MAMMOTH TRUMPET

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Center for the Study of the First Americans
Department of Anthropology, Texas A&M University
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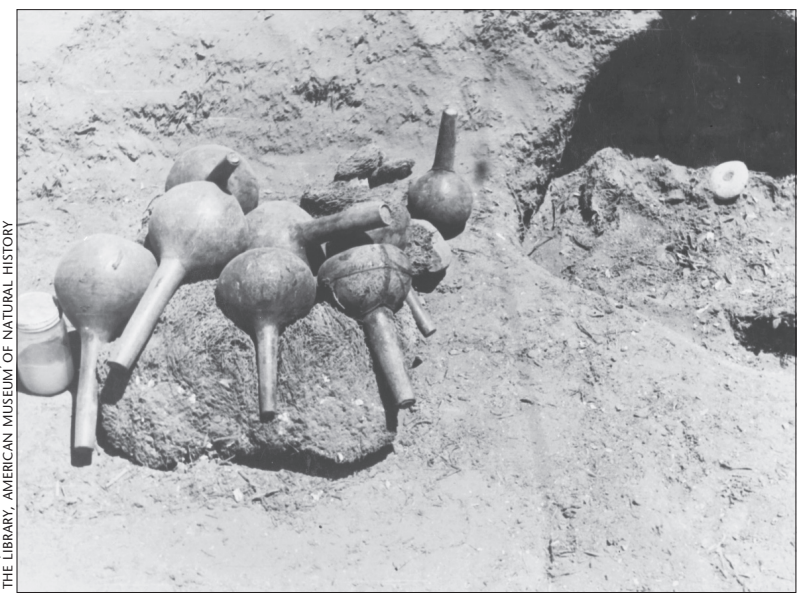
With man, from Africa to the New World



NEG./TRANSPARENCY NO. 126955, COURTESY THE LIBRARY, AMERICAN MUSEUM OF NATURAL HISTORY

Remarkably well preserved after 3,500 years, these bottle gourds were found with a stone sinker and fishnet at Huaca Prieta in Peru. Peruvian fishermen today, using gourds as floats with nets up to 30 m long, wade into the surf and drag their catch to shore. The bottle gourd, which is used to make all manner of implements and musical instruments, appears in other New World archaeological sites as much as 9,100 years old, even earlier in Asia. Because of its widespread distribution dating to early prehistory, scientists conclude that people appear to have experimented with agriculture much earlier than we suspected. They do not agree, however, on exactly how the bottle gourd, which originated in Africa, made the trip across the Pacific. Our story on this enduring partnership of man and plant starts on page 4.

The Center for the Study of the First Americans fosters research and public interest in the Peopling of the Americas. The **Center,** an integral part of the Department of Anthropology at **Texas A&M University,** promotes interdisciplinary scholarly dialogue among physical, geological, biological and social scientists. The **Mammoth Trumpet,** news magazine of the **Center,** seeks to involve you in the peopling of the Americas by reporting on developments in all pertinent areas of knowledge.

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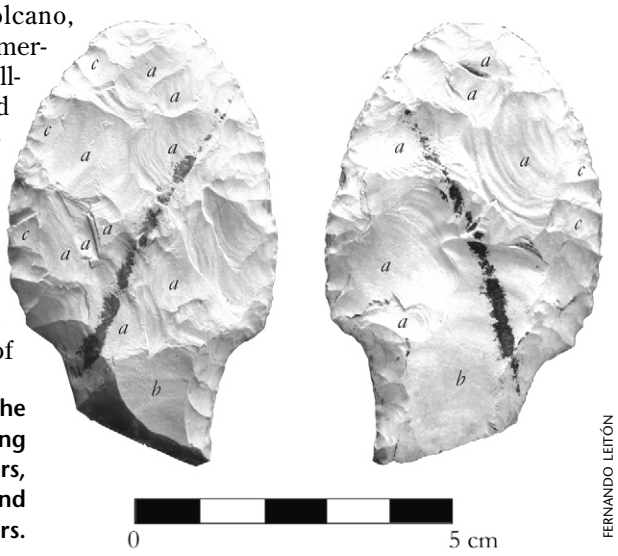
A New Fluted Fishtail Point Find from Costa Rica

by Magdalena León

The zone of La Virgin de Sarapiquí in the northern part of Heredia Province, Costa Rica, has previously yielded clear archaeological sites from at least 4,000 years before the present, including several early-Ceramic sites. Now with the discovery of the Birlen fishtail point, the alluvial terraces of the lower Sarapiquí River, like those near Turrialba and the area around the Arenal Volcano, have a demonstrated Paleoamerican presence, as shown by skillfully flaked bifacial fluted points, knives, and other diagnostic Paleoamerican tools such as keeled scrapers.

The archaeological wealth of Sarapiquí

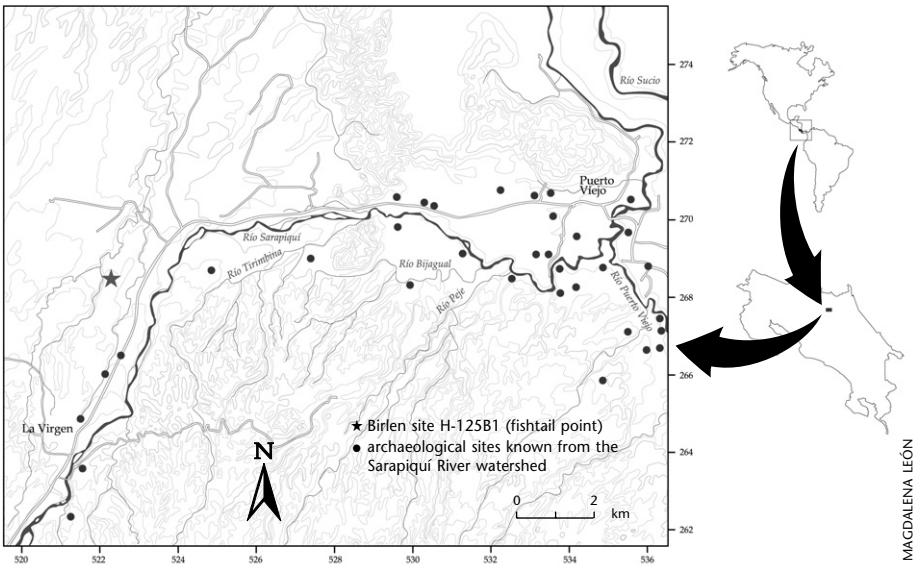
The Birlen site (H-12Bl) in 2005 yielded chipping debris of silicified slate and a nearly complete example of a fluted fishtail Paleoamerican spear point. The site, located on an alluvial terrace in the lower drainage of the Sarapiquí River, lies in the corner of an extensive pineapple plantation. In addition to the fishtail point described here for the first time, the general area of the site has also produced a beautiful Archaic point and ceramics from all the recorded periods to date in this part of Costa Rica.



Photograph of both sides of the Birlen fishtail point showing (a) primary thinning flake scars, (b) channel flake scars, and (c) pressure flake scars.

INSIDE

The lower reaches of the Sarapiquí River were as attractive to the earliest pre-Columbian people as they are to today's inhabitants. The region enjoys an agreeable subtropical climate, reasonably fertile soils on its alluvial terraces, and the navigable river itself, an important route for communication



Distribution of archaeological sites in the lower watershed of the Sarapiquí River.

and trade. Known archaeological sites span the period from 10,000 B.C. to around A.D. 1200. Extensive cemeteries of stone box tombs beautifully made from river cobbles complement the many small village habitation sites from all ceramic periods.

The Birlen fluted fishtail point

This point from La Virgen de Sarapiquí is made of cream-colored silicified slate, with an oxidized stain produced by its conditions of deposition 120 cm deep in the subsoil. The point measures 67.56 mm by 41.51 mm, with a maximum thickness of 5.52 mm. The makers of the point employed classic skillful Paleoamerican chipping techniques, combining carefully controlled percussion and pressure flaking. Several thinning flakes extend almost from side to side, and the center section of the point is very thin. Careful pressure retouching along the edges and point produced strong, sharp edges. The point has two ancient fractures apparently caused by use, one at the tip and another on one side of the peduncle.

Taking stock of Central American lithics

No Paleoamerican site in Central America has been radiocarbon-dated, nor have any Paleoamerican chipped-stone artifacts been found directly associated with Pleistocene megafauna, although separate finds of mastodons (*Cuvieronius hyodon),* giant sloths and armadillos, native American horses, and even mammoths have been reported. The most extensive lithic assemblage confidently assigned to Paleoamerican times, recovered from the Guardiria site near Turrialba, consists of hundreds of simple backed knives; bifacial knives; keeled, side (hide), and spoon-shaped scrapers; burins; drills; and more than a dozen whole and fragmented fluted points and performs.

Clovis-type fluted points have been found in Belize (Ladyville), Guatemala (Los Tapiales), Costa Rica (two from Turrialba, another from the Arenal zone, and a fourth from an unknown part of Guanacaste province), and Panama (La Mula, Lake Alajuela).

Fishtail fluted points, more characteristic of South America, have only rarely been found north of Costa Rica. The Birlen fishtail point may in fact be the northernmost fishtail yet found, pending secure identification of other candidates from Belize and southern Mexico. At various sites in South America, fishtail points have been found directly associated with extinct Pleistocene megafauna including mastodon, giant ground sloth, and American horse.

More Clovis fluted points than fishtails have been found in Central America. In Costa Rica the four Clovis points found to date outnumber the two (now three) fishtails, even if we exclude the several finished Clovis basal fragments and numerous Clovis preforms from Turrialba. With fluted fishtail points the proportions change; Turrialba has produced two, and now the Birlen point is the third found in Costa Rica. In Panama, on the other hand, only two Clovis-type fluted points are known, compared with six fishtails, all from the Lake Madden–Alajuela region.

Costa Rica and Panama, then, form the "zone of transition" or area of overlap between two clearly different and firmly established Paleoamerican fluted-point traditions. The fishtail points known from Costa Rica and Panama closely resemble those from as far south as Fell´s Cave in Patagonia, while the Costa Rica–Panama Clovis points more closely resemble the so-called "Eastern Clovis" points of North America. It remains to be seen whether these different fluted-point traditions represent different ethnic groups of hunter-gatherer bands or whether there is a chronological difference (which isn't apparent in the radiocarbon dates available today).

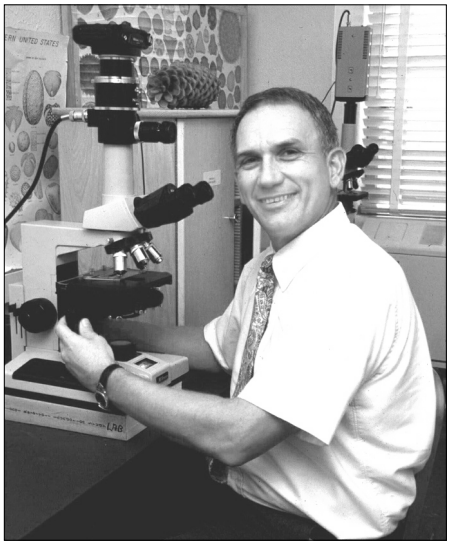
The Birlen fishtail point opens a new avenue of research into Paleoamerican lifeways in Costa Rica, which are usually considered to have been small bands engaged almost constantly in hunting and gathering. The Guardiria-Turrialba site in Costa Rica has been regarded until now as the only known Paleoamerican quarry and workshop

continued on page 20

The Birlen site, where the new fishtail point was found (center right, where the pineapple field meets underbrush at the edge of the river).

Vaughn Bryant Honored by SAA

Vaughn M. Bryant, professor of anthropology and director of the Texas A&M Palynology Laboratory and the Paleoethnobotany Laboratory, will receive the 2007 Fryxell Award for Interdisciplinary Research from the Society for American Archaeology. Nominees are evaluated on the breadth and depth of their research and its impact on American archaeology, the nominee's role in increasing awareness of interdisciplinary studies in archaeology, and the nominee's public and professional service to the community. The award cycles through zoological sciences, botanical sciences, earth sciences, physical sciences, and general interdisciplinary studies. Each separate area is considered once every five years. Bryant's award will honor his lifetime of accomplishments in the field of archaeological botany, including work in such diverse areas as reconstructing past environments, analyzing pollen from underwater shipwrecks, searching for the origins of agriculture, reconstructing prehistoric diets, and inferring cultural uses of plants from plant fragments and pollen recovered in the soils of archaeological sites.



VAUGHN M. BRYANT

This prize is the latest in an impressive series of awards Bryant has received since he joined the TAMU faculty in 1971. In 1974 he received one of only six Distinguished Achievement Awards for Teaching presented, and in 1990 he received the only Distinguished Achievement Award for Administration presented by TAMU. In 1999 the American Association of Stratigraphic Palynologists honored him with their Distinguished Service Award—only 12 such awards had ever been presented during the 30-year history of that society. In 2005 he became the eleventh AASP member to be honored with a lifetime Honorary Membership. He has also earned worldwide recognition for his articles, or articles about his research, in many popular U.S. and international magazines including *Scientific American*,

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

–Michael R. Waters, Director

Tracking the Well-traveled BOTTLE GOURD

DOMESTICATED PLANTS may have played a larger role than we suspected in helping the First Americans adjust to their New World surroundings—spotlighting the possibility they had very early discovered the secrets of better living through horticulture.

Arguably, new research pointing to an Asian origin for ancient bottle gourd remains found in New World archaeological sites helps refine the image of these rugged Paleoamerican hunters. Instead of existing precariously in their new home—living off little but wild plants and animals until they discovered agriculture, as hunter-gatherers are frequently depicted—these late-Pleistocene migrants appear to have brought with them sophisticated plant knowledge and the skills to use it.

"These people did not come empty-handed," says Bruce D. Smith, who coauthored a 2005 paper outlining research that uses genetics and archaeology to solve a century-old scientific puzzle: Explaining how a plant species native to Africa, the bottle gourd (*Lagenaria siceraia*), appears in ancient archaeological sites in Florida, Kentucky, Mexico, and Peru.

Raw material for making handy gadgets

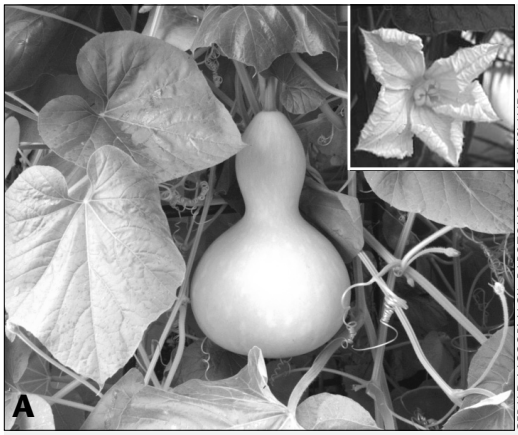
Early people seem to have brought this domesticated plant with them, Dr. Smith notes, a plant that was not a food source but one with significant "utilitarian value." Thick-rind domestic bottle gourds are a hard-shelled species prized for centuries as lightweight containers of all sorts. With a hole in the top, a hollowed-out bottle gourd becomes a canteen, Smith suggests; just cut off the bottom to make a bowl or a container you can use to process, cook, or eat food. Manipulated in various ways, gourds also become fishing floats or musical instruments. Some cultures still use them in place of pottery, which, recent research notes, appeared in East Asia some 14,000 years ago. It's reasonable to assume that the durable bottle gourd would have been an extremely practical part of a Paleoamerican tool kit, Smith says, far easier to have carried than pottery for cooking, drinking, and eating. A gourd is as versatile as a Swiss Army knife or other multipurpose tool, with the additional benefit of being a constantly renewable resource when the seeds are planted.

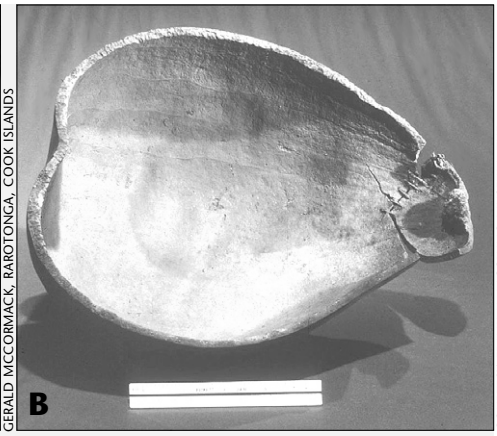
Their findings, Smith says of his team's efforts, add a new dimension to our understanding of the First Americans and their relationship with plants, while illuminating the pivotal role that one plant may have played in settling the Americas. By focusing "on their [Paleoamerican] attention to, and skill in, management of the environment," he notes, it adds an "interesting nuance to the domestication of plants and animals," for their study suggests the paradigm of an abrupt transition to sedentary farmer from the more precarious life of a nomadic hunter-gatherer—a change considered a major turning point in human history—may be a "conceptual simplification" of a far more complex, subtle, and gradual process.

Published in the Proceedings of the National Academy of Sciences, the study drew upon a multi-disciplinary team of anthropologists and biologists in addition to Smith, a scientist with the Archaeobiology Program of the Smithsonian: David L. Erickson, principal author of the supporting research paper, with the Laboratories of Analytical Biology of the Smithsonian; Andrew C. Clarke, with the Allan Wilson Centre for Molecular Ecology and Evolution and the Institute of Molecular BioSciences of Massey University in New Zealand; and anthropologists Daniel H. Sandweiss, University of Maine–Orono, and Noreen Tuross, Harvard University.

From Africa to the New World—which route?

Expanding genetic and archaeological research has steadily advanced the understanding of human transition to agriculture, which authorities tend to agree began some 10,000 to 5,000 years ago with the domestication of plants in at least eight regions of the world, Smith notes. But "understanding domestication of New World species" in the Americas, he added, has been complicated by the so-called "African enigma," the bottle gourd that became the focus of this study.





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COURTESY OF THE PHOEBE APPERSON HEARST MUSEUM OF ANTHROPOLOGY AND THE REGENTS OF THE UNIVERSITY OF CALIFORNIA; COLLECTED BY RALPH L. BEALS, CATALOG NUMBER 3-3203.

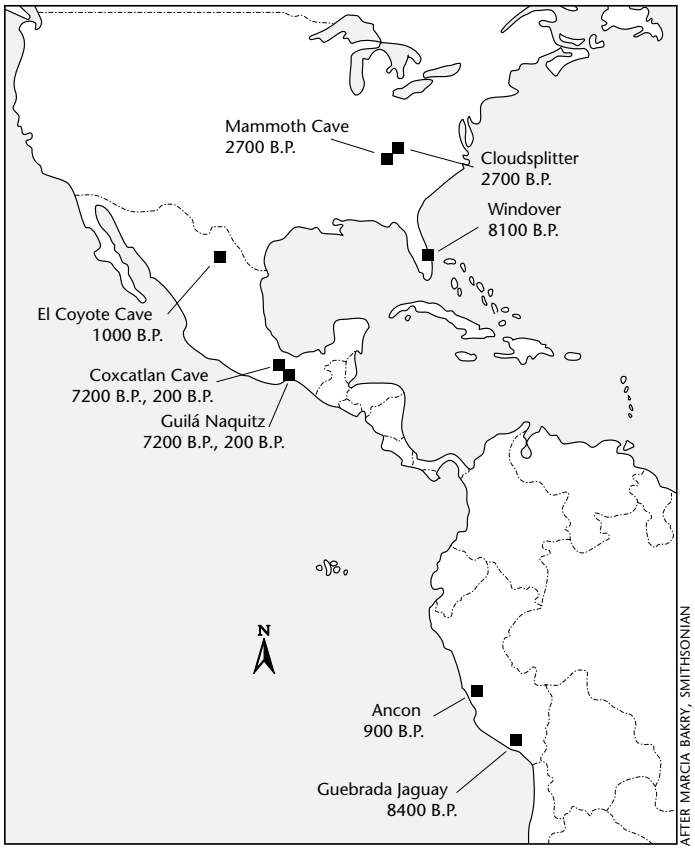
GOURDS GROWN AND HAND CRAFTED BY KEVIN & NORMA LINDAHL OF SOMETHING PRIMITIVE. PHOTO BY KEVIN LINDAHL.

A, bottle gourd plant with blossom. **B,** desiccated African water bottle. **C,** a 1,000-year-old bottle gourd seed from Cold Oak rockshelter in Kentucky. Its morphology is typical of the Asian subspecies *Lagenaria siceraria* ssp. *asiatica.* Seed length is 14.3 mm. **D,** this drum is one of many different musical instruments made from the bottle gourd over the ages. **E,** gourd water bottle (*bule para agua*) of Mayo Indians, Navojoa District, Sonora. **F,** some of the myriad kinds of utensils made from bottle gourds for thousands of years.

Indigenous to Africa, the gourd reached East Asia roughly 9,000 to 8,000 years ago (ultimately exhibiting sufficient differences to create a subspecies, *L. siceraria* ssp. *asiatica*). The gourd was broadly distributed in the Americas by 8,000 years ago. Researchers unable to explain its presence in early archaeological sites looked to its African origin as the starting point for its journey to the Americas. A variety of theories on how it got here were offered. Among them:

- The African plants, without known progenitors in the Americas, floated across the Atlantic and were picked up by people here. Floating tests have proved bottle gourds can last in sea water for nearly a year without losing seed viability, ample time, say some researchers, to have drifted to the New World.
- After making their way to Asia from Europe, the gourds drifted, or were carried by boat, out of Asia over open Pacific Ocean waters toward Oceania and through Polynesia to South America. Bottle gourds were, in fact, found in a Peruvian pre-Columbian burial in the 1840s; their age, unfortunately, cannot be ascertained today.

Early researchers still weren't certain they were dealing with a domestic gourd population, Smith reports, since nobody had documented a wild population to compare with rinds found in archaeological sites. Researchers have wrestled with this problem for a long time. James B. Richardson III, professor of anthropology at the University of Pittsburgh and curator of the Section of Anthropology at the Carnegie Museum of Natural History in Pittsburgh, Pennsylvania, addressed it three decades ago in a paper citing the necessity for a "detailed genetic,



AFTER MARCIA BAKRY, SMITHSONIAN

New World finds of early bottle gourds.

taxonomic and ethnobotanical study" to settle questions related to the origins of the bottle gourd.

Dr. Richardson's wish finally came true with the recent discovery of a wild population in southern Africa, which opened the door to modern scientific scrutiny and made Erickson et al.'s study possible.

Smith notes that few gourd samples exist from archaeological contexts older than 4000 CALYBP in the Americas. His team collected 17 study samples for detailed study from El Coyote Cave, Mexico; Cloudsplitter and Mammoth caves, Kentucky; Windover, Florida; Guilá Naquitz and Coxcatlan caves, Mexico; Ancon and Quebrada Jaguay, Peru. The oldest specimens, from Guilá Naquitz Cave, were radiocarbon-dated at 10,000 years old. The youngest, from Coxcatlan Cave, dated to 200 CALYBP; a second sample from the same cave dated to 7200 CALYBP.

The research team also launched a search for modern bottle gourd samples that accurately reflect African lineages, Smith recalls. Worried that seed catalogues or roadside stands might offer unreliable samples, they sampled museum ethnological specimens—such as those collected from Masai tribesmen in the 1930s—and scoured rural areas "to collect from indigenous groups." Finally they amassed a diagnostic assemblage of bottle gourds and seeds of assured pedigree. When they compared key genetic markers from the DNA of the ancient gourds with their modern counterparts in Africa and Asia to determine New World gourd origin, they got a pleasant surprise.

"We observed that all of the archaeological rind fragments predating the arrival of Europeans from which DNA could be amplified were identical to the modern Asian reference group," the joint paper states. Although a 10,000-year-old rind fragment from Guilá Naquitz Cave yielded no amplifiable DNA, another sample from the same cave dated at 9,100 years old did contain usable DNA—revealing its Asian origin. A 200-year-old Coxcatlan Cave sample, the youngest of the samples, turned out to be from the African reference group, likely deposited during the European contact period. The study notes that, "on the basis of DNA analysis," it appears that African gourds replaced the very early Asian gourd species throughout the Western Hemisphere after Europeans introduced them into the New World.

DAVID ERICKSON

Erickson in his lab.

Borne by water or carried by human migrants?

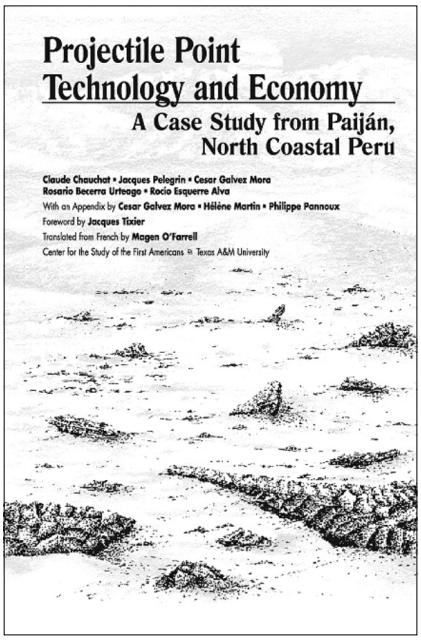
While satisfied with an Asian origin for the ancient bottle gourds, and emphasizing that DNA analysis was critical to solving the puzzle, Smith cautions that scientists still lack proof about how the gourds got to the New World. For the time being his team accepts human transport as a plausible explanation.

"This study just says they [bottle gourds] were here 10,000 years ago and that they could have been brought here by humans coming on foot or by boat," Smith explains. Since the Asian gourd fragments were in a dated archaeological context, "it is another good, solid piece of evidence suggesting that the First Americans entered the New World through Asia, and that they brought bottle gourds with them." However, it doesn't quash the possibility that the gourds floated south on North Pacific currents into the New World.

While conceding that some archaeologists may challenge the suggestion that ancient humans brought the gourds to the New World, Smith says, study findings are not at odds with theories portraying humans coming into the New World along possible routes that include overland by foot through the ice-free Beringian corridor, by foot along the North Pacific Coast, or by boat along the northwest Pacific Coast. Although the study's researchers favor a near-coastal route of entry by

Projectile Point Technology and Economy: A Case Study from Paiján, North Coastal Peru

Claude Chauchat and Jacques Pelegrin, principal authors



THE PAIJÁN CULTURE, whose lithic industry manufactured exotic projectile points, is a poorly understood Paleoamerican tradition. Contemporaneous with the famous Folsom culture in North America, it is known from open-air sites and one rockshelter spread over 1000 km of the Peruvian coastal desert.

Claude Chauchat and his research team present a detailed archaeological case study of the Cupisnique region at the Pampa de los Fósiles locality on the north coast of Peru. This volume uses the *chaîne opératoire* approach, originally developed in France for studying flaked-stone tool assemblages. Stone tool assemblages are characterized as a succession of technical actions beginning at the moment of raw material acquisition and continuing through manufacture, utilization, and final abandonment of tools. The *chaîne opératoire* approach, applied to the study of a surface lithic workshop area at the site of Pampa de los Fósiles 14, Unit 1, documents raw material use at flaking loci and describes cores, flakes, flake tools, limaces, bifaces, and lithic reduction practices of the Paiján site occupants. The structure and employment of flaking areas are presented in plan maps, and stages of bifacial production are inferred from archaeological remains. Refitting studies and lithic technology experiments based on site patterning provide insights into tool production decisions and spatial patterning of workshop activities. Steps used in creating a Paiján point are illustrated through lithic replication experiments. In addition to providing a detailed history of stone tool flaking activities, the investigators combine raw material acquisition patterns with regional survey data to infer mobility models for the Paiján people. This amply illustrated volume will excite prehistoric archaeologists, lithic technologists, and knowledgeable readers.

–Copy from the rear cover

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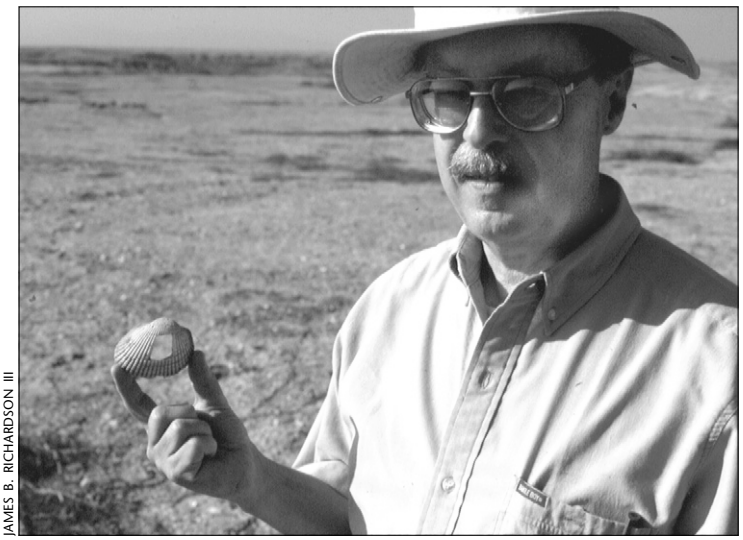
boat, Smith is quick to point out that they presently have no solid evidence to support it—particularly since no Paleoamerican sites containing bottle gourds have been documented along the North America Pacific Coast.

Smith isn't sure why evidence hasn't been found. "I hope it's just a simple question of people not looking for it [the bottle gourd]," he says. "It may be an issue of preservation—plants of that time period don't have very good preservation."

While their study puts domestic bottle gourds from Asia into central Mexico by 10,000 years ago, it also addresses the need to find older ones in Asia to demonstrate they were available to ancient New World settlers. Archaeologists have pulled bottle gourd fragments from 9,000-year-old sites in China and Japan, Smith notes. Therefore it's quite reasonable to look for evidence of earlier domestication in Asia. "I really think that in the next 20 years archaeologists will find domesticated bottle gourds in China and date them to 12,000 to 13,000 years ago," Smith says. Those earlier dates also would be consistent with the initial domestication in Eurasia of dogs, whose remains have shown up in ancient New World archaeological contexts.



JAMES B. RICHARDSON III

Richardson at the Siches site on the coast of Peru, 1995.

The researchers state in their paper, "We suggest that the bottle gourd and the dog, two 'utility' species, were domesticated long before any food crops or livestock species, and that both were brought to the Americas by Paleoamerican populations as they colonized the New World." Therefore archaeologists should seek both when sifting site debris.

Despite its preference for human transport as the probable means by which the gourd was introduced to the Americas from the north, the study doesn't entirely rule out a trans-Pacific route out of Asia—where bottle gourds are thought by some researchers to have bobbed their way across the southern Pacific and Polynesia, eventually drifting, or being carried by people, into such places as Peru. Some scientists (Wyatt, 2004, among the most recent) forcefully argue the idea that ancient long-distance boat travel through the Pacific Ocean was possible on grounds that:

- The archaeological record shows that sites in South America are consistently older than those in North

America, indicating the Americas could have been initially settled from across the south Pacific.

- Boat travel certainly was required to settle Australia, demonstrating that boats and open-ocean navigation skills existed 50,000 years ago and could have been used to reach the Americas.
- Early boat travel to Peru from Oceania was possible by island hopping when sea levels were lower and numerous now-submerged islands were exposed during the last glacial maximum some 20,000 years ago.

Despite continued support for a south Pacific migration theory over the years (**MT 16-2,** "The First Americans: Were They Australians?"), Smith labels it a definite long shot because there is no direct proof to support it. Just because it's possible, he argues, doesn't prove it happened. "I would argue that 10,000 years ago the types of watercraft available would not have been able to make it across the Pacific, even island hopping," he says. It still makes more sense, he adds, for people—their plants and animals—to have come straight to the New World from the north with boats floating close to land.

Smith makes another argument against the theory that the bottle gourd was carried across the South Pacific in open watercraft by 10,000 years ago. If that's the case, he contends, where is the evidence it existed in Australia and Southeast Asia prior to 4000 yr B.P.? "It could also have been brought by colonists from outer space," he observes wryly, "which is about as probable as a south [P]acific voyage."

In fact, solid evidence remains elusive for all the suggested routes into the New World, Smith concedes. However, two 10,000-year-old archaeological sites on the Oregon coast newly found by Davis et al. push the late-entry time envelope, stirring support for a possible coastal entry route. Ancient Pacific coastal sites, however, stubbornly fail to produce proof that their occupants arrived by boat from Asia. Finding that proof won't be easy, agree researchers Smith and Richardson, particularly because it would probably lie deep under offshore waters now covering ancient shorelines. "Maybe it won't happen in my lifetime," says Richardson, "but in the next 100 years we will find fancy techniques to get at those sites." Subsequent finds could drastically alter the swirling currents of archaeological debate over New World entry.

Richardson says he's also excited by the implications of the study suggesting humans brought the gourds to America. At the very least, the study may restructure archaeological inquiry toward a wider range of possibilities regarding the horticultural capabilities of the First Americans. Conceivably, "these early migrants very consciously and carefully brought things from their homeland that would aid them in their new life in the unknown," he says. "That's pretty exciting to me. I don't think we have been giving them as much credit as they deserve."

–George Wisner

Suggested Readings

Davis, L. G., M. L. Punke, R. L. Hall, M. Fillmore, and S. C. Willis 2002–2004 "A Late Pleistocene Occupation on the Southern Coast of Oregon." *Journal of Field Archaeology*, 29 (1–2):7–16.

Erickson, D. L., B. D. Smith, A. C. Clarke, D. H. Sandweiss, and N. Tuross 2005 "An Asian Origin for a 10,000-year-old Domesticated Plant in the Americas." Proceedings of the National Academy of Sciences, PNAS Web site www.pnas.org

Hall, R., L. G. Davis, S. Willis, and M. Fillmore 2005 "Radiocarbon Soil and Artifact Chronologies for an Early Southern Oregon Coastal Site." *Radiocarbon,* 47 (3):384–394.

Pearson, R. 2005 "The Social Context of Early Pottery in the Lingman Region of South China." *Antiquity*, 79 (306):819–828.

Richardson, J. B. III 1972 "The Pre-Columbian Distribution of the Bottle Gourd (*Lagenaria siceraria*): A Re-evaluation." *Economic Botany*, 26 (1):265–271.

Wyatt, S. 2004 "Ancient Transpacific Voyaging to the New World via Pleistocene South Pacific Islands." *Geoarchaeology: An International Journal,* 19 (6):511–528.

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Vaughn Bryant Honored by SAA

continued from page 3

People, Reader's Digest, National Geographic, National Geographic World, Der Spiegel, Colours, and *The World and I.* TV audiences have seen him on a number of programs including the BBC, *Today Show, To Tell the Truth, 1-2-3 Contact, CBS Evening News,* and *Fox-Network News.*

Bryant has written and edited articles and texts about pollen, plant remains, and anthropology that are highly regarded in their fields. *Mammoth Trumpet* readers will remember the enormously entertaining reminiscences of his early years in palynology (**MT 18-2,** "Pollen and the First Americans," and **MT 18-3,** "The Elusive Pollen Grain").

On hearing he will receive the Fryxell Award, Bryant remarked, "I was quite surprised to find I had won this! I guess it only took 40 years of work to qualify for consideration!"

Folsom on a Mountain Top

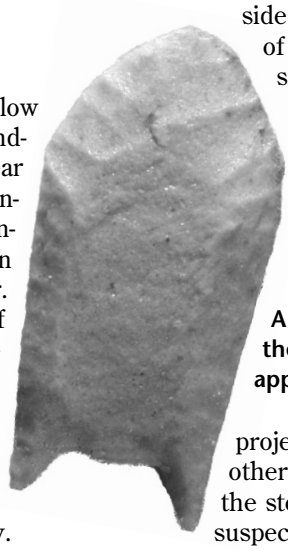
The Folsom-age inhabitants of the house atop Tenderfoot Mountain enjoyed this breathtaking view of the Rockies.

ALL PHOTOS AND GRAPHICS: MARK STIGER

REMAINS OF AN ANCIENT HOUSE high in Colorado's southern Rocky Mountains are offering a fresh glimpse into the lives of Folsom-age hunters who lived in the twilight of the Ice Age some 12,000 years ago. The find suggests these people—conventionally seen as perpetual nomads of the Great Plains—were more settled than previously thought.

A house built by unlikely masons

Now little more than a pile of rocks around a shallow depression, the house sits at 8,600 ft atop a windswept mesa known as Tenderfoot Mountain near Gunnison. Once, though, a family could overwinter comfortably there, gazing out daily at a panoramic vista across the Gunnison River Plain some 900 ft below, according to Mark Stiger. Dr. Stiger is professor of Anthropology, director of the CT Hurst Museum at nearby Western State College, and principal investigator at the aptly named Mountaineer site. The college owns the site and has used it since 2001 for archaeological field schools. Project research funding comes from the Colorado State Historic Fund, City of Gunnison, and the National Geographic Society.



A Folsom spear point recovered from the Mountaineer site (overall length approximately 4.5 cm).

Built around a shallow circular depression—perhaps no more than 40 or 50 cm deep and about 5 m in diameter—the house feature along a bulge on the west-central side of the mesa is the centerpiece of the Mountaineer site. Stiger suggests the house originally would have been built teepee-like of upright willow or aspen poles placed around the depression. Rocks found around the basin's edge, some as heavy as 100 pounds, suggest wall-like placement around the poles to anchor the structure's base. Smaller slabs of rock and traces of plant material nearby apparently provided "shingling" up the sides; leftover holes were plastered with mud. Small bits of mud used as mortar were found in and around the structure. Some of it, burnished red like oven-baked bricks, suggests the structure was burned and collapsed, cracking rock and firing the mud plaster or "daub." Inside the house ring, researchers found a small grouping of rocks surrounding a dark stain, possibly a hearth. They also detected a second, exterior hearth nearby. Numerous clusters of debitage, projectile points, point fragments, knives, scrapers, and other tools lay inside and nearby the house ring. Most of the stone tools were made from local quartzite. Although suspected contamination prevented reliable dating of collected charcoal samples, associated bison bone fragments produced bone collagen dates averaging approximately 10,375–10,400 RCYBP, or roughly calendar 12,000 years ago.

"We think this was an overwintering site," Stiger says, in

part because of the substantial nature of the teepee construction and the way artifacts were dispersed inside and outside the structure. For example, debitage dispersal suggests occupants periodically "cleaned" the house. Larger debitage tossed into a debitage dump southeast of the structure was deposited in a fan-shaped area leading away from what Stiger conjectures was a doorway, consistent with similar patterns elsewhere that imply maintenance activity and long-term occupation of prehistoric structures.

"My guess is they would have been there for months," says Stiger. "There is lots of debitage inside the structure, and a lot of it is tiny pressure flakes," suggesting they were making tools and possibly processing meat, bone, and hides. "We have got channel flakes fitted to preforms and finished projectile points. . . . We also have one projectile point in the house and pressure flakes to that in a trash spot outside."

Looking southeast across the partially exposed structure. The southern half of the structure is outlined by the arc of tumbled rocks.▶

House at start of 2003 field season. The dotted line shows the approximate boundary of the house. Maximum width is approximately 5 m.▼

New research throughout the region is producing more variation in Folsom-age sites, Stiger notes, with mountain sites in Middle Park, Colorado, excavated by University of Wyoming showing evidence of winter occupation. Maybe, he suggests, it's time to rethink our model of Folsom. "Perhaps they are overwintering in the mountains," he explains, and seasonally adapting to the plains in summer—an observation contrary to conventional wisdom that sees them exclusively roaming the Great Plains and leaving little trace of ephemeral housing. "Typically, you just don't think of Folsom being in the mountains at 8,600 feet," Stiger concedes. "You don't think of them as being settled enough to construct a rather substantial structure either. I think this whole basin was continually occupied. Hunter-gatherer societies are highly mobile, and they occupy an area even if they are not physically present there—it remains part of their long-term land use."

While stopping short of declaring the mountains, rather than the plains, the primary "home" of Folsom people, Stiger suspects they may well have been "at home in both places." But he believes they may have spent more time in the mountains because "that's certainly where the action is." More may be revealed as artifact analysis from this site continues and other Folsom sites are unearthed.

The Mountaineer site, according to Stiger, quite likely was a hunting camp. The occupants may have been preparing for spring hunting rounds to the valley floor, readily accessible from the mesa top, or they may have hunted the mountain slopes—Stiger confesses that "we haven't figured that out yet." In either case, he adds, meat from readily available bison and large mammals such as elk could easily have been brought to the site for processing. Stiger is still searching for the site's primary residential trash dump, for significant faunal and floral remains could tell us a lot about precisely which seasons the site was occupied and the kinds of activities that took place there. So far bison and weasel are the only species detected—weasel probably used to produce clothing, Stiger guesses, rather than as food. Taken together, collected stone and bone evidence from inside and outside the structure tells Stiger that Folsom people revisited the site for long periods and were busy while they were there.

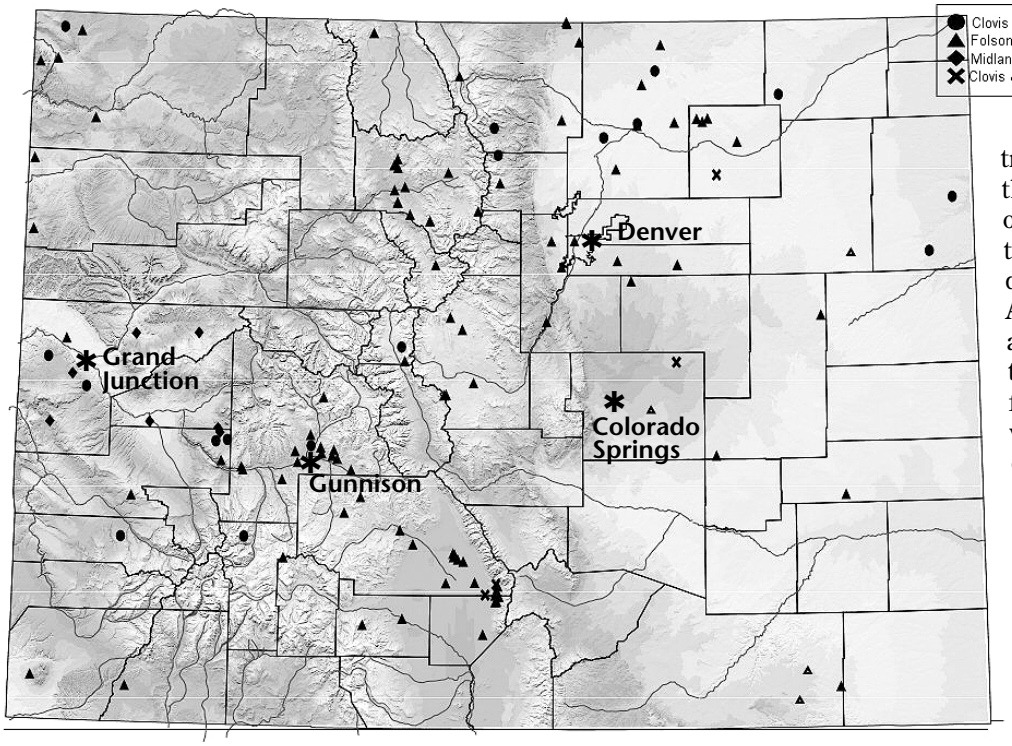
Some stone work, including unique overshot techniques, appears similar to that used in manufacturing fluted Clovis-style projectile points. Blades were manufactured of quartzite, though, and Stiger notes they are "not as nice and beautiful as those of chert manufactured by Clovis peoples." But the existence of such toolmaking techniques suggests a connection with the earlier Clovis people, long considered the First Americans.

Our changing view of classic Folsom

Folsom was a Great Plains bison kill site discovered in 1926 near Folsom, New Mexico (**MT 21-1,** "The Denver Museum of Nature & Science: A History of Early-Paleoindian Research," and *Folsom: New Archaeological Investigations of a Classic Paleoindian Bison Kill,* "Suggested Readings"), before the discovery of Clovis in 1933 at Blackwater Draw. Unique fluted stone tools found in association with Great Plains bison *(Bison antiquus)* at the first Folsom site established beyond doubt the antiquity of early Americans. Similar to earlier Clovis projectile points, Folsom points are smaller, with finely retouched edges and characteristic ear-like projections at the base. Over the years, Folsom has come to be seen less as a separate cultural entity than as part of a cultural continuum stretching out from Clovis. Recent research elsewhere (**MT 16-1**, "On the Cusp between Pleistocene and Holocene") suggests that Folsom people, a highly adaptable, skillful, and well-organized culture, lived in a relatively benign climate where game was plentiful. Of the

several Folsom sites found in the Gunnison Basin, Mountaineer is among the largest. *Discover* magazine in January 2004 underscored its significance when it named the house find one of the "Top 100 Science Stories of 2003." More complete details of the project appear in the April 2006 issue of *American Antiquity*.

Although the Rockies can be inhospitable in winter, Stiger doubts that the climate in prehistoric times would have precluded Folsom-age people from enduring winter on Tenderfoot Mountain. "The climate probably would not have been dissimilar to today," he notes, although summers might have been cooler. Since researchers recently put a weather station atop the mesa, we are discovering that winter weather there is, according to Stiger, "a heck of a lot nicer" than in the valley ("except for the wind," he concedes). It isn't uncommon for valley temperatures to dip to -30°F during the winter, and precipitation is greater in the valley than on the mesa. "Gunnison is at the intersection of several major drainages," he explains, "and we get all the cold there." On the mesa it's a bit warmer, particularly in the higher-elevation sun, and Folsom-age climate on the mountain might also have promoted more trees such as spruce and juniper. Although the mesa top is bare now, Stiger suspects aspen might have grown there in Folsom times, providing significant cover for hunter and the hunted. There is no doubt that the people who were there left their mark behind.



Folsom people were equally at home in the mountains of Colorado and the plains east of the Rockies, as this map of known sites shows.

A workshop besides a home

The staggering mass of material collected from across the first excavation block at Mountaineer likely will take years to analyze. Researchers so far have found more than 65 clusters of stone tools and collected more than 40,000 artifacts. While 5 of the clusters are of Archaic age (8,000–1,000 years ago), finds include 17 clusters of Folsom-age (10,900–10,300 RCYBP) tools. The Folsom clusters found inside and outside the structure vary significantly, suggesting to Stiger repeated site occupations. So far, however, diggers haven't found bone tools or other perishables such as fiber.

But there's little mystery surrounding the bulk of the tool stone source. The region's active river system moved quartzite toolstone almost to the doorstep of Folsom house, Stiger notes, providing toolmakers with "hundreds of sources of quartzite in the valley, cobbles and bedrock." Toolstone would have been readily available at a distance of a quarter mile to 5 miles. "They could pick up toolstone at the base of the mountain," he says. "It is literally a stone's throw away."

Not all the tools were made from local quartzite. "We are getting some chert tools," he explains, "but we are not sure where the chert comes from." Although chert is found about 5 miles away, Stiger finds it to be of poor quality. Researchers have also recovered flakes of obsidian, traceable to New Mexico. Overall the site, says Stiger, is a bonanza of material. He frankly admits that college ownership of it is a definite bonus for researchers. Among those writing their theses and dissertations on aspects of the project are graduate students from Southern Methodist University, who helped to unearth 3 of the more than 15 Folsom occupations on the site.

Good science . . . and a bit of luck

Western College has owned the mesa and used it for campus recreational purposes since the 1930s. Surveyors recorded Mountaineer as a lithic scatter in 1994, after construction was started on a cell-phone tower atop the mesa. Plans called for installation of more electronics sites atop the mountain, and in 2000 researchers surveyed, mapped, and collected artifacts from across the mesa. Finding a Folsom presence there was a welcome surprise.

He was back in the lab and going through material in the bags that had been recovered from that survey, Stiger recalls, when he found the "side of a projectile point with an ear coming down" at its base. He remembers looking at it and saying, "My God! That looks like Folsom"—an observation that ran counter to conventional wisdom that said Folsom wasn't in the mountains of southwest Colorado. "So I went back up there," he continues, "and went to the spot where I thought that point

came from and I found another piece of it. It fit in place and I had the complete base of a Folsom point. I spent the next two weeks up there on my hands and knees and found 20 more Folsom points on the surface. I'd find three a day. I shouted for joy, I can tell you that. It was a real mind-blowing experience."

Putting their noses into the dirt, researchers detected more and more paleolithics. It wasn't long before site boundaries were expanded and test pits dug. Folsom material appeared in shallow deposits some 20 cm under the surface; the site was registered and money was sought for continued research. "I have since spent a lot of time down on my hands and knees on this site," Stiger declares. Archaeological field schools have been held there each season since 2001. Besides the usual run of stone tools, researchers have found a bone-processing area containing broken bison ribs concentrated around an anvil stone with a large hammer chopper in the middle of it.

Discussing the house on site summer 2005 (*left–right*) Brian Andrews, Mark Stiger, David Meltzer, and Lewis Binford.

Archaic material is scattered in clusters several hundred meters away from the house structure. Significantly, since none was found within the house itself, Stiger believes it unlikely the Folsom material was incorporated into a house built by early-Archaic people. Besides producing some of its best Folsom diagnostics, discovery of the house set the stage for researchers to conduct some unique experimental archaeology to see if they could duplicate the burned clay "daub" fragments they theorized were originally mud plaster used to seal cracks in the house walls. They torched two models of teepee structures built of rock, aspen, and willow, and plastered with mud from on and off the site. The experiment succeeded: Researchers concluded that the structure was built of local material and that burning such a structure, either naturally or purposely after abandonment, could account for the remains uncovered on site.

Stiger concedes he doesn't know how many people lived atop the mesa. Although he hasn't found a way to accurately measure total occupancy for the site, Stiger says he confidently expects to find another Folsom-age structure. "Based on other ethnographic studies," he explains, "we probably had seven or eight people and two houses up there." While recent Native Americans are thought to have overwintered in villages or at least in large groups, Stiger doubts that would have been the case for Folsom people. Their neighbors might have been quite visible 10 or 15 miles away from the mesa top, he allows, and these mountain-top dwellers could easily have seen their campfires or known what they were doing based on their knowledge of the surrounding environment. A lot remains unknown about the site, Stiger admits, and he's likely to be probing its secrets for years.

"It is a lifetime of work here," he says. "There are so many questions to be answered. This is just a marvelous area for research archaeology." In coming seasons, he hopes to open more pits, find a trash dump, perhaps find a "dog yard" to explore questions relating to early domestication of dogs. The house site, in particular, will broaden research potential. Residential artifact assemblages for Folsom and Archaic-age peoples are emerging in the mountains, Stiger explains, and it would be helpful to be able to use similar units when comparing these cultures. There's also some Clovis material in the basin. "I would like to open up some of those," he reflects, "and see if we are looking at continuity [from Archaic] back to Clovis.

"I think all this is going to tell us a whole lot," he concludes. "It probably will confuse us a whole lot. But that's good, too. Sometimes it's important to know what you don't know."

–George Wisner

Suggested Readings

Downing, C. G. 2004 "Discover's Guide to the Top 100 Science Stories of 2003." *Discover,* 25 (1).

Hall, D. A. 2000 "On The Cusp Between Pleistocene and Holocene." *Mammoth Trumpet*, 16-1:1.

——— 2001 "Hoofs Open Window on the Past." *Mammoth Trumpet,* 16-1:20.

Meltzer, D. J. 2006 *Folsom: New Archaeological Investigations of a Classic Paleoindian Bison Kill*. University of California Press.

Mountaineer Site, Gunnison County, Colorado, Web site www.coloradohistory-oahp.org/programareas/shf/projects/2005/mountaineer.htm

Powell, E. A. 2003 "Starter Home." *Archaeology,* 56-6, Nov./Dec.

Stiger, M. 2006 "A Folsom Structure in the Colorado Mountains." *American Antiquity*, 71 (2):321–351.

Western State College of Colorado, Folsom Archaeology in the Gunnison Basin, Web site www.western.edu/anthropology/folsom/

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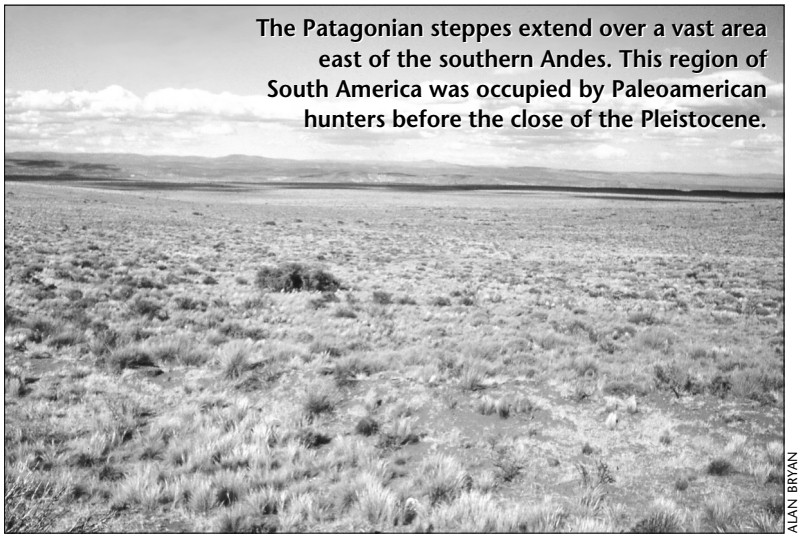
To the End of the Southern Continent

Paleoamericans in Patagonia

TOWARD THE CLOSE of the Pleistocene, between ca. 12,000 and 11,000 radiocarbon years ago, as piedmont glaciers retreated into the valleys of the southern Andes, Paleoamerican populations expanded into the grasslands of Patagonia. They had to cope with a harsh environment: a vast open steppe, cold and windswept at all seasons of the year. But there was plentiful game to hunt—herds of horses and the southern South American camelid, the guanaco; and flocks of large flightless rhea birds. Adequate shelter was to be found in caves or rock overhangs; and good toolstone was locally available for weapon points, knives, and scrapers. Settling into their territory, early hunters adjusted well to the Patagonian environment as it changed from late-Pleistocene to early-Holocene conditions.



The Patagonian steppes extend over a vast area east of the southern Andes. This region of South America was occupied by Paleoamerican hunters before the close of the Pleistocene.

ALAN BRYAN

Since the pioneer work by Junius Bird at Fell's Cave in the 1930s, a number of other late-Pleistocene archaeological sites in southernmost South America have been excavated by Chilean and Argentine archaeologists. Some recent investigations are summarized in the CSFA volume *Where the South Winds Blow*, edited by Laura Miotti, Mónica Salemme, and Nora Flegenheimer (2003).

Alero Tres Arroyos

At the end of the Pleistocene, hunters were camping in the rockshelter now known as the Alero Tres Arroyos, which is situated in a rock outcrop in the northeastern sector of the island of Tierra del Fuego. At that time the Straits of Magellan was not an open seaway. There was still glacial ice in its southern reach, and in its northern reach was a braided proglacial stream draining eastward into the Atlantic. The first people to enter Tierra del Fuego could have crossed on foot, following herds of game onto the eastern grasslands of the great island. At ca. 53° S. latitude, the Alero Tres Arroyos is the southernmost late-Pleistocene archaeological site in the world.

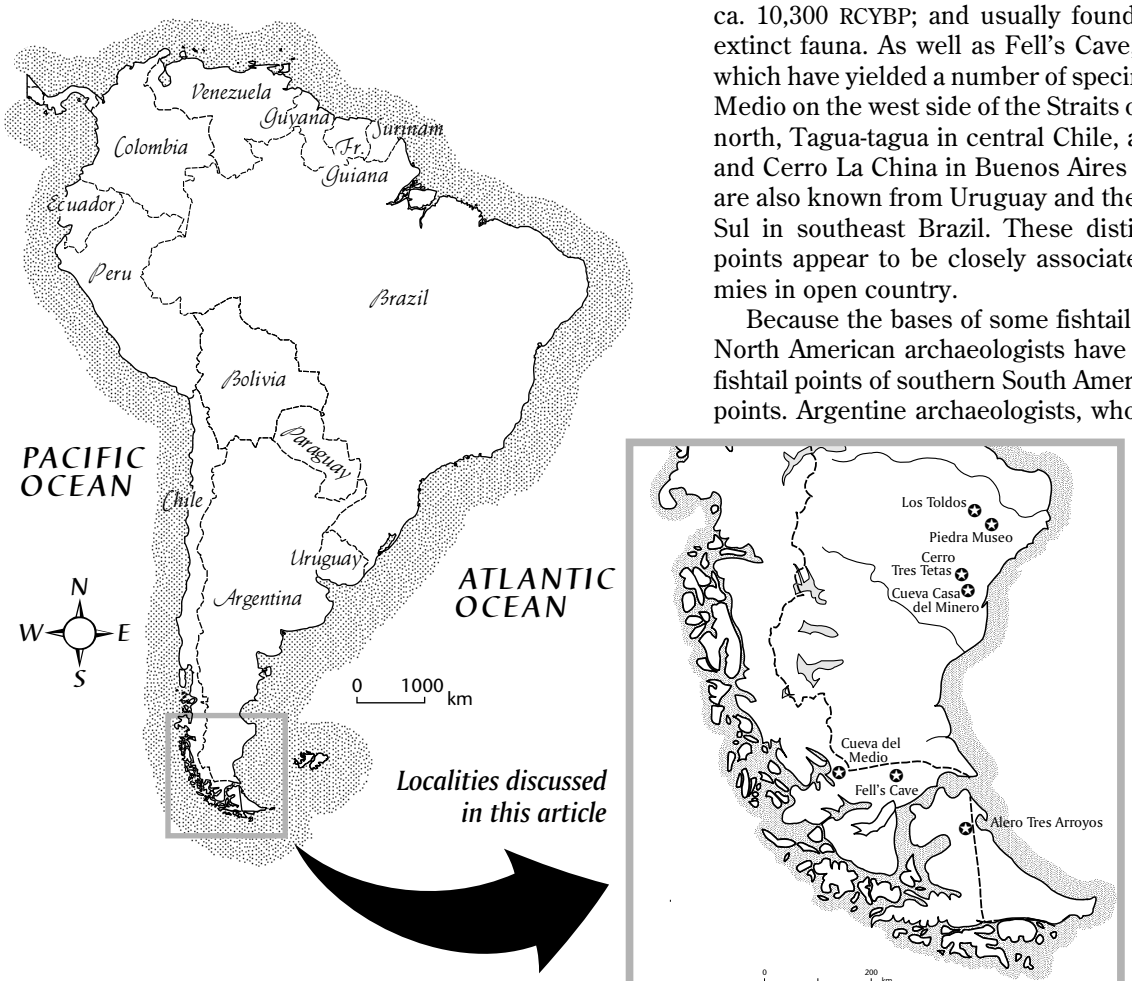
Excavations at the Alero Tres Arroyos were carried out by Mauricio Massone in the early 1980s and again in the late 1990s. Five hearths were uncovered in the earliest occupation level, Va, a silty clay deposit. Burned bones associated with hearth 1 were dated at 11,800 ± 250 RCYBP; three other dates on charcoal from hearths 2, 3, and 4 ranged from 10,600 ± 90 RCYBP to 10,130 ± 210 RCYBP.

Over 800 stone artifacts were recovered in association with the hearths in Level Va in the Alero Tres Arroyos. The assemblage features large flake tools, identified as endscrapers, sidescrapers, and unifacial knives. Two fragments of bifacial projectile points were also recovered. Abundant bone fragments associated with the early occupation, predominantly remains of guanaco but also including bones of the southern South American horse (*Hippidion saldiasi*) and ground sloth (*Mylodon darwinii*), testify to the success of the early hunters in the cool tundra-like country at the southern end of the hemisphere.

Fell's Cave

For archaeologists, the most famous site in southern Patagonia is Fell's Cave, located ca. 50 km north of the Straits of Magellan. The cave, actually a small rockshelter at the base of a basalt conglomerate cliff overlooking a broad glacial outwash channel, was first excavated by Junius Bird in the mid-1930s. Even then, well before radiocarbon dating was developed, it was obvious that the earliest occupation zone, capped by rock fall, was late Pleistocene in age, as many bones of extinct horse and ground sloth as well as guanaco, fox, and bird were directly associated with hearths and artifacts. Subsequently, three radiocarbon samples collected from the early occupation levels in the 1960s rendered dates of 10,720 ± 300 RCYBP and 10,080 ± 180 RCYBP on bone; and 11,000 ± 170 RCYBP on charcoal.

Fell's Cave served as an excellent campsite for aboriginal hunters from the late Pleistocene through the Holocene into protohistoric times. Deep deposits of silt and rubble accumulated, and five major periods of occupation are distinguished. Paleoenvironmental data derived from sediment samples collected by Bird and later analyzed by Vera Markgraf indicate that at the time of Period I, the earliest occupation zone, between ca. 11,000 and 10,000 RCYBP, there was very cool herbaceous grassland in the surrounding area. The numerous



bones of fox within the early occupation zone suggest the use of furs for clothing in this severe late-Pleistocene environment.

The artifacts associated with Period I indicate the emphasis on hunting expectable in open grasslands. The assemblage features large flake scrapers and utilized flakes, choppers, bird-bone awls, and bone tools used to flake stone. Most distinctive are so-called fishtail projectile points, featuring a broad blade, slight shoulders converging to a broad convex-sided stem, and a slight lateral flare at the base.

Fishtail projectile points have proved to be a distinguishing feature of late-Pleistocene archaeological sites in southern South America, associated in excavated sites with radiocarbon dates ranging in age from ca. 11,000 RCYBP to ca. 10,300 RCYBP; and usually found with remains of now-extinct fauna. As well as Fell's Cave, major excavated sites which have yielded a number of specimens include Cueva del Medio on the west side of the Straits of Magellan; and farther north, Tagua-tagua in central Chile, and Cerro El Sombrero and Cerro La China in Buenos Aires province. Surface finds are also known from Uruguay and the state of Rio Grande do Sul in southeast Brazil. These distinctive stone projectile points appear to be closely associated with hunting economies in open country.

Because the bases of some fishtail points are fluted, some North American archaeologists have assumed that the early fishtail points of southern South America are related to Clovis points. Argentine archaeologists, who are most familiar with the type, note significant differences. Fishtail points are smaller on average than Clovis points; and different in form, with pronounced basal stems. Unlike Clovis points, they are normally made on flakes, not biface preforms; and usually shaped by marginal retouch, not complete overall flaking. Only a very few specimens feature basal thinning by fluting, and not by the same technique as Clovis. The comparative dating presents the biggest problem for visualizing a Clovis connection: the earliest radiocarbon-dated fishtail points in South America are those most distant to the south, and these dates indicate that the southernmost fishtail point sites are virtually contemporary with Clovis sites in faraway North America.

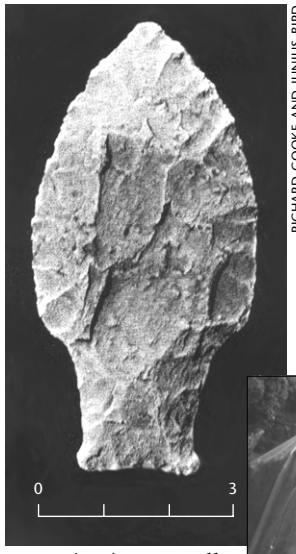
ALAN BRYAN

Fell's Cave was first excavated by Junius Bird in the 1930s. Even before the development of radiocarbon dating, bones of now-extinct animals indicated a late-Pleistocene age for the earliest occupation zone.

The Piedra Museo locality

Northward from the Straits of Magellan region, the terrain of Patagonia rises into a dissected upland. In the steppe country on the central plateau of the southern Argentine provinces of Santa Cruz and Magellanes, four cave or rockshelter sites dating ca. 11,000 RCYBP or older have now been identified. Best known at present is site AEP-1 in the Piedra Museo locality, investigated in the 1990s by Laura Miotti and Mónica Salemme, and their associates.

Piedra Museo is a very large rock outcrop featuring a number of rockshelters along its rim, some with prolific rock art. The major excavated site, Alero El Puesto 1 (AEP-1), is a small rockshelter situated in a very strategic location for hunters: it overlooks a low grass-covered basin that enclosed a small paleolake or lagoon attractive to animals. Successful early hunters brought portions of their game up to the rockshelter to complete the butchering process, and left tools and weapon points with the bones.



RICHARD COOKE AND JUNIUS BIRD

◄ A fishtail projectile point from the Period I zone in Fell's Cave.

Ruth Gruhn examines the stratigraphic section exposed in ▼Fell's Cave, May 1970.


ALAN BRYAN

The animals taken by the earliest hunters at AEP-1 included the existing species of guanaco (*Lama guanicoe*), a smaller species of guanaco which is now extinct (*Lama gracilis*), now-extinct Patagonian horse (*Hippidion saldiasi*), and the ground sloth *Mylodon*. They also hunted two existing species of rhea, one of which is not found today in Patagonia. Local hunters adapted to the changing environmental conditions as the Pleistocene came to a close, the climate became drier, and the steppe vegetation changed in character from scrub steppe to grass steppe. The archaeologists note a trend over time toward specialization in the hunting of the modern guanaco, as the various large mammal species characteristic of Pleistocene times died out. By 10,400 RCYBP, bones of modern guanaco constituted 75 percent of the remains left at the site by hunters, with the remains of Pleistocene horse and small guanaco then constituting only a small minority of the identifiable bone refuse.

The earliest hunters occupied AEP-1 in late-Pleistocene times. There is a radiocarbon date of 12,890 ± 90 RCYBP on charcoal at the base of the lowest stratigraphic zone in AEP-1, Unit 6. Two additional dates from Unit 6 are 11,000 ± 65 RCYBP on charcoal and 10,925 ± 65 RCYBP on a modified horse bone. The lower part of the overlying Unit 4/5 produced a date of 10,400 ± 80 RCYBP. The earliest artifact assemblage, from Unit 6, consists of a small number of uniface knives and sidescrapers made on flakes. A polished bone point was also recovered from Unit 6. The artifact assemblage from Unit 4/5 is larger, still featuring unifacial flake knives and scrapers, but also including two fragments of fishtail projectile points.

Other early southern Patagonian sites

AEP-1 is not the only archaeological site with late-Pleistocene radiocarbon dates in the southern Patagonian province of Santa Cruz. In a canyon not far from Piedra Museo is Los Toldos 3, a cave excavated by Augusto Cardich in the early 1970s. The earliest occupation zone, in Level 11, yielded a distinctive assemblage of large broad unifacially trimmed flake tools in association with bones of *Hippidion* and *Lama gracilis*, and a radiocarbon date of 12,600 ± 600 RCYBP.

In recent years two additional late-Pleistocene rockshelter sites have been investigated in southern Patagonia. At the locality of Cerro Tres Tetas in Santa Cruz province, Cueva 1, CT3, excavated by Rafael Paunero and associates, produced six dates ranging from 11,560 ± 140 RCYBP to 10,853 ± 70 RCYBP on charcoal from hearths in the lower levels of stratigraphic Unit 5, in association with a small assemblage of flake sidescrapers, retouched flakes, unifacial knives, and flaking detritus. Just to the south, in the province of Magellanes, the lowest occupation zone in the site of Cueva Casa del Minero I, also excavated by Paunero and associates, produced dates of 10,990 ± 55 RCYBP and 10,967 ± 65 RCYBP on charcoal from hearths in association with bones of *Lama guanicoe* and the extinct camelids *Hemiauchenia* and *Lama gracilis*, together with flake tools, flaking detritus, and

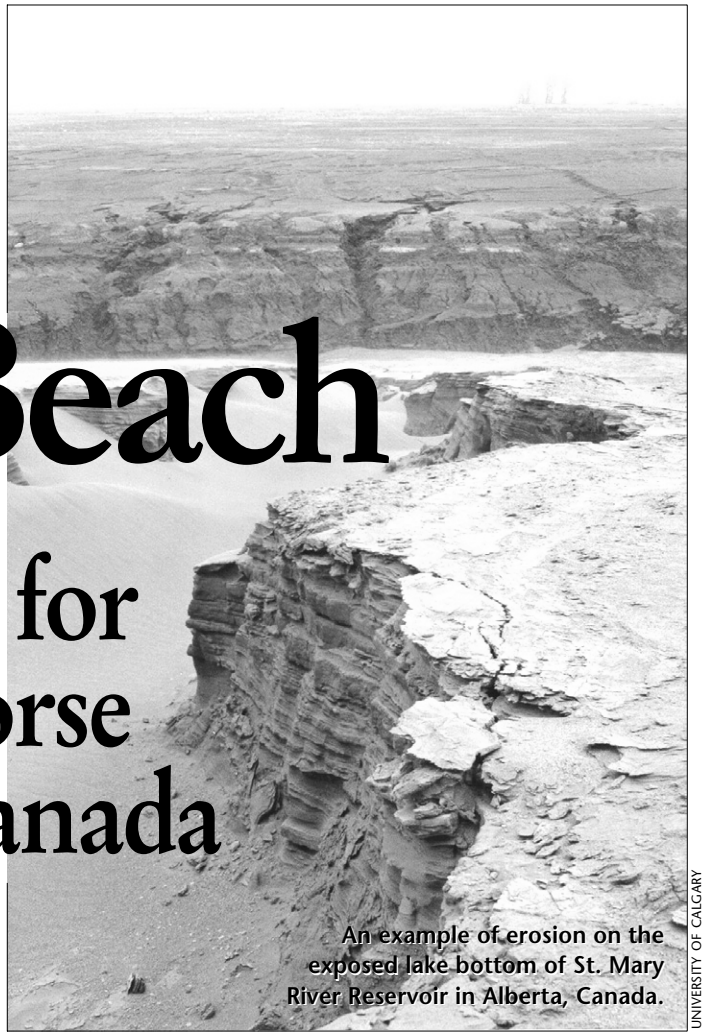

RUTH GRUHN

Rock painting on the ceiling in Los Toldos Cueva 3.

continued on page 19

Wally's Beach

New Evidence for Pleistocene Horse Hunting in Canada

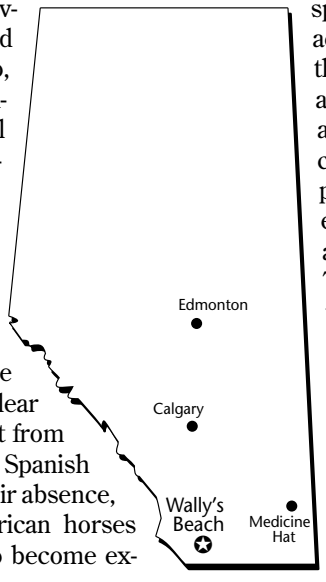


An example of erosion on the exposed lake bottom of St. Mary River Reservoir in Alberta, Canada.

UNIVERSITY OF CALGARY

ASK PALEONTOLOGISTS about the origins of the horse, and they'll tell you the first equines appeared in North America about 55 million years ago, just 10 million years after the dinosaurs died out. Over the epochs, their descendants extended their range over most of the planet, traveling to other continents over land bridges formed during ice ages. Until about 10,000 years ago, horses were among the most common large animals that graced the American landscape—until they suddenly disappeared in the blink of a geologic eye. Recent evidence from an archaeological site called Wally's Beach in Alberta, Canada, provides intriguing clues about what may have happened to New World equine inhabitants.

Horses have a long and distinguished lineage. Only a few species survive today, and none is native to the New World. In fact, despite the arguments of a few renegade historians, it's clear from the fossil evidence that horses were absent from the Americas for thousands of years until the Spanish reintroduced them sometime after A.D. 1500. Their absence, however, seems odd. Why would North American horses survive thousands of years of glaciation, only to become extinct as the Ice Age drew to a close? Most researchers are quick to point out that their evolutionary exit coincided with the appearance of a new predator: the human hunter.



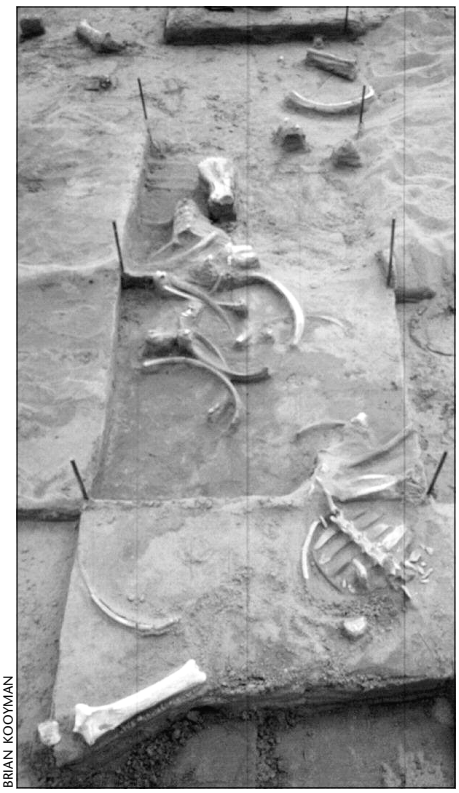
The First Americans left copious evidence, in the form of large spearpoints and similar tools, that they were well acquainted with big-game hunting. In view of the fact that giant sloths and elephantids, and most camelids and bison, became extinct in North America at about the same time as Paleoamericans were becoming proficient at exploiting megafauna, it appears likely that humans contributed to the local extinction of the horse as well. After all, a horse nets a capable hunter a lot of meat in one handy package. The problem with this theory is that for a very long time there was little direct evidence to support it. Sure, it seemed logical, but where were the kill sites? It was rare to find artifacts associated with horse remains, and rarer still to see evidence that humans ate them. There was no smoking gun (or, in this case, bloody spearpoint) to point toward a systematic exploitation of horses as a food source. But with finds like the ones at Wally's Beach, that's no longer the case.

On the Beach

The Wally's Beach site (DgPg-8) is located northeast of the town of Cardston in southwest Alberta, within what's now the St. Mary River Reservoir. As with many such finds, its discovery was serendipitous. Ordinarily Wally's Beach lies under 9 m of water, but occasionally the lake level is lowered so that repairs can be made on the spillway and dam. Given the lack of vegetation on the lake bottom, the fine-grained local sediments, and the unrelenting wind, it's not uncommon during periods of drawdown for erosion to strip away centuries' worth of sediments in just a few hours.

In the late 1990s, a fellow named Shayne Tolman took his children to the lake, where they found a nice sandy area eroded to a depth of about 2 m. While exploring, they found some interesting artifacts, which Tolman reported to researchers at the University of Calgary. Archaeologist Brian Kooyman, geologist Leonard Hills, and geology grad student Paul McNeil joined Tolman in investigating the site, and they soon discovered not just more early artifacts, but various faunal remains and trackways left by camels, mammoths, horses, and other vanished species. The skeletal remains of horses, extinct bison, extinct helmeted musk oxen, and caribou yielded radiocarbon ages ranging from 11,000 to 11,350 RCYBP. The excitement of finding a major Paleoamerican site galvanized Tolman into going back to school to get his master's degree under Dr. Hills—"so it inspired him," Dr. Kooyman concludes with gentle humor.

In the terminal Pleistocene, Wally's Beach lay on an island in the St. Mary's River; a thousand years earlier, it was probably under glacial ice. The earliest cultural remains date firmly to the Clovis period. Hills points out that "the nature of the glacial lake sediments precludes the evidence of any earlier occupations, even if people were there." But Wally's Beach offers something nearly as exciting: firm evidence that early Americans were hunting horses, as many of us have long suspected but couldn't easily prove.



BRIAN KOOYMAN

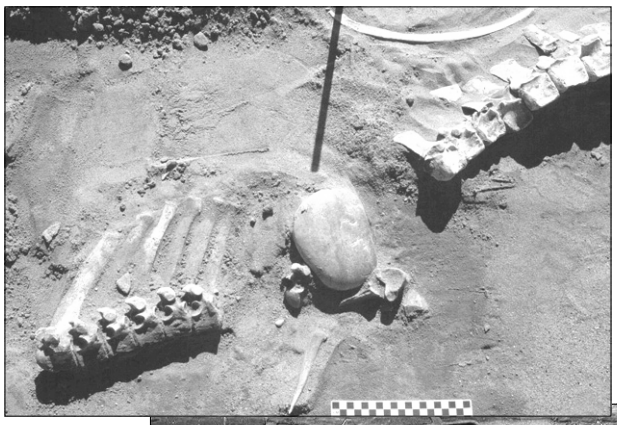
The horse 2 remains.

Lines of evidence

Although evidence of Pleistocene horse predation by human hunters has been discovered at Lubbock Lake and Bonfire Shelter in Texas, as well as at sites in Oklahoma, Wyoming, and elsewhere, Wally's Beach offers the best evidence so far: the well-preserved remains of seven horses, sealed in eolian sediments beneath a calcareous paleosol. These finds appear to represent at least two separate kills. "Three were in a cluster," explains Hill. "They were killed at the same time, and were probably part of a herd. The other kill site consisted of a double and two singles. The two horses in the double were probably killed at the same time, but we can't say all four kills were made at once."

All seven sets of horse remains produced associated lithic tools, including in one case a hammerstone, in another a chopper. Four of the others yielded utilized flakes; one of these lay partially under one of the skeletons, providing excellent evidence that humans butchered the horses. The same set of remains (horse B) included a cut-marked hyoid bone, prima facie evidence that at least this horse was butchered.

Radiocarbon assays yielded ages of about 11,300 RCYBP for the horse remains. In all cases they were well preserved, and perhaps the most interesting aspect of the bones themselves is their orientation. The remains were tightly clustered, and certain elements—particularly limbs and cervical vertebrae—were often either incomplete or missing altogether. This might be explained by the activity of animal scavengers, except for the fact that other parts of the skeletons showed remarkable articulation—as if they had decayed in place. Moreover, elements that would have attracted scavengers, including re-



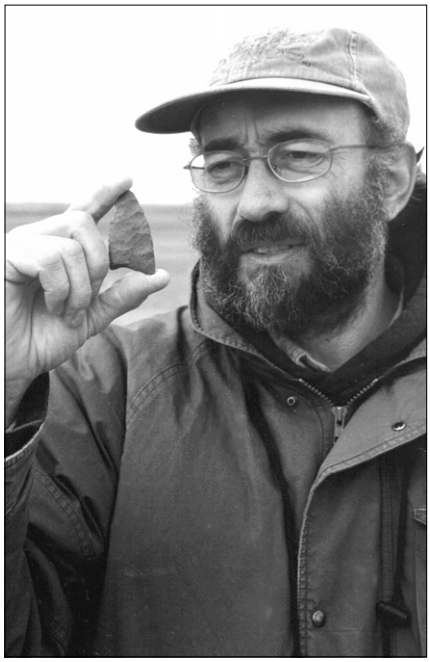
◀The remains of horse B, showing the cobble and utilized flake associated with the find. Note the articulated ribs and vertebrae.

▼ The remains of horse A. Note the articulated ribs and vertebrae in the upper right quadrant.

BOTH: BRIAN KOOYMAN

maining long bones, ribs, and vertebrae, were untouched. No gnawing was noted, and in some cases the costal rib cartilage was intact—which would be amazing indeed if scavengers were involved. Animal scavengers would have scattered the bones much more widely and devoured fragile parts. What the distribution and relative degree of articulation of these skeletal remnants seem to indicate is that specific sections of the carcasses were removed immediately after death, and the remains were almost immediately covered with windblown sediments. "You can get up to 10 cm of sand moved in half a day at the site," Kooyman notes. "Plus, there's good evidence in the sediments that there was very rapid burial."

A third line of evidence for horse hunting at Wally's Beach comes from analysis of proteins recovered from several Clovis points. Six Paleoamerican points (three of the Clovis tradition, one Folsom, and two Goshen), from approximately the same horizon as the horse remains, were tested for protein residues. All three Clovis specimens tested positive, and two yielded horse proteins (the other was bovid, either extinct bison or musk ox). The argument could be made that the points might have been used to butcher rather than to kill the horses, since Clovis points were often used as multipurpose tools. However, points used as implements to dismember carcasses are usually found to be broken and resharpened specimens, but there's no evidence that the Clovis points that tested positive for horse proteins were resharpened. There is, however, solid evidence that the points had been used to kill animals, for both clearly show the kind of impact damage we'd expect of spearpoints.


UNIVERSITY OF CALGARY

Kooyman with a Clovis point recovered from Wally's Beach.

And if all that weren't enough to convince doubters, a hearth found a short distance from one of the horse kills contained burned horse teeth—"obvious utilization," as Hills points out.


UNIVERSITY OF CALGARY

Hills with a mandible from a Wally's Beach horse.

Careful kills or lucky finds?

It's obvious that humans butchered horses for food at Wally's Beach. The question is, Were they actively hunting horses, or did they just scavenge them? Humans, always opportunistic creatures, have been known to take advantage of situations in which animals were mired or recently killed by other creatures in order to add protein to their diets. Could something like this have happened at Wally's Beach?

According to Hills and Kooyman, that's highly unlikely. For one thing, scavenging generally involves one carcass at a time. It's doubtful that three horses of different ages would have died together as a group, as was seen at Wally's Beach. Instead, violent death is the likely cause, and human hunting is the obvious agent. Although other sites show evidence that mired animals were exploited, this probably wasn't the case at Wally's Beach. For one thing, the sediments are very sandy, and despite plentiful evidence of massive animals like mammoths at the site, "only in rare cases do the trackways at the site show deep penetration," according to Hills. Another interesting feature about the animal remains from Wally's Beach is that human hunters apparently took only horse and musk ox, despite the presence of mammoths, camels, and bison. "It's hard to imagine a situation where people were systematically scavenging only the horses," Kooyman reflects.

Shifting paradigms

While Wally's Beach is a remarkable site with diverse intriguing finds, its primary significance (at least from a First Americans viewpoint) is that several lines of inquiry have produced well-documented evidence that humans hunted and butchered horses there during the terminal Pleistocene. Before Wally's Beach the evidence for horse predation was bafflingly rare—especially given the abundant evidence for other big-game hunting. Considering the substantial amount of meat on a horse, it seems that horse kills should be more common than they are. So why are they so unusual?

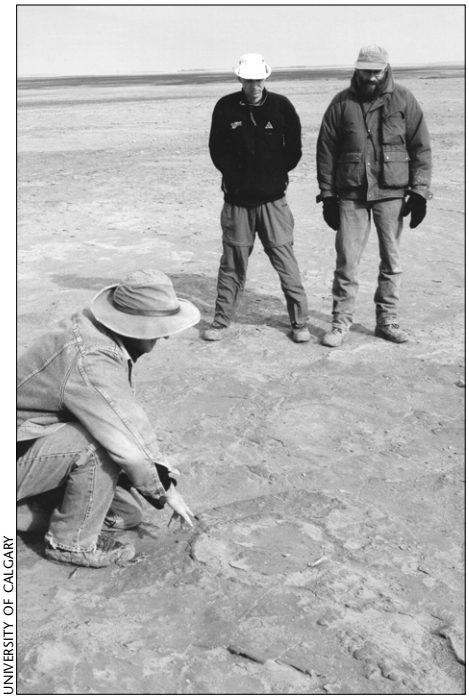
"I don't think it's because there were any social reasons that [Paleoamericans] didn't eat horses," says Kooyman. Hills agrees. "Most horse remains have been recovered from fluvial sediments," he points out. Such finds are rarely in primary context. It may be, he suggests, that most horse kills occurred in areas that were not conducive to preservation. Wally's Beach is a special instance where the remains were well preserved because they were covered with windblown sand within hours.

Wally's Beach makes it clear that humans almost certainly played a role in the extinction of horses in the New World, and Hills, Kooyman, and their colleagues conclude that they disappeared because of a combination of environmental stresses and human predation. Changing

vegetation zones, climatic shifts, and possibly new diseases may have set up the equine population for a death blow, which came in the form of humans who depended on horses for a significant proportion of their protein. Unlike caribou and other herd species with a migratory lifestyle, horses are territorial and stay in one area year-round. "Horses would have provided a game population that was more available throughout the year," Hills notes, and this may have encouraged human hunters to depend on horses more than other game species.

A curious consequence of the dearth of evidence for horse predation has been a reluctance among most researchers to accept that the First Americans ate horse meat, or in fact played a major role in the horse's local extinction. "There's no question that we know that horses were quite abundant, yet we rarely see them in sites; so it's reasonable to come to the conclusion that they weren't utilized," says Kooyman. "But now that there's some evidence, I would hope that people would be willing to change their minds." MT

–Floyd Largent



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Graduate student Paul McNeil points out a mammoth track at Wally's Beach (DhPg-8) to archaeologist Brian Kooyman (*right*) and archaeology student Alan Youell.

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Paleoamericans in Patagonia

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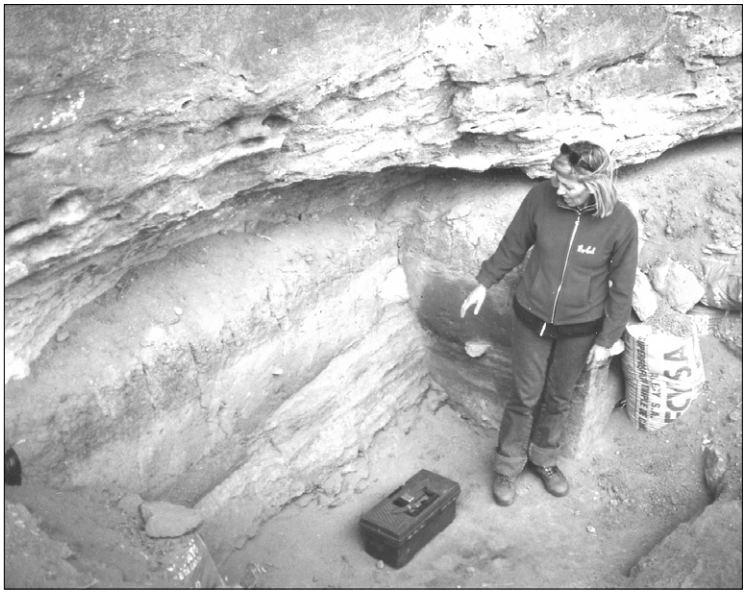
simple bone awls, all sealed under a rock fall. These two recently investigated late-Pleistocene sites of southern Patagonia are summarized in *Where the South Winds Blow.*



RUTH GRUHN

Laura Miotti explains the stratigraphy in the rockshelter AEP-1 to visitors to the Piedra Museo locality, December 2000.

Summing up, and looking ahead

Paleoamericans arrived in the southernmost regions of the hemisphere before the end of the Pleistocene. By focusing on hunting herd animals and birds, the incoming population adapted well to the cool open steppe country; and the early archaeological record is now known from a number of campsites in rockshelters where tools and weapon points were left with the bones of now-extinct species. In peopling southern Patagonia, Paleoamericans of the southern continent demonstrated their ability to survive and thrive in a restrictive environment. In the next article in this series, I shall describe the late-Pleistocene adaptations of Paleoamericans to other challenging environments, in the coastal desert and high mountains of Peru. MT

–Ruth Gruhn

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Costa Rica

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site in Central America, thanks to giant chert boulders in a stream bed next to the site. But the Birlen site also displays chipping debris, not yet systematically collected owing to its greater depth, and may turn out to be another source of local toolstone, especially interesting in light of its lowland location not usually associated with Paleoamerican sites.

Acknowledgments

To my mentor, professor, and dear friend Michael J. Snarskis, a special thanks for the urgent translation of this report, but what I am really most grateful to him for is his unconditional support and encouragement in furthering my professional career in archaeology.

Thanks also to Harry Massey for his hard work in producing the several figures illustrating this article, and to professional photographer Fernando Leitón for his photo of the Birlen fishtail point.

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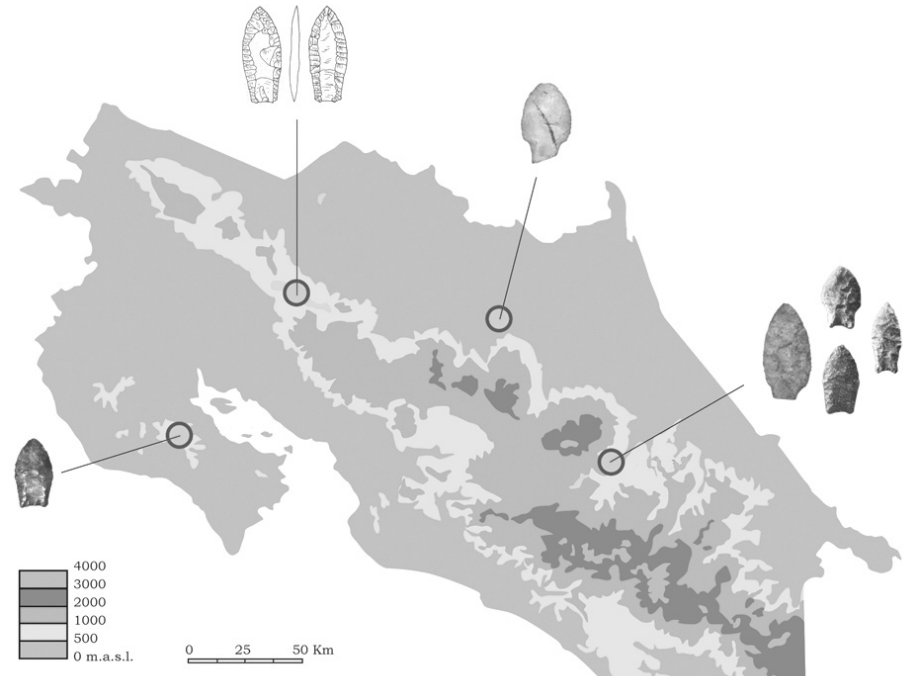

MAGDALENA LEÓN

Distribution of fluted Paleoamerican point finds to date in Costa Rica. Fluted basal fragments and fluted preforms (10–12) not shown.

Clovis point purchased by archaeologist C. V. Hartman in 1903 as part of a larger collection of archaeological artifacts from Guanacaste; length 5.8 cm (Swauger & Mayer-Oates, 1952)

Clovis and fishtail points found during a surface collection of the quarry-workshop site of Guardiria (Turrialba), in the Turrialba Valley, Cartago province; length of Clovis point (a) 6 cm, length of Clovis point (b) 5.9 cm, length of fishtail point 5.3 cm (Snarskis, 1979).

Clovis point found on the shores of Lake Arenal, Guanacaste; length 8 cm (Sheets & McKee, 1994).

Fishtail point found during a surface collection of the quarry-workshop site of Guardiria (Turrialba), in the Turrialba Valley, Cartago province; length 8 cm (Valerio, 2000).

Fishtail point unearthed by pineapple-farming activities in the town of La Virgen de Sarapiquí, Heredia province; length 6.7 cm (León, 2005).

Suggested Readings

Acuña, V. 1993 Florencia-1, un Sitio Paleoindio en la Vertiente Atlántica de Costa Rica. *Vínculos* 9 (1–2):1–14. Museo Nacional de Costa Rica, San José.

Bird, J., and R. Cooke 1977 Los artefactos más antiguos de Panamá. *Revista Nacional de Cultura,* No. 6. Instituto Nacional de Cultura, Panamá (Feb.-Mar.)

Ranere, A., and R. Cooke 1991 Paleoindian Occupation in the Central American Tropics. *XX International Congress of the International Union for Quaternary Research,* Ottawa, August 1987.

Sheets, P. D. 1994 Chipped Stone Artefacts from the Cordillera de Tilarán. In *Archaeology, Volcanism, and Remote Sensing in the Arenal Region de Costa Rica*, Payson Sheets and Brian McKee, eds. University of Texas Press, Austin.

Snarskis, M. J. 1979 Turrialba: A Paleoindian Quarry and Workshop Site in Eastern Costa Rica. *American Antiquity* 44 (1): 125–138.

——— 1984 Central America: The Lower Caribbean. In *The Archaeology of Lower Central America,"* F. W. Lange and D. Stone, eds. School of American Research, University of New Mexico Press: 195–232.

Swauger, J., and W. Mayer-Oakes 1952 A Fluted Point from Costa Rica. *American Antiquity* 17 (3):264–265.

Valerio, W. 2004 Evidencias Paleoindias arcaicas y su distribución espacial en Finca Guardiria, Turrialba. *Cuadernos de Antropología.* No. 14:135–157. Universidad de Costa Rica.

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