal of the project was to collect information to test current hypotheses relating to the peopling of Central and South America. Pearson listed four specific questions being asked by Paleoindian archaeologists:

- Are Clovis-like points found in Central America older than, younger than, or contemporaneous with fishtail projectile points?
- Was South America populated by a group of generalized hunter-gatherers using a unifacial industry before the spread of fluted points across North and Central America?
- Is there evidence of an early migration along the Pacific coast that may be related to Monte Verde?
- Are the technological variations between Clovis and the early assemblages of Central and South America simply a representation of different environmental adaptations during the spread of Clovis, or do they represent separate cultural groups?

Seeking clues to help answer these difficult questions, the Lake La Yeguada project focused its surface collecting and subsurface testing on key geographic features such as mouths and confluences of streams, rockshelters, and sources of lithic raw materials. It also examined knolls, promontories, and other points that could have served as strategic lookouts. Pearson and Beckwith actively prospected for knappable stones in exposures, stream beds, and gravel bars. In the process the project is building a lithic comparative collection that will be stored at the Smithsonian Tropical Research Institute.

Pearson explained that stone tools found in Panamanian sites changed considerably through time, a fact that aids archaeologists because it allows them to recognize specific diagnostic traits that characterize each period. For example, bifacial reduction of cryptocrystalline raw material ceased about 7,000 years ago; lithic industries that followed were dominated by unifacially retouched blades and flakes. "The mere presence of bifacial thinning flakes of fine-grained material at a site is an indication of its great antiquity," he wrote.

Reviewing the background of the search for early human presence in Panama, Pearson noted that until relatively recently the country's Paleoindian record was limited to isolated finds around Lake Alhajuela, formerly called Madden Lake. Then Cooke and colleague Anthony J. Ranere located many additional sites during their Santa Maria survey. One of their discoveries, the Corona Rockshelter, which is less than 20 km south of Lake La Yeguada, contains a bifacial industry dated at 10,440 ± 650 years B.P. In addition, Clovis-like point fragments and fluted bifaces were unearthed at the La Mula West site situated east of Parita Bay.

Paleoenvironmental research is also providing information about early Panamanians. Palynologists have reported that a significant increase in particulate carbon in Lake Yeguada's sediments occurred slightly more than 11,000 radiocarbon years ago. This suggests that early humans were burning vegetation surrounding the lake, possibly to attract game animals by encouraging grass for grazing or to clear areas for camps.

Preliminary results of this year's field work included the discovery of 10 quarry/workshop sites associated with sources of three different types of raw materials. Pearson reported that the quarries are quite large, one measuring

61 by 18 meters and another measuring 65 by 54 meters. The workers discovered the sites on exposed or poorly vegetated mounds of volcanic rock. "The same erosional forces responsible for denuding the bedrock left behind large angular boulders of jaspers and cherts as lag deposits. In most cases, these large workshop areas consisted of nothing less than solid carpets of mixed debris, cores, and tools."

Unfortunately for the archaeologists, the materials represent several millennia of exploitation, so the team collected only diagnostic samples. These included several broken bifaces, bifacial thinning flakes, spurred endscrapers, keeled scrapers (limaces), large scraper planes, and a stemmed point (photo, page 8). Pearson said that some of the bifacial fragments were so weathered that they had become completely porous and almost unrecognizable. In their survey, Pearson and Beckwith noted that only those tools considered as Paleoindian were manufactured from heat-treated or non-local materials.

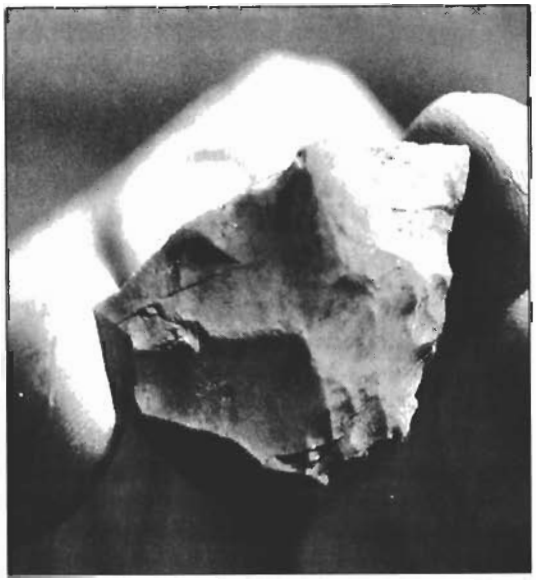
They excavated some test pits near quarry sites in hope of finding stratified assemblages. These excavations revealed that the prehistoric Panamanians did not limit themselves to exposed boulders, but also engaged in mining. The buried debris appeared as rich as that found on the surface. "We recorded over 660 lithic artifacts in a single 40-cm-deep, 50-cm-square test pit just north of quarry site Q1."

The survey also discovered four rockshelters, which Pearson described as from car-sized to house-sized. "These were nothing more than very large, freestanding erratic-like volcanic boulders that afforded protection against the elements." Artifacts were found around them, and the survey tested the largest by excavating a one-meter-square pit to a depth of 1.2 meters. Artifacts proved to be only in the uppermost 40 cm of the excavation. The underlying clay was hard and sterile of cultural material, and there was no evidence of Paleoindian or bifacial technology. Pearson said the presence of a three-sided edge-ground cobble 36 cm below the surface suggests that the rockshelter may have been occupied as early as 6,000 or 7,000 years ago.

Taking advantage of the dry season, which extends from December to mid-April, the archaeologists found many artifacts on newly exposed beaches and banks around the lake as the seasonal water level gradually fell. Among these discoveries was a small concentration of bifacial thinning flakes of non-local and apparently heat-treated chert.

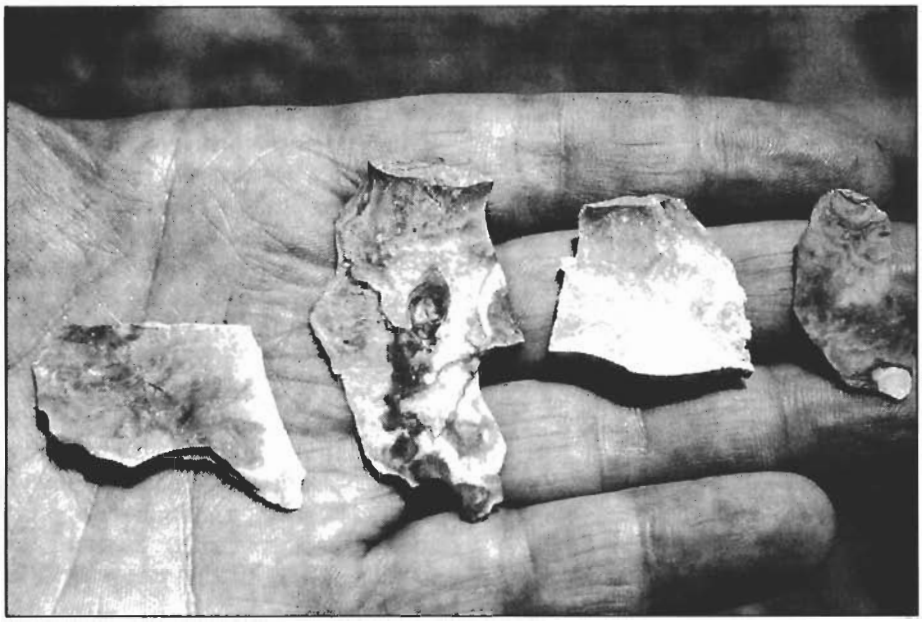
The other sites the survey investigated included a variety of places such as lookouts, mountain tops, deflated surfaces, and cut banks. "The most common diagnostic artifacts found at these locations were bifacial thinning flakes," said Pearson. Among the discoveries was a triangular blade that had been fashioned of non-local white chert into what he describes as a double-spurred end scraper that shows evidence of having been hafted. "The fact that it is complete and was found by itself suggests that it is, perhaps, a lost item."

The many lithic sources the team found provided prehistoric peoples with a variety of materials. Six quarry sites on the north side of the lake contain jaspers of various colors including red, yellow, and caramel. Northwest of the lake are off-white gray cherts mixed in with the jaspers. At a quarry site on an eroded surface on the west side of the lake the archaeologists found banded bluish-black chert, and on the southern side of the lake, they found nodules of olive-brown chert and yellow jasper eroding out of the banks.



Georges A. Pearson examines lithic debris on the surface of a quarry area designated as Q2. Below is a point base the survey found on surface of Q2.

BOTH: G. A. PEARSON



G. A. PEARSON

These bifacial thinning flakes were found together on the beach of Lake La Yeguada.

Planning is under way for a follow-up project to allow more thorough examinations of the quarry sites as well as to expand the survey into other parts of Panama. "Areas of high potential would include locations where megafaunal remains have been reported, the Pearl Island, and the southern tip of the Azuero Peninsula, where the Pleistocene coastline has not significantly receded since the post-glacial seal-level rise," said Pearson.

Preliminary results of the survey support findings from Piperno's paleoenvironmental research that people were living around Lake La Yeguada in Paleoindian times. "We can surmise that these early populations were sparse and very mobile," he said, noting that the archaeological materials discovered were rather thinly distributed over the landscape. Though the survey found no large Paleoindian camp, Pearson said there could be several reasons—site density, visibility, or destruction by recent rise in water level. Also the survey could simply have missed sites because of the large area surveyed by only two archaeologists.

Pearson believes that Panama holds the potential to allow archaeologists to better understand the peopling of the Americas, and especially the relationship between Clovis and fishtail projectile points. However, lack of information has prevented archaeologists from developing ideas that "integrate both hemispheres of the Americas into a 'unified theory' of the peopling of the New World." As it is, several hypotheses relate these classic North American and South American projectiles. These theories, Pearson insists, need testing and resolving.

SUGGESTED READINGS

ON California

Moratto, Michael J., and David Fredrickson 1984 California Archaeology. Academic Press, Orlando.

ON Arlington Springs

Fiedel, Stuart J. 1999 Older Than We Thought: Implications of Corrected Dates for Paleoindians. American Antiquity 64:95–115.

Johnson, J. R., T. W. Stafford, Jr., H. O. Ajie, and D. Morris 1999 Arlington Springs Revisited. In: Proceedings of the Fifth California Islands Symposium, Santa Barbara Museum of Natural History (forthcoming).

Orr, P. C. 1962 The Arlington Spring Site, Santa Rosa Island, California. American Antiquity 27:417–419.

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

Stafford, T. W., Jr., P. E. Hare, L. Currie, A. J. T. Jull, and D. J. Donahue 1991 Accelerator Radiocarbon Dating at the Molecular Level. Journal of Archaeological Science 18:35–72.

ON Panama

Bird, J. B. and R. G. Cooke 1978 The Occurrence in Panama of two Types of Paleo-Indian Projectile Points. In Early Man from a Circum-Pacific Perspective, edited by A. L. Bryan, pp. 263–272, Occasional Papers No. 1, University of Alberta, Edmonton.

Bush, M. B., D. R. Piperno, P. A. Colinvaux, P. E. De Oliveira, L. A. Krissek, M. C. Miller, and W. E. Rowe 1992 A 14,300-Yr Paleoecological Profile of a Lowland Tropical Lake in Panama. Ecological Monographs 62:251–275.

Cooke, R. G. 1998 Human Settlement of Central America and Northernmost South America (14,000–8,000 B.P.). Quaternary International 49-50-251-275.

Cooke, R. and A. J. Ranere 1992 Prehistoric Human Adaptations to the Seasonally Dry Forests of Panama. World Archaeology 24(1)114–133.

Piperno, D. R., M. B. Bush, and P. A. Colinvaux 1991 Paleoecological Perspectives on Human Adaptation in Central Panama. 1. The Pleistocene. Geoarchaeology: An International Journal 6:201–226.

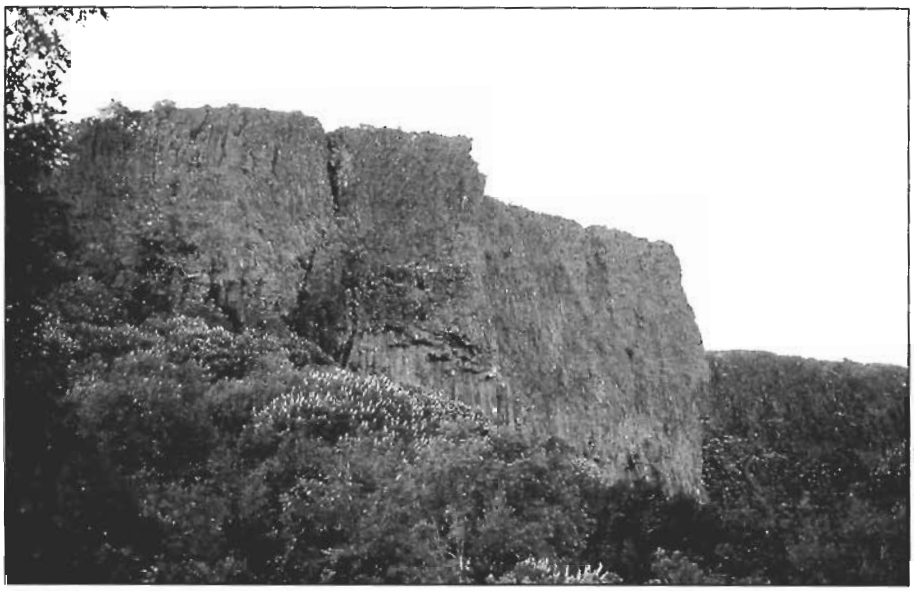
Ranere, A. J., and R. G. Cooke 1991 Paleoindian Occupation in the Central American Tropics. In Clovis: Origins and Adaptations, edited by R. Bonnichsen and K. L. Turnmire, pp. 237–253. Center for the Study of the First Americans, Oregon State University, Corvallis.

Ranere, A. J., and R. G. Cooke 1996 Stone Tools and Cultural Boundaries in Prehistoric Panama: An Initial Assessment. In Paths to Central American Prehistory, edited by F. W. Lange, pp. 49–77. University Press of Colorado, Niwot.

Snarskis, M. J. 1979 Turrialba: A Paleo-Indian Quarry and Workshop Site in Eastern Costa Rica. American Antiquity 44:125–138.

ON Year 2000 Problem

Grossman, Wendy M. 1998 Y2K: The End of the World as We Know It, Scientific American, October p. 27.



MICHAEL J. MORATTO

Tuolumne Table Mountain in the Sierra Nevada foothills is where miners once reported finding a human skull and artifacts beneath a lava flow that dates to the Pliocene Epoch. It remains the sort of landform that might contain rockshelters or caves that could contain clues to the earliest Californians.

In Search of the First Californians

CALIFORNIA may be one of the best places to look for clues to the first Americans, but it has also been the focus of more sensational claims about the peopling of the New World than any other part of the hemisphere. As a result, California archaeologists who would offer evidence of the state's most ancient people may be burdened by the ghost of Archaeologists Past.

"California is a good place to look for the remains of the first Americans," says Michael J. Moratto, archaeologist at California State University–Fresno and author of *California Archaeology*. The abundance of resources and great diversity of environments supported a large population in prehistoric times. Before the first Europeans arrived, there may have been a half million people in the land that what was to become California. There is evidence of craft specialization, the establishment of trade networks by 10,000 years ago or before, and unmistakable indications of environmental management, such as controlled burning. The evidence suggests great time depth to Dr. Moratto, and California's astounding linguistic diversity—nearly 100 distinct languages representing six or more separate, seemingly unrelated phyla—is further indication that people have been in California for a very long time.

Extending from the moist coastal forests of the northwest to the marshes of the Central Valley and on to the blistering deserts of the south, and from the depths of Death Valley to the crest of the Sierra Nevada, California's topography encompasses great diversity. The contrasting habitats provide an enormous variety of places to look for evidence of early peoples, so it's no accident that the state has a large number of archaeologists at work.

Note: Scientists' search for the first Californians was reviewed by archaeologist and author Michael J. Moratto during a symposium on coastal entry into the New World co-sponsored by the ***Center for the Study of the First Americans*** *last August. We reported briefly on his presentation ("On To California . . ."* ***Mammoth Trumpet 14:1****), but were unable to present many of the interesting details of California's prehistory. Now, with Dr. Moratto's help, we're able to revisit the fascinating challenges of California's oldest archaeological sites.*

Where should one look for evidence of the earliest Californians? Moratto posed the question, and offered some answers, in the paper "Prospects for Pleistocene Archaeology in California" he delivered at a plenary session of the Society for California Archaeology last year. "The best candidate for exploration would be large, well-protected caves situated above floodplains but near economically important resources in coastal, lake-marsh, and valley-riparian environments." He went on to suggest inspecting the table mountains of the Sierra Nevada foothills for rockshelters and caves. He also suggested looking at quarry sites that would have yielded high-quality lithic materials.

"Wherever faunal remains are encountered in contexts less than around 25,000 years old, archaeological potentials should be carefully accessed," he said, adding that potential sites might be individual faunal skeletons or aggregations of bone as well as sites well known as the La Brea tar pits, where the bone of a *Smilodon* bearing possible tool marks has been dated to about 15,000 radiocarbon years.

Whenever the first humans arrived in California, it was not as long ago as some people have insisted. Moratto says that outlandish claims of the 19th century, which included gems such as "Eocene Man" and "Auriferous Gravel Man," brought on a period of scientific conservatism and skepticism early in this century. Then the 1950s, '60s and '70s brought a new flood of claims of the great antiquity of Californians. Many of these claims were the result of faulty dating techniques, and once again the scientific establishment exercised caution anew. The suggestion that there may have been Californians much before 11,000 radiocarbon years ago continues to be met with great skepticism.

Moratto says the colorful archaeologi-

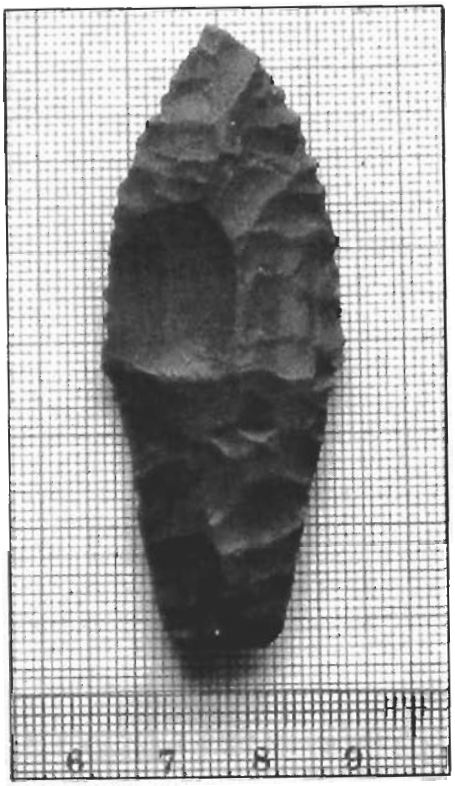
cal record of California dates back 150 years. "During the Gold Rush, there were numerous claims of human remains and artifacts being found in deposits representing truly great antiquity." For example, at Tuolumne Table Mountain in the Sierra Nevada foothills, miners reported finding a human skull along with charmstones, mortars, and pestles beneath a lava flow that dates to the Pliocene Epoch—evidence that the first Californians were millions of years old! And then at Gold Springs, also in the central Sierra, miners claimed to have found mastodon bones along with mortars and milling stones in gold-bearing gravels up to 16 feet below the surface. Further, a human skull was reportedly found in a gold mine near Columbia 250 feet deep in solid rock.

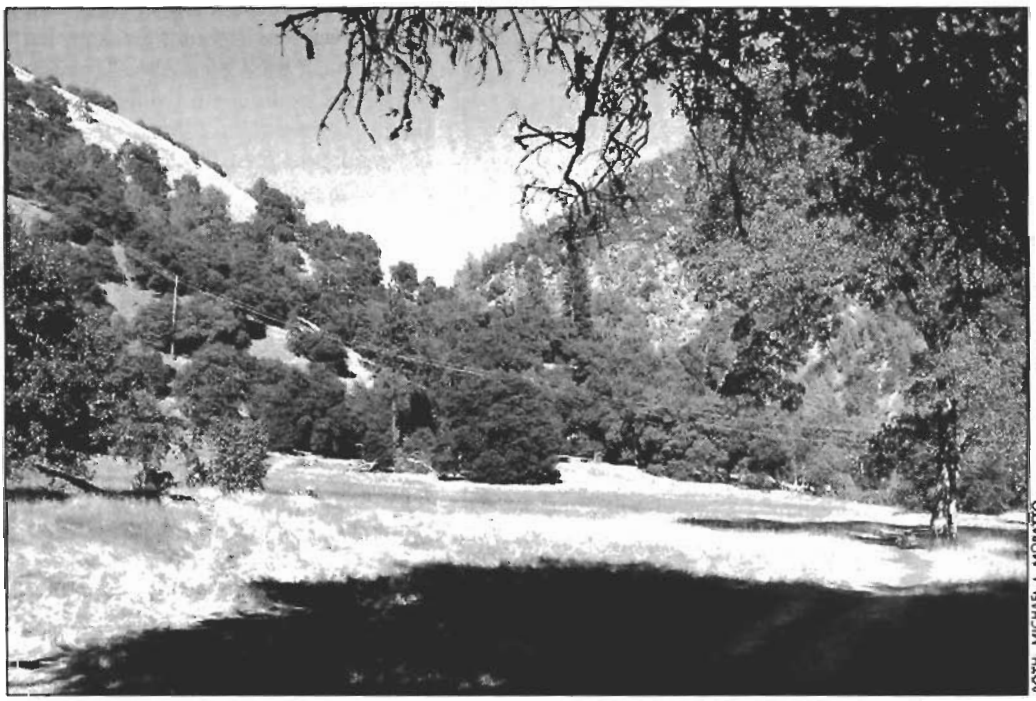
Then there was the Calaveras skull, said to have been found near Angels Camp in 1866 in a mine shaft at a depth of 150 feet in gravel dating to the Eocene Epoch. Moratto says that rather than being around 70 million years old, the skull had been removed from a local mortuary cave and is probably only 1,000–1,500 years old. Unfortunately, in the latter part of the 19th century, many people—including scientists—concurred with such claims. For example, the noted geologist Josiah Whitney published a book in the 1880s in which he accepted the veracity of the miner's hoax. Moratto himself has studied the mortuary caverns in the vicinity where the miners took the skull; most of the skeletal material dates to around A.D. 900 to 1500.

Early in the 20th century, the deceptions and mistaken analyses regarding outlandishly ancient archaeological evidence were gradually refuted. Aleš Hrdlička and other scientists were able to show conclusively that human specimens said to be Eocene in age were actually of recent age. The truth was accompanied by decades of scientific conservatism. "Even as late as the 1920s," says Moratto, "the prevailing orthodoxy allowed only a few thousand years for the prehistory of the Western Hemisphere." Discovery elsewhere of Folsom and then Clovis points associated with the remains of extinct animals changed that thinking. Soon fluted points were being discovered in California.

The state's first fluted-point site was Borax Lake near Clear Lake in the Coast Ranges about 100 miles north of San Francisco, but so far at least 40 fluted-point sites have been discovered in the state. One of these, the Witt site in the Tulare Lake area between Fresno and Bakersfield, has produced more fluted points than any other in the United States ("California Lake Site Rich in Fluted Projectile Points," **Mammoth Trumpet** 12:2).

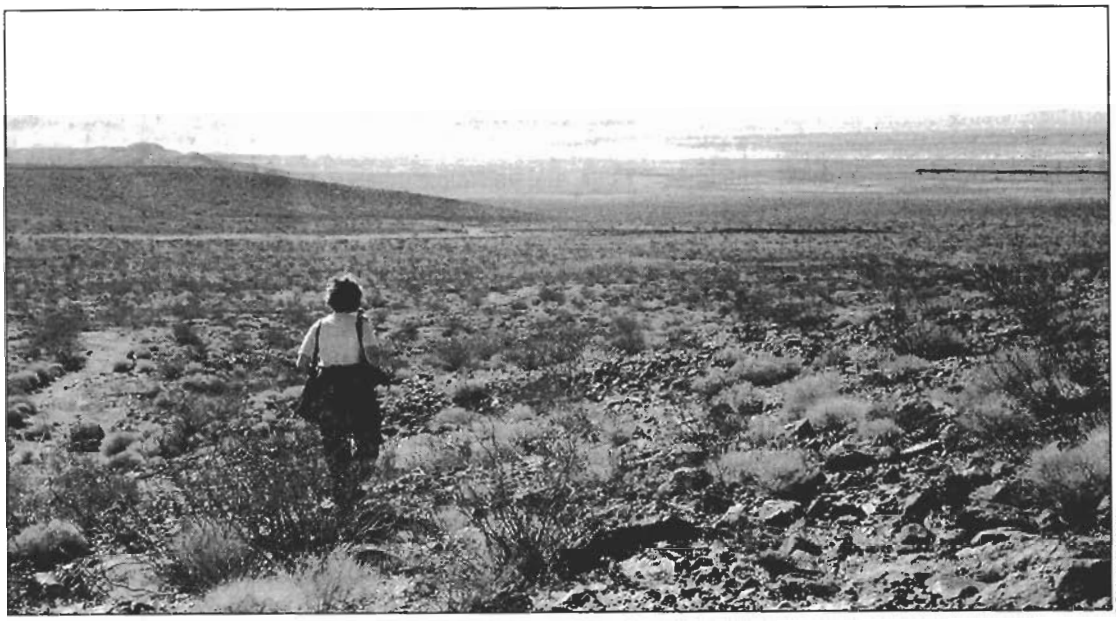
Fluted-point sites occur all across California from the sea to the Sierra Nevada and from the northern plateaus to the southern deserts. "Judging from the number, and the geographic dispersion of the known fluted points," says Moratto, "California was widely and well populated by about 11,000 radiocarbon years ago. But, he notes, despite California's great biotic diversity and the cherished notions





BOTH: MICHAEL J. MORATTO

The large stemmed point above, found at site CA-Cal-S-347 on Clarks Flat near the Stanislaus River in the central Sierra Nevada, dates to between 9,000 and 7,000 years ago. The Clarks Flat area, left, contains numerous archaeological sites, one of which has been radiocarbon dated to around 11,000 years ago.



DON ALAN HALL

In the Mojave Desert east of Barstow, Calif., is Lake Manix, a Pleistocene playa. Viewed from the Calico Hills, Lake Manix is seen as the white band just below the distant horizon.

that Paleoindians were big-game hunters, the fluted points have not yet been discovered in unequivocal association with the remains of extinct megafauna.

Claims of much earlier human occupations were based on evidence from a number of Southern California sites from the 1950s to the 1970s, and some of these were sensationalized in the press. Sites in the San Diego area were reported to yield lower-Paleolithic artifacts 80,000 to 100,000 years old. Bipolar artifacts were found that looked similar to those found in 400,000-year-old sediments in China's Zhoukoudian ("Research Suggests Early Tools Near San Diego," **Mammoth Trumpet** 1:4). Enormous ancient hearths were reported at the Texas Street site.

Many Southern California sites that had been dated far back into Pleistocene time by the amino acid racemization technique were eventually determined to be much younger, according to careful radiocarbon dating.

MICHAEL J. MORATTO

DON ALAN HALL

Chalcedony, Calico Hills quarry material (right), lies scattered on the surface of the hillside above the archaeological site. The arrow points to a Swiss army knife for scale. Below is an artifact display at the Calico site's visitors center.

The most controversial site of all is in the Mojave Desert east of Barstow. A 1950s archaeological survey of Lake Manix, a Pleistocene lake playa with abundant chalcedony and stone tools made from it, ultimately led researchers up into the nearby Calico Hills. Lake Manix tools occurred only on the surface and not in a context that could be dated. Could these tools be found in situ, in their original stratigraphic context?

That search, led by Ruth DeEtte Simpson, then director of the Southwest Museum in Los Angles, and championed by paleoarchaeologist Louis Leakey, led to discovery of the Calico site ("The Calico Site: Coming of Age in California," **Mammoth Trumpet** 2:2). Simpson and her colleagues located Lake Manix artifacts in what appeared to be their original context. Leakey, visiting the site in 1963, said that the context was actually a secondary deposit, but there was great interest in the site. Excavation at Calico began in earnest in November 1964.

Over the years, suggested antiquity of the site, set on an old pediment or an inactive alluvial fan, ranged back in time from tens of thousands of years to millions of years, though Uranium-Thorium dating placed it around 200,000 years old.

Moratto says a major problem with Calico has been the artifacts, noting that the project's investigators including Leakey, who died in 1972, selected them from "literally tons and tons of natural

along the coast. The pattern suggests to anthropologists that speakers of Hokan languages once controlled much of the state and then others came in and pushed them to the outside. In the middle Holocene, starting about 5,000 years ago, says Moratto, groups ancestral to Penutian pushed into the middle of what was to become California. These represented three or four migrations, probably from Nevada, but perhaps one from Oregon.

Later, Uto-Aztecans, who came to occupy much of the southern and eastern parts, expanded into California. Still later came speakers of Algic languages—Yurok and Wiyot—and finally the Athapaskans including the Hupa, Tolowa and their neighbors in the northwest part of the state.

Then, says Moratto, there are the Yukian peoples (speakers of Yuki and Wappo) who came to be isolated in a few small groups in the North Coast Ranges. "For various reasons, we think they may be among the oldest of all the language groups known in California. They probably were there before Hokan speakers entered California."

Ethnologists have always considered the Yuki and Wappo people of the mountainous territory roughly halfway between San Francisco Bay and the Oregon line as a distinctive people, Moratto says. "Their language is an isolate that cannot be linked confidently to any other language stock in the world. Most linguists still view Yuki and Wappo as unique."

Such cultural and linguistic separation implies great time depth.

"My own hypothesis is that the Hokan people who once occupied virtually the entire state are the folks who brought in the fluted projectile points. And I think that their predecessors, in parts of California, at least, were speakers of a language or languages ancestral to Yukian." He says that if his hypothesis is correct, it means that people who now speak Yuki and Wappo are descended from some pre-Clovis or pre-fluted-point population.

–Don Alan Hall

COMING CONFERENCES

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

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

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

Oct. 28–31 Conference: Clovis and Beyond, Santa Fe, N.M. Sponsors: Center for the Study of the First Americans, Laboratory of Anthropology of the Museum of New Mexico, and the Smithsonian Institution.
Contact: Clovis and Beyond Conference. 505-982-8520.

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

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

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

Oldest Bones?

continued from page 1

charcoal that yielded the 10,000-year-old date. No cultural material had been found in association with the bones, and little more was done with the find.

But Orr had anticipated that the future would hold advances in chronological and archaeological techniques; he and his team excavated an irregular block of earth, 60 centimeters by 40 centimeters by 33 centimeters, that contained the bones. After jacketing it in plaster, Orr stored this block of sediments in the Santa Barbara museum's basement so they could be examined when new dating methods evolved, Johnson said.

In 1987 Johnson and Don P. Morris, of Channel Islands National Park, found the block and decided it was time to reevaluate the Arlington Springs material. Johnson said the impetus to do so included new techniques of bone protein isolation, and radiocarbon dating by Accelerated Mass Spectrometry (AMS).

Several studies were undertaken in 1989 and 1992. After

SANTA BARBARA MUSEUM OF NATURAL HISTORY

In the Santa Barbara Museum of Natural History, Gil Unzueta and John R. Johnson measure the block of earth removed nearly four decades ago from the Arlington Springs site on Santa Rosa Island.

SANTA BARBARA MUSEUM OF NATURAL HISTORY

Arlington Springs site on Santa Rosa Island as it was being excavated in 1960.

taking off the plaster jacket, Johnson and Morris sent an isolated bone fragment to the Laboratory of Isotope Geochemistry for Environmental Isotope Research at the University of Arizona's Department of Geosciences to determine its condition. The lab analyzed the amount of original protein in the bone and reported that it was too deteriorated to use for dating. But the possibility remained that bone within the sediment block would be better preserved and thus yield more information.

Researchers probed farther into the earthen block in 1993. They subjected bone samples to DNA testing and concluded that the samples contained no preserved DNA.

Then Johnson gave three different specialists fragments of the bone to conduct various chemical tests. The bone proved too degraded for enzyme collagenase testing, Johnson said, so efforts focused on testing remaining amino acids, AMS radiocarbon dating of different preserved fractions of preserved bone protein, and AMS dating of osteocalcin, a non-collagenous bone protein and the most abundant protein in bone after collagen.

Also in 1993, researchers returned to Arlington Canyon on Santa Rosa Island to map the site's stratigraphy. In the process, they recovered more charcoal from the stratum that had yielded the human femora and sent it for testing. At the same time, they also subjected to AMS radiocarbon dating the mouse bones extracted from the museum's sediment block. They were identified as the bones of an extinct deer mouse, *Peromyscus*

CAT Scan Reveals Evidence of Stature

The block of earth from the Arlington Springs site recently underwent a CAT scan that gave researchers at the Santa Barbara Museum of Natural History "X-ray vision" to see what was inside. Curator of Anthropology John Johnson said the CAT scan (computerized axial tomography) revealed the distal end of a femur (thigh bone) and a patella (knee cap). "We were able to add the length of the distal part of the femur to measurements taken on the proximal part that we had already removed," Dr. Johnson told the Mammoth Trumpet.

By learning the total length of the femur, the researchers were able to estimate that the Arlington Springs Woman was between 4 feet 11 inches and 5 feet 2 inches tall.

nesodytes, a species that was endemic to the island. It went extinct during the early Holocene when it was replaced by a smaller, more aggressive mouse from the mainland, *P. maniculatus*, probably inadvertently introduced by people. Although it is possible that the mouse could have floated to the island on a piece of driftwood, Johnson said researchers suspect that it stowed away aboard the watercraft that people used to ply the waters between the mainland and the island.

The two series of radiocarbon tests produced somewhat conflicting information, yielding 10 radiocarbon dates on bones and charcoal that ranged from 6,610 ± 60 years (CAMS-14363) by osteocalcin analysis, to 11,490 ± 70 years (CAMS-17125) on AMS dating of the deer mouse mandible. Charcoal collected during 1993 from the site's stratum in which the human bone was found yielded a date of 10,090 ± 70 radiocarbon years (CAMS-13036).

Johnson said in the symposium paper written jointly with Stafford of Stafford Research Laboratories, Inc., Boulder, Colo., Henry O. Ajie of the Department of Earth System Science, University of California, Irvine, and Morris of the National Park Service, that the date on mouse bone may be the most accurate measurement of the site's age. The researchers explained that the chemical preservation of the mouse bones was better than the preservation of the human bones—they contained more

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At the Arlington Springs site during 1960 excavations, two human femora are pictured in situ. One is in the hand of a member of the archaeological team; the other is on the right.

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The block of sediment from Arlington Springs lies on a museum work table in December 1993, exposing part of a human femur.

collagen. Further, the human bones apparently had been reworked into the sediments containing the rodent bones. "Therefore the rodent bones would be older than the human bones."

Citing difficulties with radiocarbon dating that have been expounded by archaeologist Stuart J. Fiedel, Johnson and his colleagues also say that the difference between the 10,090 and the 11,490 radiocarbon years may be more a reflection of radiocarbon calibration problems than actual age differences ("Corrected Radiocarbon Calendar Can Clarify Peopling of Americas," **Mammoth Trumpet** 12:4).

Recalibration of the oldest dates by comparing radiocarbon dates with those obtained from Greenland ice cores, Caribbean corals, and lake-bed sediments in Europe and Canada resulted in a determination that the materials are approximately 13,000 calendar years old, Johnson and Stafford said. While the new Arlington Springs dates are older than originally thought, they remain coeval with recalibrated dates for Clovis sites, Stafford noted, pointing out that the dates remain younger than the 12,500-radiocarbon-year dates for material from the Monte Verde site in Chile. The antiquity of Monte Verde has convinced many American archaeologists that humans entered the New World earlier than Clovis—possibly along the Northwest Coast.

Stafford and Johnson say that recalibration of radiocarbon dates remains controversial because the curve used in the testing procedure may not be reliable. They believe that more dates need to be obtained to verify the antiquity of the Arlington Springs human bones because they apparently were eroded from their original location and deposited into alluvial sediments of a small stream channel through the site, leaving it uncertain whether the associated charcoal and mouse bones are contemporary with the human remains.

However, the researchers remain convinced of the site's overall significance, particularly because of research on other Channel Island sites such as Daisy Cave on San Miguel Island, where University of Oregon archaeologist Jon M. Erlandson has recovered material dating at least to 10,000 radiocarbon years ("Living on the Rim," **Mammoth Trumpet** 13:2). San Miguel and Santa Rosa islands were linked as a single island during the terminal Pleistocene when the sea level was about 150 feet lower than today.

Although research at Arlington Springs and Daisy Cave does not provide sufficient evidence to prove people first entered the New World by boat, Johnson says this proven seafaring ability of Paleoindians is an important clue. "When you consider these two sites, it is evident people had to get to the islands on some kind of watercraft, and we know they were adapted to marine resources." But, Johnson adds, "when you are dealing with ancient remains there remains a little bit of uncertainty." Thus his research team plans to conduct more tests on bones.

Stafford says he would like to see the geology of the site analyzed from the top to the bottom so researchers can have a complete profile to study.

Johnson says Arlington Springs points up the importance of saving portions of archaeological sites for future study. The Spirit Cave site in Nevada provides proof that researchers can make significant discoveries by using new methods to reanalyze material recovered decades earlier ("Remarkable Discovery," **Mammoth Trumpet** 12:2).

"This whole thing reaffirms the importance of museums as proper places to archive significant finds for posterity," Johnson said. "Orr had the foresight to plaster-jacket his find and archive it for the future. The lesson is that there is value in setting aside samples for the future and saving ancient skeletal remains."

–George Wisner

SANTA BARBARA MUSEUM OF NATURAL HISTORY

In August 1993, Dr. T. Rockwell examines the stratigraphy at the Arlington Springs site.

AAPA Symposium

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Replacement or Continuity?

Using craniofacial morphological data, Joseph F. Powell of the University of New Mexico examined what he called "two simple models" regarding the origins of the earliest-known Americans, who many investigators have found differ craniofacially from recent American Indians. One, the Replacement model, posits that the earliest population died out and was replaced by later populations. The other, the Continuity or relationship model, posits that various evolutionary processes, such as genetic drift, explain differences between earliest and later skeletal samples.

Under the first model, morphological data from the oldest individuals would be expected to be quite different from those of modern American Indian populations, but similar to samples in other parts of the world, such as Europe, Africa, or the Pacific. Under the second model, the craniofacial data should show some connections between past and present populations in the Americas.

Over the past few years, Dr. Powell has been examining both the few American skeletons of 8,000 or more years antiquity ("Paleoindian Skeletal Data Re-examined" **Mammoth Trumpet** 7:2) as well as a much larger Archaic sample, now numbering 938 individuals, that lies between Paleo and Modern samples in age. To test the two hypotheses, his analysis also employed the cranial databases of W. W. Howells and Tsunehiko Hanihara, which include many relatively modern samples.

Data Favor Continuity Theory

Though Powell's analysis found differences between Paleo and modern American Indian samples, he found that Archaic samples tended to cluster with Paleo samples, suggesting that microevolutionary change is involved in these changes, including a trend toward increased cranial breadth. Also, he reported continuities between Archaic and modern peoples, notably in samples in the Western Great Basin. Considerable variation among the few ancient crania available for study complicates interpretation as well as analysis, but overall Powell's data led him to favor the Continuity hypothesis over Replacement. Powell said that Kennewick Man of Washington State and Lapa Vermelha IV of Brazil, two ancient individuals much debated in recent months ("Discovery of Ancient Skeleton Raises Trying Rights Question" **Mammoth Trumpet** 12:1 and "New World Migration Research Paints Increasingly Complex Picture" **Mammoth Trumpet** 13:4), like other ancient crania, fit this model of continuity.

Dr. Long and three coauthors from the National Institutes of Health analyzed the genetic structure of contemporary American Indian populations for ancient European ancestry. Assuming that some post-Columbian admixture has occurred within these populations, they wanted to determine whether current genetic data suggest that there might also have been some pre-Columbian admixture—that is, whether the native American ancestry includes early migrants from Europe as well as from Asia. They did this using a model developed by L. L. Cavalli-Sforza and their own data on polymorphic loci from Cheyenne, Pima, and Navajo populations, along with samples from China and from Sweden. The models they developed were consistent with evolution of the Native American gene pools from an Asiatic source, with some post-Columbian admixture. Like Powell's skeletal analysis, their conclusion from genetic data did not support a pre-Columbian European contribution to the American Indian population.

Archaeologist Favors Late Entry

Archaeologist Ted Goebel of the University of Nevada–Las Vegas evaluated the archaeological evidence from Siberia that causes him to believe humans did not actually come into the Americas until considerably later than much of the genetic and linguistic analyses suggest. Archaeology, he said, indicates that early Siberian people favored regions that offered a variety of resources—mountainous areas of southern Siberia. People seemed tethered to foothills and mountains that offered different habitats and thus a diversity of foods as well as wood, a vital commodity totally absent on the great Mammoth Steppe farther north. Dr. Goebel said that southern Siberia's blade-and-biface stone technology indicates that the peopling of Alaska and the Americas was the final episode of the spread of humans into Siberia. Because of the severity of the last glacial maximum, he doesn't believe people could have started to occupy Siberia until after 17,000 years ago.

Everett Rhodes, a physician at the University of Oklahoma Health Sciences Center and past director of the Indian Health Service, offered a cultural perspective to the symposium. A Kiowa Indian who traces his medical background to ancestors who were considered powerful traditional healers and witches, as well as to his biomedical training, Dr. Rhodes reminded the scientists that many people have alternate explanations for the origins of the First Americans. In an often humorous presentation that carried a serious message, he said that many American Indian people are concerned that genetic research will have unknown and potentially adverse consequences for them. He noted that the issue of Kennewick Man is of acute concern in Indian country, where people have heard that politicians are suggesting that if this one individual is "proven" not to be an ancestor of Indians, the United States should abrogate all those treaties with Indian people. He told the researchers he doesn't know of any Indians who have "a vested interest in learning that there may have been other migrations."

Respect for Ancient Dominion

Rhodes urged the human biologists to carefully acknowledge the DNA they are testing. "Who makes the decision about the ultimate disposal of that DNA? Is that DNA treated with the reverence that is one of the characteristics of Indian people?"

Szathmary revisited Rhodes's theme by stating her own background as an immigrant to Canada from a heritage of Asian people who immigrated into what was to become Hungary. Scientists making broad continental analyses of ancient migrations should make it clear, she said, that evidence from the relevant population groups actually is quite sparse. She suggested that her colleagues should recognize, as Dr. Rhodes indicated, "that these peoples are entities that have their own histories." Further, she noted, comparative data on many of the

Correspondence

The Year 2000 Problem and the Peopling of the Americas

The Y2K problem is approaching fast, and archaeologists, certainly those who use dates, should at least be aware of it. It's a simple problem, really, and if we didn't hit upon it before, it's just that the year 2000 was too far away. Nobody really thought that our programs of the 1960s would last this long, but they did, so if you use radiocarbon dates in old spreadsheets, take heed.

It's just a question of bits and bytes in the computer. A bit is a 0 or a 1, a NO or a YES if you wish, and 8 bits make up a byte. The information you can store in a string of bits is 2 to the Nth power, where N is the number of bits. So for half a byte (called a nibble) you can store the digits from 0 to 7 if it represents a number. A byte can be up to 127 in the decimal system if you also count the zero. If you use negative numbers—the "B.P.s" in the carbon datings—you need an extra starting bit to indicate that it is positive or negative.

Everything would have been easier had we been born with eight fingers on each hand so that we would be using the octal or hexadecimal system instead of the decimal one, but don't worry about that. The computer will convert your decimals into the hexadecimals for you. It's only that in doing so you waste bytes, and nobody liked to do that. Machine memory was at a premium until a few years ago. So banking programs, and others using many dates, assumed that everything happens in nineteen hundred so and so for most transactions, thereby earning precious bytes. If in 1970 you took a loan at the bank maturing in 1998, the program would subtract only the 70 from the 98, making it correctly a 28-year loan. But if it matures in 2002 you get 02 minus 70, so the bank owes YOU for 68 years! Storing dates with three digits instead of two wouldn't have solved the problem. You would get 002 minus 970, making it even worse. It's all easy to fix, of course, but it means a lot of trouble and money, especially since most old programs were written in languages like Cobol and others considered obsolete by modern programmers.

Indeed, the archaeology of programming languages would be a very rewarding subject all by itself.

Now, what has all this to do with the peopling of the Americas? Simply this: if bytes were so precious just a few years ago, how much more important would they have been extrapolating back 15,000 or 20,000 years?

Everybody has been wondering how the Americas happened to be peopled so fast, and here finally we have the answer. Consider the most probable occupation site in the U.S. dated with certainty to be 14,000 B.P. and the respective one in the south of South America to be about 12,000 B.P. They must have been rushing like mad!

And this, *thousands* of years before the marathon was invented, which means they knew about the problem! It was still worse for them, not only because they needed five digits instead of our four, but also for having to use an extra bit for the negative numbers.

So at last we can get a clear picture of what really happened. The first Asian to become an American was a clever fellow called Nagay, who led his tribe over the Bering Land Bridge while the going was still good. Once in America he gathered his tribe together and told them:

"It's rather cold over here. I know of a land called Tierra del Fuego, so it should be warmer there, *fuego* meaning fire, but it is far away. We will go there. But remember, the Y10k problem (the year minus 10,000 problem) is upon us and we don't want to carve those stones all over again to correct the dates. So let's make a run for it!"

And leading by example, he started to run south. Not everybody could sustain Nagay's pace, and those who peeled off settled North America. But some kept the tradition and ran on and on, wondering as they reached South America how everything turned upside down and was spelled backwards. And so it is how Tierra del Fuego was to be peopled so quickly by Nagay's descendants, who, spelling backward, became the Yagan tribe.

They made it well before the Year-minus-10k problem came to a head, and let's hope they were rewarded by a big fire.

Our own Y2K problem looks small in comparison. If they could solve it, so can we.

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The 'Animegrad' Perspective

peoples also are sparse, and extrapolation from a sample in one area to a larger group [such as from an Athapaskan-speaking group to a hypothesized language group such as Na-Dene] may be invalid. "What Na-Dene are we talking about?" Szathmary asked. "How many samples do you really have, for example, of Northern Athapaskan?"

She spoke of Indians' concerns about scientific interest in their origins. It raises painful questions both in the United States, where they were conquered, and in Canada, where they were not. "For Canadian aboriginal peoples, this notion that 'you're just another bunch of immigrants' causes grave consternation because of the land-claims issue." When we speak of the original peopling of the Americas, Szathmary told her colleagues, we should remember to say that it occurred such a long time ago "that these were the people who first took dominion over North and South America. Dominion," she said, "is a very nice word that comes from the Bible. Taking dominion means that you make it yours, and it was their land. Who cares if they came 12,000 years ago or 18,000 years ago. This was their land."

Praising Powell's paper, she said skeletal biologists need to be very careful about how they undertake their analyses and the conclusions they then render, because most of the conclusions are not based on the large number of early Holocene and Paleoindian-era individuals Powell used. "Single individuals can cause real problems."

–DAH