MAMMOTH TRUMPET

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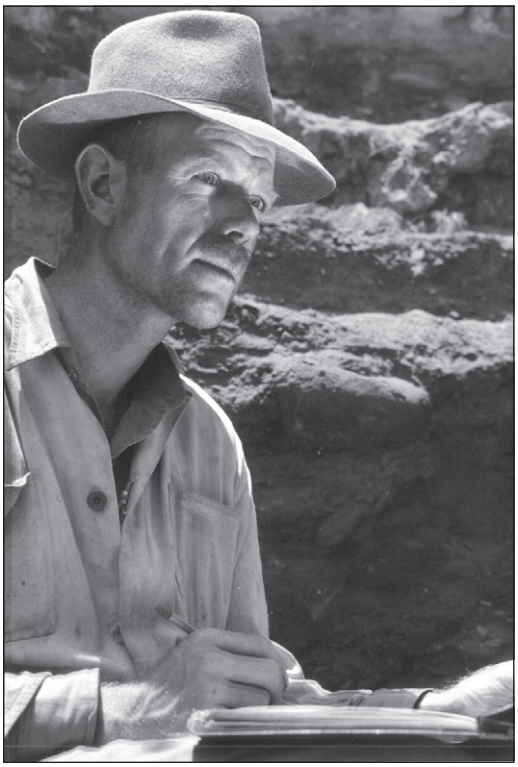

DIVISION OF ANTHROPOLOGY, JUNIUS BIRD ARCHIVES, AMERICAN MUSEUM OF NATURAL HISTORY

The Stuff Myths Are Made Of

Three quarters of a century ago Junius Bird stunned the archaeological community when he found evidence of early Americans—as early as the newly discovered Clovis culture—as far distant from Clovis, New Mexico, as it's possible to travel in the New World: at the tip of South America, in caves atop a lava field a stone's throw from the Straits of Magellan. Despite footdragging and protests of disbelief from his colleagues over the years, Bird's discovery has refused to be silenced, and now plans are being made to form an international interdisciplinary team of scientists to continue Bird's investigations. You can bet, though, that the modern-day expedition will be a dull enterprise compared with Bird's adventure. With his bride, Peggy, and their homely dog, Bird traveled the coast of Chile in a 19-ft sloop that looked too heavy to float and too clumsy to sail. Their transport for crossing the Patagonian plains was a Model T Ford powered variously by gasoline, wind, and oxen. The opening installment of our series on this fascinating giant in American archaeology starts on page 17.

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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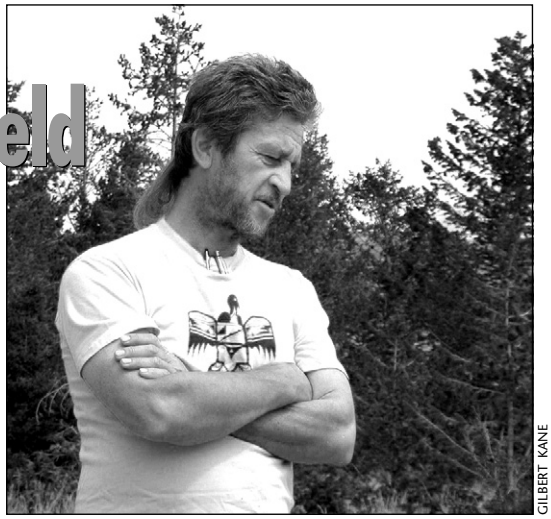
Marcel Kornfeld

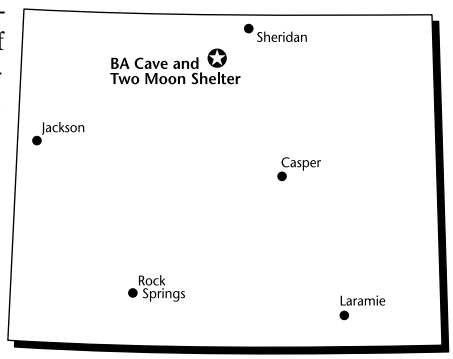
Paleoamerican Subsistence and Folsom in the Rockies



GILBERT KANE

Kornfeld in the field at Black Mountain camp, the location of Two Moon Shelter and BA Cave, 2007.

FOR NEARLY A CENTURY, one of the guiding precepts of Paleoamerican studies has been that the First Americans were primarily big-game hunters. After all, the evidence is right there in front of our noses: big, well-crafted projectile points found in association with—indeed, sometimes imbedded in—the skeletal remains of bison, mastodons, mammoths, and other megafauna. While such sites are somewhat rare, they do offer high-profile examples of Paleoamerican subsistence practices. This being the case, it wasn't long before some influential researchers began to declare that big-game hunting was the defining factor of *any* paleo site. If a site appeared to be the same age as Clovis but lacked Clovis points or mammoth bones, for example, it was generally ignored. In recent years, however, researchers like archaeologist Marcel Kornfeld have begun shaking free of this mindset.



Dr. Kornfeld and like-minded colleagues have turned their attention to the less-dramatic aspects of Paleoindian subsistence, demonstrating in the process that the earliest Americans weren't necessarily big-game hunters after all. On the contrary, they were more likely to be broad-spectrum generalists, who hunted and gathered what they could, when they could. If anything, large-animal pro-

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His exploits, which read like the adventures of a dime-novel daredevil hero, obscure his remarkable achievements in first-rank scientific inquiry.

tein provided a limited percentage of their dietary needs.

One paradigm, shifting

As Director of the George C. Frison Institute of Archaeology and Anthropology at the University of Wyoming, Kornfeld knows whereof he speaks: Having worked at more than his share of Paleoamerican sites, he takes exception to the idea that Clovis, Folsom, and other early cultures focused on big game at all. Rather, he says, "It appears that early Americans ate everything. Voles, turtles, pack rats, birds, lizards, probably insects, roots, fruits, and many other resources—and, yes, large animals as well."

Kornfeld's interest in Paleoamerican subsistence has its roots in his first field season, back in 1974. He spent that summer working at the Jones-Miller site, a Hell Gap bison bonebed in Colorado. As he recalls, "It was a time of great bison bonebed excavations [Olsen-Chubbuck, Horner, Glenrock, etc.], all interpreted as 'bison kills,' but the logic of interpretation wasn't very powerful. Basically, a large pile of bones equaled a kill, or maybe a processing location. We've since learned that bonebeds may represent middens, or the archaeological by-products of many different types of kills." Some bonebeds may even mark non-archaeological mass deaths; this is one of the competing interpretations for the famous Hudson-Meng site in Nebraska (**MT 22-3**, "Is It or Isn't It? The Quiet Controversy Over the Hudson-Meng Site").

"In that context," continues Kornfeld, "I wondered, 'What else were these prehistoric people doing?' The plant and small-animal remains just don't survive in the archaeological record . . . or they do so only in some cases." Groundbreaking ethnographic research, including that presented at the influential Man the Hunter symposium at the University of Chicago in 1966, had begun to make it clear that historic and modern foraging societies generally depended on a diverse range of food sources. Why not prehistoric ones? "Only in restricted, extreme environments such as the Arctic was dependence skewed towards a large-animal, meat diet," Kornfeld points out, "and even then plant products were in high demand, often extracted from sea mammal and caribou stomachs where they were concentrated. So the question was, and still is: If Paleoindian diets included a variety of resources and all we find is bonebeds, how do we interpret this very biased archaeological record?"

Set in stone

The big-game mindset seems to have its roots in the classic quandary that archaeologists have faced since Day 1: differential preservation. Organic material can only last so long in the ground, while stone lingers forever. Large bones do decay, but they tend to be preserved much longer than small bones, fish scales, wood, seeds, and other plant matter. So when we see stone tools in association with large mammal bones and little or nothing else, it's easy to assume that it's because the people who left those tools behind based their subsis-

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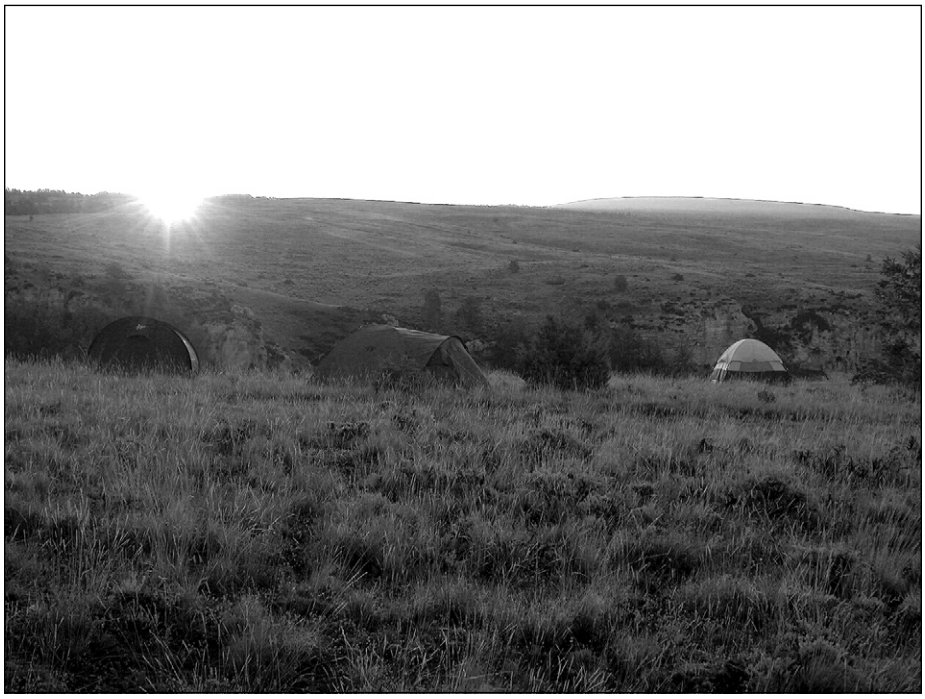
–Michael R. Waters, Director



MARCEL KORNFELD

Sunrise over the 2007 Black Mountain Archaeological District field camp, with White Creek Canyon in the background.

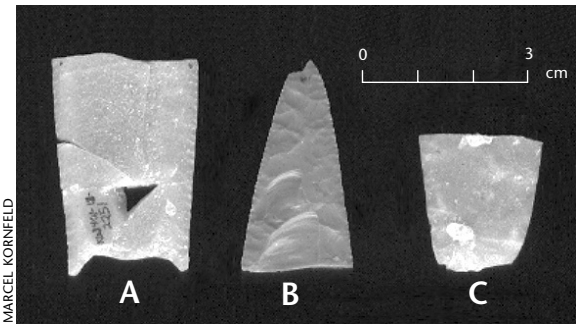
tence economy entirely on big, meat-rich animals. But according to Kornfeld, that's a false assumption. "[Due to] a variety of social and scientific circumstances, the milieu within which we all do research created a myth that likely never existed," he asserts. "The systematic under-investigation, non-publication, or under-publication of thousands of Paleoindian sites that are *not* bone middens has undoubtedly affected our understanding of Paleoindian lifeways." Even some well-known early sites, such as Hell Gap, Allen, and Lindenmeier, have only recently been reexamined and the findings published—often for the very first time, sometimes decades after the sites were excavated, simply because they didn't initially fit the old paleo bone-midden paradigm. As a result, Kornfeld says, "All are beginning to give us an alternative perspective on Paleoindian subsistence."

Part of this transformation, Kornfeld believes, is also due to the development of taphonomic studies in the 1970s and 1980s. Taphonomy is the study of the ways that once-living remains are transformed by natural processes after deposition; these natural processes can include decay, trampling, bioturbation, erosion, ice-heaving, geological events, and more. Kornfeld begins with Russian paleontologist Ivan Efremov's definition of taphonomy as the study of death assemblages, and modifies it to "anything that falls out of a living system—that being a biological organism, like a mammoth, or a cultural organism, like a forager group's material culture. This is precisely why all archaeology must begin as a study of death assemblages; a bonebed doesn't become a midden until it's demonstrated to be such." It only becomes evidence of past events and cultural behavior when cultural dynamics are breathed into it, Kornfeld insists, "and this requires *analysis*, not a seat-of-the-pants field interpretation."

Kornfeld is skeptical of the much-publicized recent conclusions by Waters and Stafford that the Clovis culture was much shorter lived and occurred somewhat later than previously thought (**MT 22-3,** "Clovis Dethroned: A New Perspective on the First Americans"). Why? "First, what they dated directly was generally bone, and generally *mammoth* bone, so you can perhaps see that this alone might raise my ire, given my issues with big-game specialization," notes Kornfeld. "To be fair, they don't tackle the issue of Clovis subsistence in their article. The assumption they're making, with a few rare exceptions when an osseous artifact was dated, is that the mammoths are behaviorally associated with humanly produced artifacts." Kornfeld isn't convinced that a direct link exists between human artifacts and mammoth remains at all the dated sites. "Perhaps Waters and Stafford are dating mammoth die-offs at the end of the Pleistocene," he suggests, "not the Clovis technocomplex that's present at those same sites."

Mountains of evidence

In addition to his reputation as a scholar of Paleoamerican subsistence, Kornfeld is known for his work on early sites in the Rocky Mountains. One current focus of his research is the intriguing Two Moon Shelter (48BH1827), a rockshelter located in the Bighorn Mountains of north-central Wyoming. Two Moon is a rare find indeed: Not only has it produced evidence of multiple occupations dating back to Folsom times—making it one of just a handful of known rockshelter sites with intact fluted-point deposits—its cultural sediments are unusually well preserved. This allows researchers to address site formation and paleoenvironmental topics that usually aren't possible in a montane rockshelter environment.



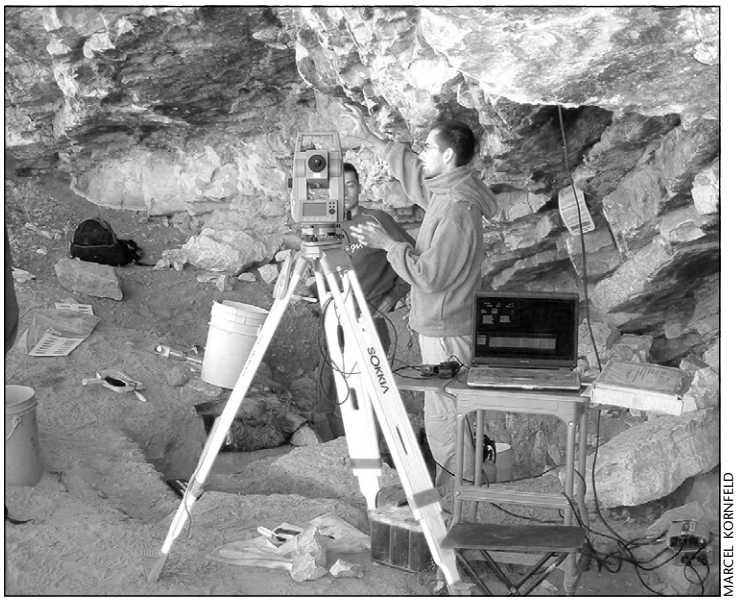
MARCEL KORNFELD

Fragmentary Paleoamerican projectile points from Two Moon Rockshelter: A–B, Folsom; C, Foothill/Mountain.

A rockshelter is basically a rocky overhang that lacks an extensive interior cave system. In the case of Two Moon Shelter, the protected interior covers just 45 square meters (m^2), with another 30 m^2 of flat area located immediately outside the dripline. Fieldwork there began in 1993, and has been carried

out carefully and deliberately over the 15 years since. The long-term nature of the project was the goal from the beginning. "When we began testing," Kornfeld explains, "we felt that the usual procedure of putting in a quick test unit would ultimately be counterproductive for a small shelter. That is, it would likely produce holes, spaces without data, because it was shoveled out in 10-cm levels instead of point-provenienced. We've seen this in nearly all archaeological site reports—archaeologists are impatient! So we opted for something closer to a standard full-fledged excavation right from the start."

Two Moon Shelter, part of the Black Mountain Archaeological District, is located on the foothills of the Bighorns at an elevation of about 2,040 m above sea level. The site may be small, but the amount of data collected so far has been impressive. Seven cultural strata have been defined, extending to 60 cm below the surface; the contact boundaries of these strata are described as "exceptionally clear" in a 2005 *Plains Anthropologist* article. In addition to a few pieces of ground stone, ocher, and charcoal, more than 33,000 chipped-stone artifacts have been recovered from the cultural strata—almost all debitage and angular fragments made from local Phosphoria chert. Initial analyses revealed fewer than 60 tools, mostly informal utilized and retouched flakes; however, there was a sprinkling of formal tools, including a few late-Archaic and Prior Stemmed projectile points—and two Folsom point fragments. This general scarcity of tools seemed to confirm the original assessment of the site as a lithic-reduction station, but later discoveries painted a more domestic picture. "Our most recent analysis identified approximately 350 chipped-stone tools in the assemblage, indicating a wide variety of sewing, cutting, and scraping tasks," Kornfeld says. Add the dozen hearths discovered since 2005, and it's clear that Two Moon Shelter was more than just a lithic-reduction site.



MARCEL KORNFELD

Excavations at Two Moon Shelter, 2007. At work are Nicholas Naudinot (*foreground*) and Yoann Cantreau, both of the Université de Rennes, France.

Radiocarbon assays have yielded dates of 3860 ± 40, 8570 ± 60, and 10,060 ± 60 RCYBP, confirming the known ages for the formalized tools recovered. The dating also reveals that some 4,500 years worth of deposits are missing entirely, probably due to erosion; fortunately, this doesn't affect the integrity of the Paleoindian occupation one bit. In Kornfeld's opinion, that's the most important result of the work at Two Moon Shelter. Given the excellent contexts and the site's unusually clear stratigraphy, Two Moon's Folsom assemblage represents "one of the most intact and pristine fluted-point occupations ever recovered from a rockshelter."

Proceed with caution

Arguably, Marcel's Kornfeld's approach to archaeology can be boiled down to this: As explicators and conservators of the past, we have to learn to pay better attention to the details, if only because we're focused too tightly on what currently *is,* not what logically *should be*. That is, when we're in a hurry (or when we've already made up our minds about things), we only find the durable items that survive the ravages of time, not the traces of fragile things that do not; as a result, some of us conclude that those fragile things were never there in the first place. Admittedly, as both our technology and archaeological theory advance, this is becoming less of a problem; but it still leaves us facing certain paradigms that we may eventually need to abandon.

Kornfeld hasn't been shy about arguing that our concept of Paleoamericans as big-game hunters is one such paradigm. The evidence is starting to tip in his favor, now that paleo-era sites lacking bone middens are being either reexamined or more carefully excavated in the first place. It seems that the original Paleoindian subsistence paradigm was formulated without taking all the data into account. Later taphonomic experimentation and observation have confirmed what some researchers had already suspected, based on existing ethnological evidence and, frankly, sheer logic.

Another example of Kornfeld's focus on detail lies in the simple fact that he's taken 15 years (thus far) to excavate Two Moon Shelter, reaping a rich harvest of data in the process—including items that more-hurried archaeologists might have missed. The lesson in all this? "Theoretically reasoned dirt archaeology is probably the best way of learning about the past in general," Kornfeld reasons. "I would hope that people are never, never, never afraid to try new and (hopefully) innovative paradigms, theories, and methods. They may stick or they may fall, but we'll never know unless we try."

–Floyd Largent

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Mockingbird Gap

A Mid-century Discovery Gets Another Spin

VANCE HOLLIDAY

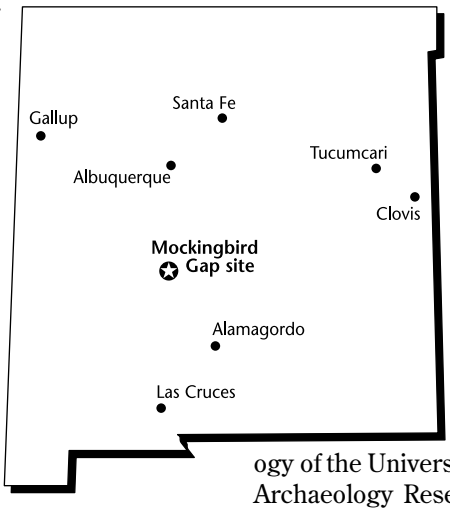
Looking across Chupadera Wash toward the coring operation. The Mockingbird Gap site is on the crest and far side of the sage-covered ridge beyond the truck.

IT WAS THE LATE 'FIFTIES, the roads were ruled by cars with giant fins and flashy chrome, the airwaves were dominated by Buddy Holly, Elvis Presley; and Jerry Lee Lewis; Sputnik I and II were launched, and we all liked Ike and loved Lucy. During this time there was a hunt being conducted, a one-man hunt. That man was the late Robert (Bob) Weber (**MT 23-3,** "Remembering Robert H. Weber"), and his quarry was new Paleoamerican sites in the basins and plains of New Mexico. He found many Clovis, Folsom, and later-Paleoamerican sites as well as Archaic sites, but perhaps the most important was Mockingbird Gap, a Clovis site located in the desert grasslands at the north end of the Jornada del Muerto and less than 25 miles from Socorro, New Mexico. How fitting that during the Atomic Age one of the most important Clovis sites in the region was found on the doorstep of the site where the first atomic bomb was tested in 1945!

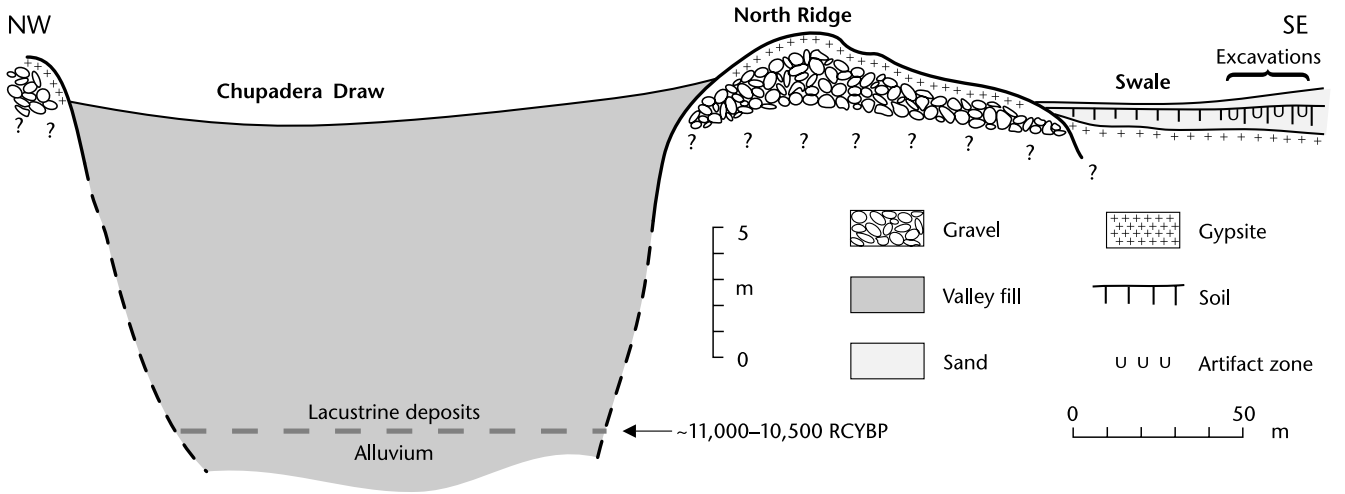
Dr. Weber almost immediately began mapping and surface-collecting at the site. In 1966–68 East New Mexico University (ENMU) had their summer field work there under the direction of Dr. George Agogino. Unfortunately, no extensive papers were published on that work and the site remained, except for Weber's diligent topographical mapping, largely ignored for the next 35 or so years.

The torch is passed

In 2004 Drs. Bruce Huckell and Vance Holliday, accompanied by Weber, visited the site for the first time and were blown away by the sheer size of the site. Scattered over about 800 m on a north/south axis, on a low ridge bordering Chupadera Wash, are at least a dozen spacially discrete clusters of Clovis artifacts. Huckell explains most of the loci "were detected primarily from surface exposures and appear to represent either discrete campsites of small social groups of Clovis that came together for short periods of time or perhaps repeated occupations of the site by a single group, probably on a seasonal basis, camping at slightly different places each time." The attraction of this site is elusive. Holliday describes the area as "a big desert basin in central New Mexico called the Jornada del Muerto, or Journey of the Dead Man . . . fairly typical of basins in the area. The site is along a drainage way that flowed to the very floor of the basin where there was an old lake in the late Pleistocene and probably even when Paleoindians were around, but it is about five miles away from the site." Definitely not Club Med, but the team, through archaeological and stratigraphical analysis of the area, is revealing its prehistoric appeal.



In 2005 Drs. Huckell and Holliday, in cooperation with Weber and with funding from the Maxwell Museum of Anthropology of the University of New Mexico (UNM), and the Argonaut Archaeology Research Fund (University of Arizona Founda-

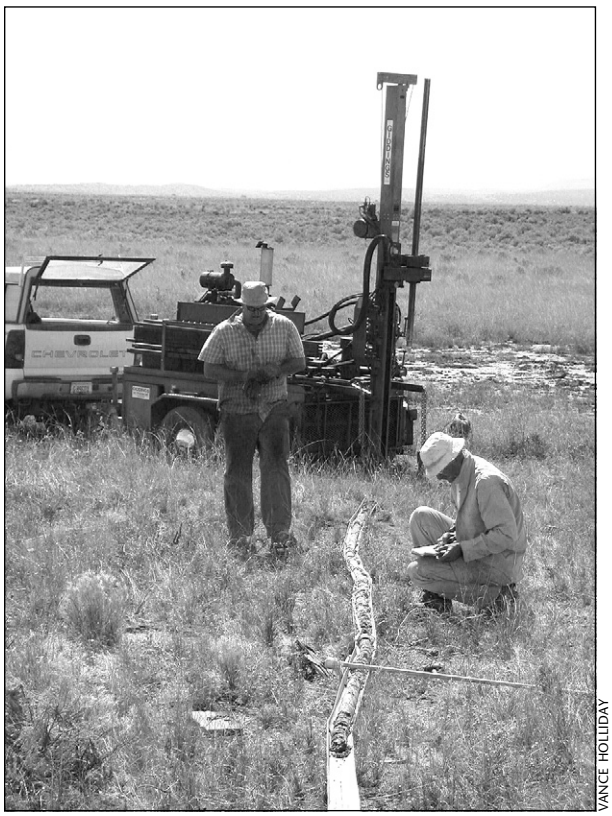


A stratigraphic profile of the Mockingbird Gap Clovis site.

tion) established by Joe and Ruth Cramer (**MT 18-1,** "A Campaign to Find the First Americans"), began conducting tests in the area bordering Chupadera Wash on the east side. A swale divides the site into northern and southern portions. Most of the southern part of the site, where the 1966–1968 ENMU summer field schools concentrated their efforts, was found to have been exposed and then reburied sometime during the Holocene. This combination of erosional exposure and reburial, along with disturbances such as burrowing rodents, acted to disperse the Clovis artifacts vertically through about 30-40 cm of sediment. At risk is the stratigraphy of the site, and to an archaeologist stratigraphy is precious.

At the Mockingbird Gap site the rolling topography is covered by eolian sand. Over time the site has become deflated: As the sand has blown away, artifacts have settled slowly onto the surface of resistant layers of gypsum and calcium carbonate. This is why it was so exciting to find, during testing in 2006, some materials at the margins of the site just beginning to be exposed. According to Huckell, "the north end of the swale, at the base of the north ridge had not had that same history of erosional exposure seen up on the ridges."

The UNM 2007 summer field school, with the support of the Department of Anthropology at UNM, excavated an area (Locus 1214) in the northern edge along a low ridge next to Chupadera Wash on the east side. With Huckell as the archaeology point man and Holliday as the stratigraphic expert, over 60 flaked-stone artifacts, almost a thousand pieces of debitage, 28 small pieces of tooth enamel (presumably from bison, although it's possible the teeth are from camels or horses), and 13 large-mammal bone splinters were excavated and examined. Holliday conducted stratigraphic studies at the site, utilizing a Giddings soil-coring rig and producing 4 cores from the wash reaching almost 11 m deep. Analysis of the cores suggests the wash was a stream or marsh at the time it was visited by Clovis campers. Consequently the team concluded that the site, attractive to both humans and animals because of abundant water and plant material, was used as a food-processing area and short-term camp. (No evidence of Clovis hearths has been found at the site; burnt waste flakes were found, but these could have resulted from a post-occupational grass or brush fire.) Sourcing studies of the varied chert and obsidian found at Mockingbird Gap indicate Clovis people traveled from a northwesterly area as far as 200 miles away.



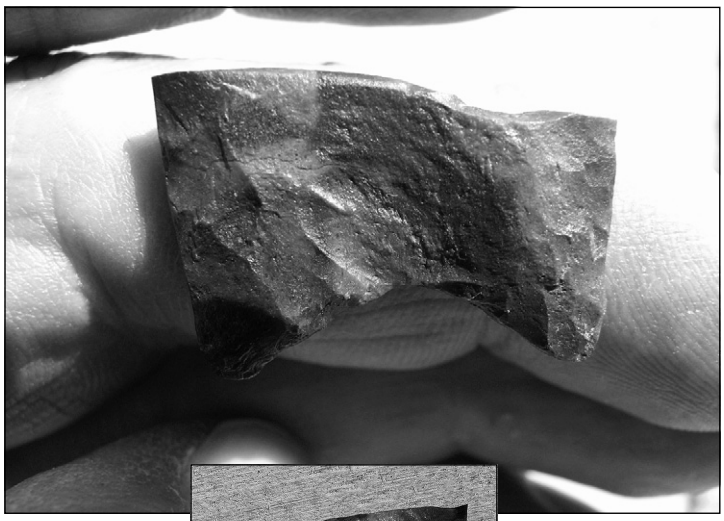
VANCE HOLLIDAY

Holliday taking notes on a core. Standing is Matt E. Hill, formerly one of his graduate students and now on the Anthropology faculty of the University of Iowa. Chupadera Wash lies just this side of the sage-covered ridge in the background, where the site proper is located.

Clovis technological lithic organization

The technological organization at Mockingbird Gap has much to tell. Consider the curious lack of blades in the assemblage. Both Weber's collection and the excavations in 2007 show negligible evidence of blade manufacture. This is unusual, since other nearby Clovis sites, such as Blackwater Draw, supported a thriving

blade industry. Is it possible blades, which aren't seen in Folsom, had already been dropped from the toolkit in what may have been a late-Clovis site? Without any radiocarbon dates from the specific area showing Clovis occupation, it's difficult to say if the site was occupied late in the Clovis period or not. Unfortunately, obsidian hydration dating (OHD), an analytical method that dates the age of chipped-obsidian tools (**MT 23-3,** "Through a Glass Darkly: Dating Obsidian Points"), can't be used at Mockingbird Gap. A valid OHD date estimate, Huckell explains, requires assumptions about unknown variables that affect the amount of moisture absorbed by the artifact, such as artifact exposure, temperature, and soil moisture over time. These factors have varied so widely over the past 11,000 years that any dates derived from OHD measurements would be questionable.



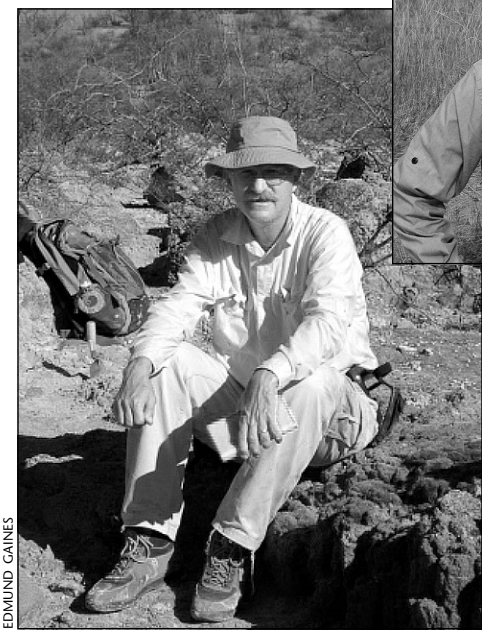
BOTH: BRUCE HUCKELL

Obverse and reverse faces of a Clovis point base found in a buried context excavated by the UNM field school at the Mockingbird Gap site, summer 2007.

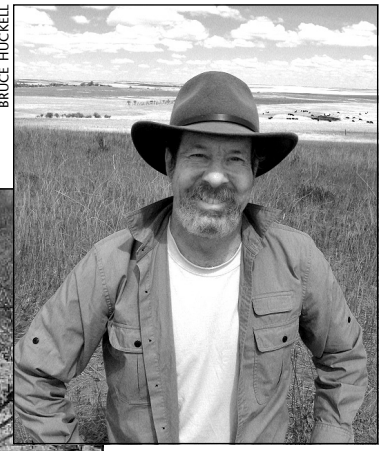
Few blades, but lots of scrapers and points

Blades may be in short supply at Mockingbird Gap, but endscrapers are plentiful. Those in Weber's surface collection number over 100. They are morphologically similar to endscrapers found at Plains sites and were presumably used for working hides.

Ample evidence at Mockingbird Gap for flaking bifaces is consistent with Clovis technological organization at sites found in Blackwater Draw and the San Pedro Valley. Huckell notes that the Mockingbird Gap lithic assemblage reflects the ongoing task of the Paleoamerican hunter to replace and rework stone points. "Projectile points are the things that are going to get damaged and broken from hunting," says Huckell, "and Bob Weber's collection of points from the entirety of the Mockingbird Gap site is dominated by basal fragments, the portion of the point that would remain in the spear haft after the blade portion is broken off." Also found at the site were small, sharp flake tools likely used for butchering and possibly for woodworking. The use, however, for the many gravers found at the site has yet to be determined. "It is going to take a fair bit of more work," Huckell says, "before the nature of what is going on with technological organization as represented at Mockingbird Gap becomes clear."



EDMUND GAINES



BRUCE HUCKELL

Principal investigators of the Mockingbird Gap site: Huckell (*above*) in the field in North Dakota, summer 2008; Holliday (*left*) at El Fin del Mundo Clovis site in Sonora, Mexico, November 2007.

Toolstone sourcing clarifies Clovis movements and land use

Work in the 2007 season included X-ray fluorescence sourcing of obsidian Clovis points in Bob Weber's collection as well as obsidian from recent excavations. A distinctive chert, whose color varies from light green to dark green to black, dominates the collection at a whopping 49.2 percent of specimens. Based on the overwhelming volume of artifacts made from this chert, the toolstone source, as yet unknown, is presumably nearby. Red rhyolite (a.k.a. Socorro Jasper), which outcrops 55 km west of Mockingbird Gap in the Chupadera Mountains, is the material of 15.9 percent of specimens. Another 4.1 percent of specimens are made of pinkish orange Chuska chert, quarried in the Chuska Mountains about 400 km northwest near the Arizona/New Mexico border. Artifacts made of Correo China chert, named for its lustrous opaque appearance and white to yellowish white hue, make up 2.7 percent of specimens; Correo China chert comes from the eastern Zuni mountains near Mount Taylor. Two flakes of Mt. Taylor obsidian, whose source is almost 200 km to the northwest, and a single flake of Cerro Toledo obsidian, probably from the Jemez Mountains 250 km to the north, are further testimony to the great distances Clovis people traveled.

continued on page 16

New Study of Animal Bones from Sandia Cave Sheds Light on 70-year-old Controversy

SANDIA CAVE, a National Historic Landmark in central New Mexico, once was hailed as the earliest archaeological site in America. Traces of human occupation in the deepest levels of the cave appeared to be ironclad evidence of a pre-Folsom culture with its roots in the Solutrean culture of the Old World Paleolithic. In the decades since its discovery, however, "Sandia Man" has fallen under a shadow of increasing doubt and suspicion. Recently, researchers from Arizona State University, Harvard University's Peabody Museum, and the New Mexico Museum of Natural History teamed up to take a new look at the mammal bones from the site in an attempt to sort out the controversy.

Is Sandia Cave a key to unlocking the mysteries of the first Americans? Or are the data hopelessly compromised by incompetence or even fraud?

The controversy

Sandia Cave is a tunnel-like solution cavity in the limestone face of Las Huertas Canyon on the east side of the Sandia Mountains northeast of Albuquerque. Former University of New Mexico archaeologist Frank Hibben, who directed the early excavations at the site, wrote in 1946 that the "question of the day is, 'Who were the earliest Americans?' " Based on his work in Sandia Cave, he claimed to have found the answer.

Hibben had uncovered a layer containing classic Folsom points along with the "shattered bones of the horse, the bison, and the camel!" At the time, Folsom represented the earliest known culture in America, so it was gratifying to find such early traces in the cave, but Hibben continued to dig in pursuit of a bigger prize.

Below the Folsom layer, Hibben and his team encountered a layer of yellow ochre, which he claimed was "unbroken, effectively sealing off whatever lay beneath it."

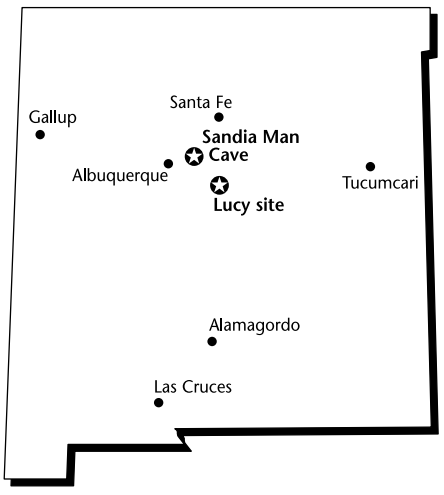
Once they were through the yellow ochre, Hibben hit the archaeological jackpot! He found stone tools, the bones of Ice Age animals, and prepared fire pits—from an unknown culture that appeared to be demonstrably older than Folsom.

Many of the stone tools were similar to those found in the Folsom layer, but instead of the classic Folsom projectile points, Hibben found a distinctly different style of spear point, which he named "Sandia points." Sandia points are single-shouldered, leaf-shaped flint spear points somewhat like Upper Paleolithic Solutrean points from Spain and France [**MT 17-1,** "Immigrants from the *Other* Side?"]. Hibben claimed that radiocarbon dates indicated that the Sandia people lived in Sandia Cave between 17,000 and 20,000 years ago, making them "almost certainly the first Americans."

Almost as soon as the claim was announced, however, Hibben's discovery became mired in controversy. The integrity of the stratigraphy was questioned, the radiocarbon dates were rejected as problematic, and some even have suggested that Sandia points are forgeries. In a study of the controversy, Eastern New Mexico University archaeologists Dominique Stevens and George Agogino determined that "all conclusive statements" concerning the putative Sandia culture are "based on insufficient and/or uncertain data." As a result, the site largely has been dismissed and forgotten.

Nevertheless, C. Vance Haynes, Jr., University of Tucson geoarchaeologist, and Agogino, in their study of the geochronology of Sandia Cave, acknowledged that it is "one of the most important sites to American archaeology and to Pleistocene geology."

A long view down Las Huertas Canyon. The inset shows the spiral staircase constructed by the U.S. Forest Service that leads to Sandia Cave.



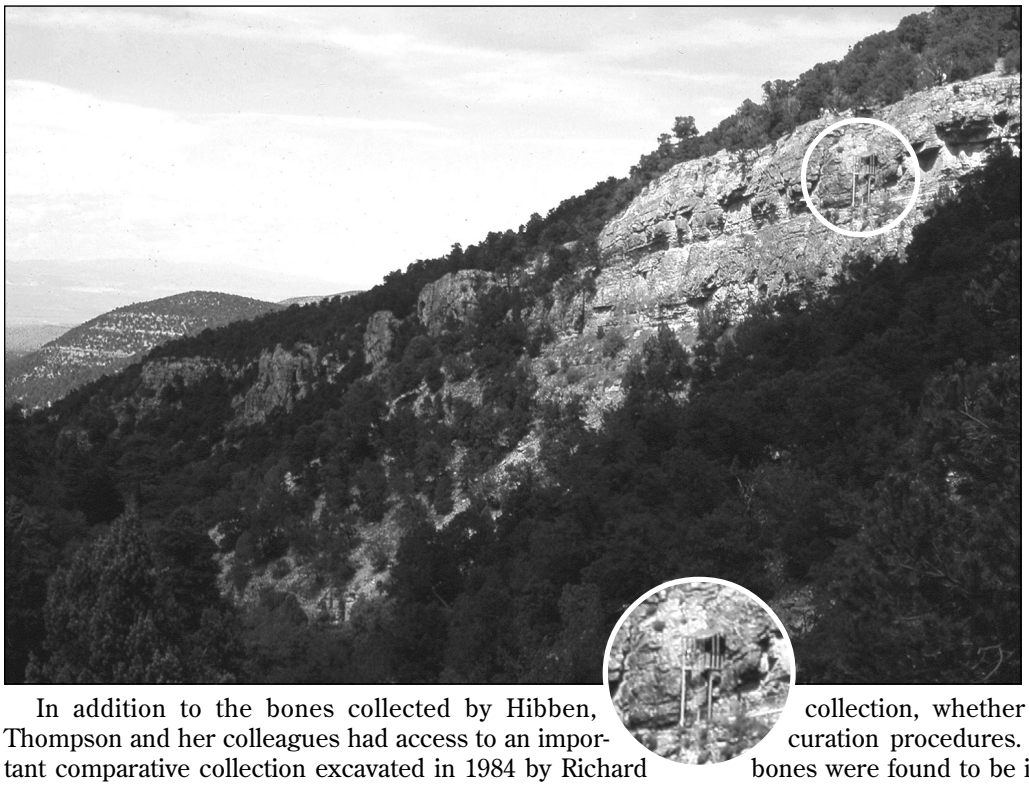
A new look at an old site

In the April 2008 issue of *American Antiquity*, Jessica C. Thompson, an archaeologist with the School of Human Evolution and Social Change at Arizona State University, Nawa Sugiyama, from Harvard University's Department of Anthropology, and Gary S. Morgan, of the New Mexico Museum of Natural History, reexamined the Sandia Cave faunal assemblage with three sets of questions in mind.

First, what kinds of animals have been identified in the bones from Sandia Cave? In particular, they sought to "provide comprehensive taxonomic and taphonomic data that go beyond the simple taxonomic list" in Hibben's original publications.

Second, what processes produced these accumulations of bone? Did humans use the site as a base camp, or was it instead a carnivore den?

Finally, is there any evidence in the faunal collection that can contribute to resolving the controversies swirling around the site?



BRUCE HUCKELL

In addition to the bones collected by Hibben, Thompson and her colleagues had access to an important comparative collection excavated in 1984 by Richard Smartt and David Hafner of the New Mexico Museum of Natural History. This material, collected with modern recovery techniques, adds to Hibben's collection, and, more importantly, it is an independent record untainted by concerns raised over the original investigation.

Sandia Cave bestiary

The original faunal collection reported by Hibben included 16 species of mammals, 7 of which are extinct: mammoth, mastodon, two varieties of horse, camel (giant llama), *Bison antiquus*, and ground sloth. The total number of species was raised to 41 with the addition of species added by Smartt and Hafner's excavations, which include the large-headed llama, flat-headed peccary, dwarf pronghorn, and Stocks pronghorn. In addition, Smartt and Hafner recovered six species of mammals that are "extralimital" (species that, although not extinct, are no longer found in the region around Sandia Cave). These extirpated species include the snowshoe hare, mountain cottontail, yellow-bellied marmot, northern pocket gopher, mountain vole, and bushy-tailed woodrat.

This large and diverse assemblage of extinct mammals and species with ranges now limited to colder regions of North America makes Sandia Cave an unquestionably important paleontological locality. But, of course, much of the significance for American archaeology was the claimed association of these Ice Age critters with the stone tools of ancient humans.

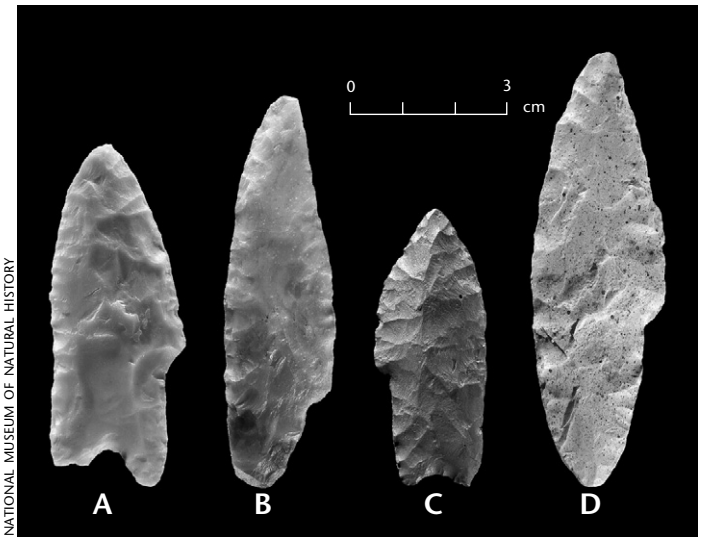
For this reason, a major objective of Thompson and her co-researchers' reanalysis of the Sandia Cave mammals was to "establish if humans were involved with accumulating and modifying" the bones.

Does the collection include bones from other sites?

Thompson and her colleagues examined the mammal bones that Hibben claimed had been excavated from Sandia Cave, checking for evidence that some of the bones might be out of place. There had been accusations that bones from other sites had been added to the Sandia collection, whether deliberately or through sloppy curation procedures. Fortunately, the majority of the bones were found to be in the "original, unwashed state." This was important because, although fewer than half the bones in the collection still had information indicating the level in which they had been found, sediment adhering to a questionable bone could provide clues about its provenience.

All the bones were covered with the "fine, golden-yellow ochre" that permeated the lower layers of the site. This ochre, not simply covering the bone surfaces, also "filled small cracks and irregularities," indicating the ochre hadn't been brushed casually onto the bones to make them appear to have been come from Sandia Cave.

Thompson and her team also compared the bones excavated by Hibben's crews with those excavated in 1984 by Smartt and Hafner to determine whether any seemed odd or out of place. They found that "none of the specimens



NATIONAL MUSEUM OF NATURAL HISTORY

Sandia points. A is from the Lucy site, B–D are from Sandia Cave.

were distinctively different in terms of color, fossilization, or matrix from those that were recovered in 1984 under controlled conditions." In other words, there's no evidence that bones in the original collection from Sandia Cave were deliberately or inadvertently mixed with bones from other contexts.

Stratigraphy—do the sediment layers have integrity?

Hibben originally argued that the "well-defined stratigraphy of Sandia Cave is one of its outstanding features." Yet Haynes and Agogino, in their meticulous reexamination of the cave, found clear evidence of mixing between all the major strata. Even Hibben acknowledged that a ground sloth claw had been found on the modern surface, but he thought that showed that ground sloths had survived into relatively recent times. Subsequent years of discovery and dating, however, have shown that ground sloths died with the other megafauna at the end of the Pleistocene. Likewise, the presence of mammoths—now known to have become extinct prior to Folsom times—in the Folsom layer of Sandia Cave is another indicator of mixing between layers.

BRADLEY LEPPER

The view from the mouth of Sandia Cave.

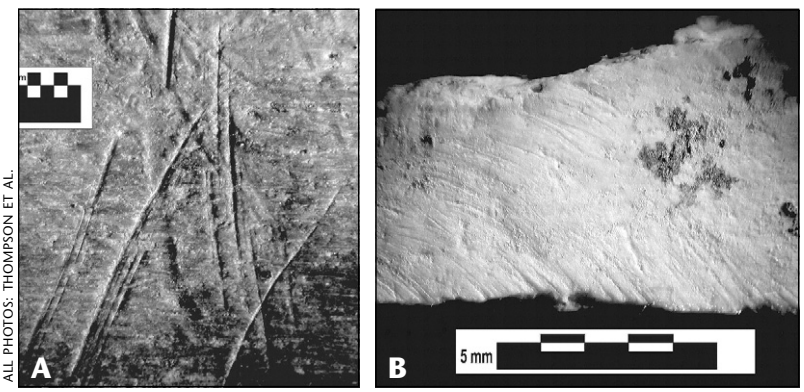
Thompson, Sugiyama, and Morgan studied bones to determine whether there were corresponding degrees of bone weathering for each of the three general time periods—recent, Folsom, and Sandia. (Their conclusions are tentative, since they had to rely on a label on each bag of bones that defined the origin of the specimens; the provenience, although probably roughly indicative of the location from where Hibben and his team thought the material derived, isn't necessarily reliable.) If Hibben was right and the layers were different in age and unmixed, then bones from the deep Sandia level, having lain in the soil for several additional millennia, likely would be more highly fossilized than bones from either the Folsom or recent layers. The team recorded mineralization as "heavy," "light," or "none."

They found that "there are similar proportions of heavily and lightly fossilized bone in the bottom (Sandia) and top (Recent) layers." This corroborates the claim that there has been considerable mixing of the bones between these levels, which undermines Hibben's claim about the integrity of the levels.

Curiously, the bones from the Folsom layer stand out as "statistically very different" from both the recent and Sandia layers. This may be due simply to sampling error, but it's also possible that the consolidated nature of the Folsom layer kept it more intact than the more loosely compacted layers above and below it.

Excavation and curation biases

Thompson, Sugiyama, and Morgan meticulously compared the bones collected by Hibben and his crew with the more recent material excavated by Smartt and Hafner to determine the quality of Hibben's excavation and curation methods. To Hibben's credit, they found he was ahead of his time in terms of saving the tiny bones of microvertebrates, which were usually discarded by his contemporaries as uninteresting, and in collecting and saving fragmentary bones. Although the relatively large mesh of the screen Hibben used biased against bones of the smallest microvertebrates, Thompson and her colleagues were nonetheless relieved to find that the original assemblage included bones of rabbits and larger rodents. Their presence verified that the assemblage hadn't undergone major sorting or analytic bias. They conclude that compared with other archaeologists of his generation, Hibben's "excavation and recovery methods were excellent." And the Sandia Cave faunal assemblage "is striking in its completeness and suitability for modern study."



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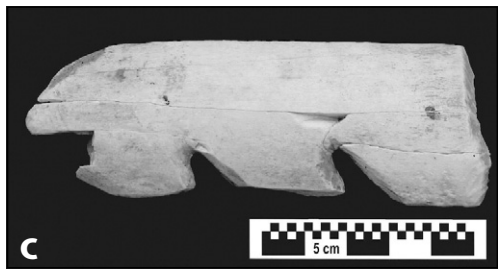


Large mammal bones from Sandia Cave showing evidence of human activity. A, stone tool cutmarks; B, percussion mark made by a hammer used to break open the bone for extracting the marrow; C, a cut and shaped bone tool fragment.

How did the bones come to be in the cave?

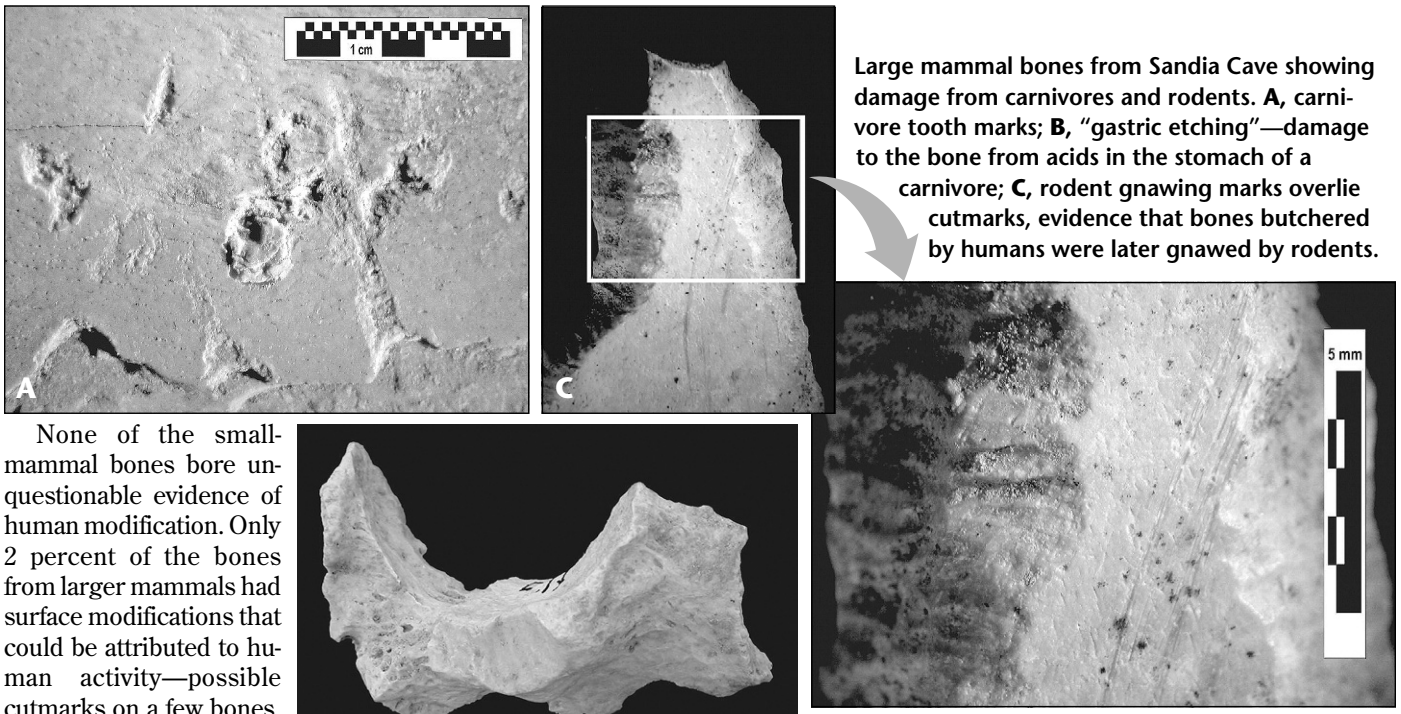
The most important question to be answered, of course, is, What role, if any, did human hunters play in bringing the bones to Sandia Cave? If Hibben is right, many if not most of the bones were brought to the cave by Folsom and

Sandia hunters. The bones represent the animals that were killed, butchered, and cooked at the site. And the bones were broken by people in order to extract the nutrient-rich marrow. Is there evidence in the faunal data to corroborate or refute this scenario?

According to Thompson and her colleagues, there are two main lines of evidence that can shed light on this question: surface modifications, including animal tooth marks and stone tool cutmarks; and skeletal element representation, which refers to the kinds of bones that are preserved at the site.

Surface modifications

To prove or disprove Hibben's claim that Sandia Cave contained evidence for human hunting and butchering of Ice Age megafauna turned out to be a task that eluded a definitive answer.



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Large mammal bones from Sandia Cave showing damage from carnivores and rodents. A, carnivore tooth marks; B, "gastric etching"—damage to the bone from acids in the stomach of a carnivore; C, rodent gnawing marks overlie cutmarks, evidence that bones butchered by humans were later gnawed by rodents.

None of the small-mammal bones bore unquestionable evidence of human modification. Only 2 percent of the bones from larger mammals had surface modifications that could be attributed to human activity—possible cutmarks on a few bones, percussion marks possibly made by stone hammers used to break open bones, and a few examples of tools made from the animal bones. Unfortunately, definite human modification was only identified on bone fragments and long bone shafts that couldn't be traced to a skeletal element or species.

Many of the bones with evidence of human modification are the most heavily fossilized specimens, which suggests that at least some of the human-modified bones "may have considerable antiquity." Nevertheless Thompson and colleagues found no evidence of any kind of human modifications on any bone from an animal "positively identified as [an] extinct Pleistocene species." Absent human-modified bones of an extinct or extralimital species, it is impossible to confirm Hibben's interpretation of Sandia Cave as an Ice Age hunting station or even as a shelter occasionally visited by terminal-Pleistocene Early Americans.

Skeletal element representation

Thompson, Sugiyama, and Morgan report that the bulk of the large-mammal bones from Hibben's excavations consists of "high-density elements such as teeth and long bone shafts," a composition consistent with carnivore action. Moreover, evidence of gnawing is found throughout the assemblage and several bones appear to have passed through the digestive tract of carnivores. Comparing the incidence of tooth marks with that of modern experimental bone assemblages that have been butchered by humans, then fed to carnivores, Thompson and her coauthors conclude that large carnivores "were the primary agent for accumulating most of the fauna including extinct Pleistocene species."

It's worth noting that the inventory of skeletal elements confirms that Hibben, contrary to the traditional practice of discarding long bone shafts that cannot be identified to skeletal element, seems to have kept everything. His compulsion to retain even apparently useless materials made it possible for Thompson and her colleagues to identify the few human modifications present in the assemblage. Although there is no evidence of human interaction with Pleistocene mammals at Sandia Cave, we at least know that humans occasionally butchered some large mammals and left bone tools at the site at some point in its history.

"Sandia Man"—fraud or First American?

Hibben's research has been controversial for decades. Although Thompson, Sugiyama, and Morgan have shown that the collection of animal bones from Hibben's excavations at Sandia Cave still has great value for answering questions of paleontological and archaeological interest, their faunal analyses make a strong case for rejecting many of his most important claims.

The animal-bone data show clearly that humans occupied Sandia Cave only infrequently and then only for brief periods.

Most of the animal bones in the cave represent the meals of large carnivores that used the site as a den. Of paramount importance is the fact that contrary to Hibben's appraisal, the "Sandia" layer was not sealed off from the upper layers by a continuous pavement of yellow ochre; extensive burrowing by rodents throughout the history of the site has jumbled materials from recent cave deposits with those from the deepest levels. But do these findings indicate that Hibben's "Sandia Man" was a fraud?

After examining the animal bones in Hibben's collection, Thompson and her coauthors are grateful that Hibben curated the entire fossil assemblage. It's likely he understood that parts of the assemblage considered unimportant at the time might in the future become significant when new analytical methods appeared. Whatever his motives, the fact remains that he left a valuable faunal collection from Sandia Cave that's usable by modern researchers. But what about "Sandia Man"?

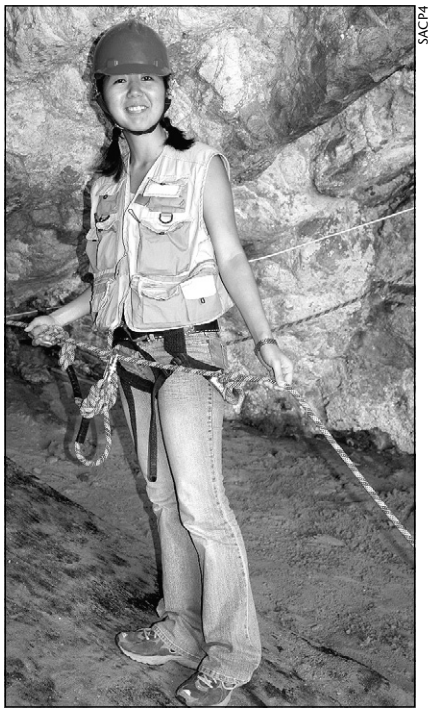
Except to show that humans had little to do with bringing the animal bones to the site, the faunal data don't contribute to proving or disproving the authenticity of "Sandia points," the single-shouldered echo of the Old World Paleolithic that was exactly the sort of "missing link" sought by archaeologists in the 1930s. It's worth noting that Sandia points have been found principally at only two sites, Sandia Cave and the Lucy site, a site in the Estancia Valley about 30 miles southeast of Sandia Cave, where Frank Hibben, and his student William Roosa found Sandia points and bones of mammoth and bison, along with other artifacts. One of the Sandia points from Lucy was fluted like a Clovis point, which suggested it was a technological bridge between Sandia points and the presumably later Clovis style of point. Hibben worked at both sites. But were Sandia points intentional frauds, or were they simply Folsom or Clovis knives that rodents dragged down into the deepest layers of the cave and that Hibben misinterpreted as the remains of a separate and distinctive culture?

Six decades after Frank Hibben wrote that "the question of the day" was "Who were the earliest Americans?" that question still begs an unequivocal answer. Granted, "Sandia Man" might not have been an intentional fraud, but Thompson, Sugiyama, and Morgan found no evidence to support the claim that he was the First American. MT

–Bradley Lepper

Principal investigators (*left-right*) Thompson, Sugiyama, and Morgan.

NAWA SUGIYAMA



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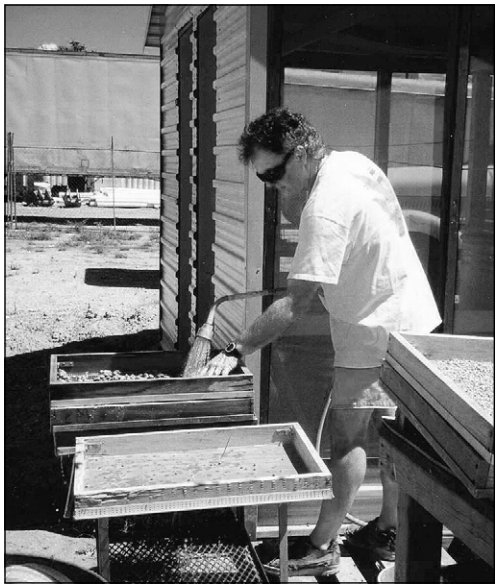

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Suggested Readings

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THE CLOVIS COMET

Part IV: The Scientific Community Responds

DID A COMET CRASH into North America 12,900 years ago? The jury's not yet in on that possibility, but according to one group of scientists, that's exactly what must have happened. In October 2007, a 26-person team led by physicist Richard Firestone and geophysicist Allen West outlined the possibility in the prestigious *Proceedings of the National Academy of Sciences*, citing more than a dozen lines of evidence. They've even tentatively identified the culprit, the parent body of Comet Encke.

In the previous articles of this series, we've introduced you to the Clovis Comet theory (**MT 23-1,** "The Clovis Comet: Evidence for a Cosmic Collision 12,900 Years Ago"), discussed the relevant data (**MT 23-2,** "The Clovis Comet, Part II: What the Data Tell Us"), and explored the implications of such a comet strike (**MT 23-3,** "The Clovis Comet, Part III: The Implications"). In this fourth and final installment, we'll take a closer look at how the scientific community has responded to the theory itself.

A monumental mystery

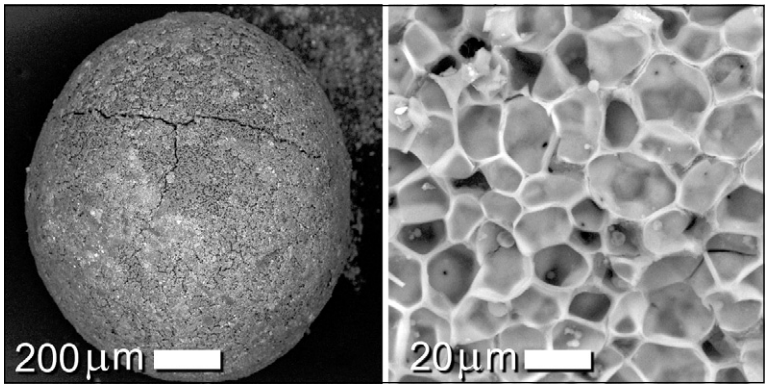
There's no doubt that *something* happened at the tail-end of the Pleistocene, something so huge it triggered an anomalous 1,000-year cool spell we now call the Younger Dryas (YD) interval. Suspiciously enough, at the same time many large-animal species became extinct in North America and the Clovis people rather suddenly gave way to descendent cultures. But it's hard to tell exactly what the triggering event for the YD might have been; what's more, who can say whether the extinctions and the Clovis demise were, in fact, related to the YD at all? Granted that the evidence for a cometary impact is intriguing and plentiful, it nonetheless remains circumstantial: There's no smoking gun anyone can point to and say, "Here's irrefutable evidence, beyond a shadow of a doubt."

Needless to say, the conclusions drawn by the *PNAS* team have met with a mixed response. The prevailing viewpoint seems to be cautionary: Many researchers find the theory intriguing, but in need of further work before the issue is resolved.

Then there are the outright critics. Aside from the expected knee-jerk responses any controversial theory invites—including an insinuation that Firestone's largely discredited hypothesis that a supernova explosion in Paleoindian times was responsible for resetting the radiocarbon clock (**MT 16-2,** "Terrestrial Evidence of a Nuclear Catastrophe in Paleoindian Times") has rendered all his work suspect—some observers wonder why this sensational announcement has been allowed to overshadow other exciting research being conducted on Paleo sites all over the Americas. A few critics have even taken the time to peer closely at and pick apart the data, providing alternative explanations for arguments offered as evidence by proponents of the theory—exactly the kind of "loyal opposition" a theory like this needs, in order to sink or swim on its own merits.

On the side of caution

Most Paleoamericans researchers have adopted a wait-and-see attitude about the Clovis Comet theory, looking forward to elaborations on and reasoned rebuttals to the basic research before they draw any conclusions. They're keenly interested in the subject, but consider themselves little more than spectators at this point—"watching the story unfold from the sidelines," as CSFA director Mike Waters puts it, unsure of what they can really contribute. The major science journals, including *Science* and *Nature*, seem to be quite careful not to take sides.



ALLEN WEST

Microparticles associated with comet impacts—like nanodiamonds and these magnetic spherules—because of their unusually high concentration at Clovis sites, weigh heavily in the evidence pointing to a cataclysmic cometary event. Critics of the theory, on the other hand, point out that they're present in the cosmic rain that continuously falls on Earth's surface. Isn't it possible, they submit, that an accumulated layer was displaced by winds born of violently unstable weather at the time of the onset of the Younger Dryas?

Of course, being on the sidelines doesn't mean all these spectators are united; in fact, their opinions fall across a rather wide continuum, ranging from an unwillingness to get involved at all to the guarded optimism of Dr. Waters and the Smithsonian's Dennis Stanford, who both find the idea intriguing but in desperate need of further research. The response of R. Dale Guthrie, whose work was recently profiled in this magazine (**MT 22-3,** "Megafaunal Extinctions Revisited"), is typical: "I'm pretty amazed by the information that [*PNAS* team member James] Kennett and his group are putting together on this subject, and understand they're working hard to gather more data. By his admission the data he has are very suggestive, and he hopes to expand that to see if the theory really floats or not. . . . Let's see how it goes."

Dr. Stanford offers some cheerful, if cautionary, advice: "My opinion is that it's an interesting alternative theory that needs to be tested. I'd like to see them keep working at it, because there's a lot we don't know about that time period. As [geochronologist] Tom Stafford once said, there's got to be another part of the equation we don't understand—and this may be it." Waters agrees: "I'm interested in the idea and think it has merit, but it requires much more work. Right now we have an idea and some interesting information presented—I think this is an exciting idea that needs investigation. There certainly seems to be something accumulating on the 12,900-year contact."

ALLEN WEST

Black mats, like this deposit (*arrow*) at the Murray Springs site in Arizona, are found at roughly a third of all Clovis sites. They're the sooty residue of a firestorm of continental dimensions, say proponents of the Clovis Comet theory, that incinerated much of Ice Age megafauna and decimated the Clovis population. Critics of the comet theory counter, Why only *much of* the megafauna? Why not *all* species? Moreover, C. Vance Haynes, the acknowledged authority on black mats, observes that all material found in and above black mats dates to the period *following* Clovis. Black mats, he concedes, appear to be the result of a singular event that occurred at the onset of the Younger Dryas. In the absence of more evidence, he allows that a cometary impact is only one possible such event.

Both Waters and Stanford point out that the comet researchers, whose studies focused on the YD contact at 12,900 CALYBP, need to take a longer view and sample continuously both above and below the YD contact at all the Clovis-age sites they can get access to. This could help eliminate (among other things) the possibility that the concentrations of nanodiamonds, magnetic spherules, and other rare materials are lag deposits, the result of a period of very windy weather at the beginning of the YD—a possibility that Stanford suggests based on an article recently published in *Nature*. C. Vance Haynes, Professor Emeritus at the University of Arizona, agrees that something like this is a possibility: "On any surface that was stable for a long time, you can expect to find a concentration of cosmic dust."

One of the localities the comet team based its conclusions on is Murray Springs, a Clovis site in southeastern Arizona that was excavated by Dr. Haynes. Not only does Murray Springs exhibit an organic-rich black mat of the appropriate age (a signifying marker of the impact theorists), the site has also produced plenty of the aforementioned magnetic spherules. But Haynes isn't convinced that the spherules are the result of a cometary impact. The problem he points out "is that cosmic dust is falling on us all the time, both from material that the Earth sweeps up during our orbit, and from meteors falling into our atmosphere"—and that cosmic dust is full of magnetic spherules. He's even detected them in dust collected from the roof of his house. On the other hand, he's convinced that something odd is definitely occurring just after the YD boundary, based on a recent examination of black mats described in his recent *PNAS* article. "You never find Clovis material and extinct fauna in these Younger Dryas–age black mats," he reports. "Mammoth, mastodon, horse, camel, dire wolf, American lion—all those species terminate at the Younger Dryas contact. They're just gone. The only extinct faunal material is bison, and any cultural material in and above the black mat is post-Clovis. My bottom line is that something happened 12,900 years ago that we have yet to understand. I'm not convinced that it was an impact, but it might have been."

Critical response

In the scientific press, researchers in the fields of chemistry, geology, and geophysics have recently begun questioning the collection and analysis techniques of some of the members of the *PNAS* team, particularly concerning their reports of nanodiamonds, extraterrestrial elements, and carbon fullerenes filled with extraterrestrial helium. However, it's the *interpretation* of the evidence that poses a problem for some prehistorians. Ted Goebel, CSFA associate director, is one example. "I don't have any qualms with the way initial data collection and analysis have been carried out," he states. "However, I do have qualms with the ways that the presumed impact event has been characterized." Dr. Goebel takes issue with the "firestorm" aspects of

the theory, noting that not all megafauna in North America died at the end of the Pleistocene. Nor is he convinced there was a human depopulation event at the onset of the Younger Dryas. "In many areas of North America, just the opposite seems to have occurred, if frequencies and sizes of archaeological sites have anything to do with human demographics. I think that Gary Haynes's arguments are most strongly supported by the bulk of the evidence."

Gary Haynes, President of the Commission on Paleoecology and Human Evolution for INQUA (the International Union for Quaternary Research), is a keen observer of any research concerning Pleistocene populations. As he explains it, "My questioning of the comet theory is pretty much along the same lines as what you'll hear from other archaeologists who think critically, such as Stuart Fiedel." Quoting Fiedel, Dr. Haynes notes that some large-animal species didn't go extinct in tandem with the onset of the YD, and that South American megafauna tended to last 500–1,000 years longer than their northern cousins. And we now know that mammoths survived well into the Holocene on a few islands in the Arctic; why weren't they wiped out too? Moreover, he argues that "the YD ended at 11,590 CALYBP even more abruptly than it began; wouldn't this require another impact? If not, why does the onset need an extraterrestrial trigger?"

Stuart Fiedel is probably the most vigorous questioner of the Clovis Comet theory, at least within the field of Paleoamerican studies. "It's certainly intriguing," Dr. Fiedel says, "and one can't ignore the unusual, seemingly extraterrestrial objects that are being reported from many sites. However, the theory is not yet entirely coherent, and it fails to account for several aspects of the archaeological record." His contrary evidence includes all the points cited by colleague Gary Haynes, as well as the assertion that the Clovis people did not, in fact, go extinct 12,900 years ago; indeed, they appear to have evolved fairly rapidly into the various later-Paleoindian cultures. He also raises the question of why large animals like bison, elk, caribou, deer, and bear didn't go extinct in the wake of the purported impact, as other large species apparently did. "But to be fair," he admits, "that's an issue with other catastrophic extinctions. Why did birds survive the KT [Cretaceous/Tertiary] event, but not small dinosaurs?"

He also explains that the extinctions that did occur were staggered in time. "Megafauna are wiped out in Florida at 12,900 CALYBP, but the medium-sized ground sloths in the Caribbean survived until the mid-Holocene. If the effects of the blast are present, as claimed, across the Atlantic in the Low Countries, how could 100 miles of water have been enough to dampen their force?" And then there's the southern survival well into the YD: "Megafauna seem to have survived at least as late as about 12,500 CALYBP in South America, maybe even centuries later than that. But more species went extinct there than in North America. If the bolide shockwave didn't wipe them out synchronously, these later extinctions cannot be attributed to the hypothesized impact. Another common factor must be sought that affected north and south with a slightly staggered timing—probably human hunting and landscape modification by burning."

Where's a time machine when you need one?

We may never know precisely what happened to North America 12,900 years ago; but then, not knowing gives researchers a reason to keep working toward clearing away the murky veil of prehistory, one site at a time. Eventually, enough data will pile up and our technology will advance enough for us to get a clearer view of what happened back then. "We'll know the truth in about 10 years," Waters surmises. "That's how long it will take for the concept to sort itself out."

Stanford agrees, though he doesn't put a time frame on a general consensus. "Look at any of this stuff—we're just scratching the surface right now," he observes. "Any of us who think they're right are just fooling ourselves. Eventually we'll get some parts and pieces of it, and we'll finally understand the consequences of it—which is the primary importance for archaeology." MT

–Floyd Largent

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Mockingbird Gap

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Stratigraphy of Mockingbird Gap

Holliday's stratigraphic studies reveal that these campsites, like Lubbock Lake and Blackwater Draw Clovis sites, were adjacent to a wetland environment. At Blackwater Draw deeply buried remains of kills and associated campsite activity were found in a large gravel pit, and at the Lubbock Lake site deeply buried evidence of Clovis occupation was exposed during construction of a large reservoir for the town of Lubbock. Unfortunately, the great depth of the wash at Mockingbird Gap prevents excavation on a similar scale. The sheer size of the wash (about 100 m wide) also poses the problem, Where do you dig? The team was able, however, to obtain core samples from about 10–11 m below surface and retrieved materials suitable for radiocarbon dating. The age range is 9000–11,000 RCYBP.

Overview of UNM field school ▲ excavations at Locus 1214 of Mockingbird Gap, June 2007; view to the southeast.

UNM Anthropology grad students ▶ Marcus Hamilton (*left*) and Christina Sinkovec, teaching assistants for the 2007 UNM Southwestern Archaeological Field School at Mockingbird Gap.

BOTH: BRUCE HUCKELL

The results from Holliday's coring samples were somewhat surprising. Not so surprising is the conclusion that climate and habitat were very different from today. What is now an arid desert grassland was once much wetter, flourishing with flora and fauna. The topography of the Clovis-age landscape, moreover, was shockingly different from today's. Holliday says theirs is the first such extensive subsurface geologic work done in this area and no one expected 30 ft of fill in the wash. "One of the common stories in a lot of the valleys is that they cut way down during the Pleistocene and have been backfilling ever since," he explains, "but we had no idea there was anything of this magnitude." Pictures of the site today show the slight and gradual elevation differences between the site landscape and the modern-day floor of the wash. What a difference from 11,000 years ago, when a 40-ft relief severely delimited the present excavation sites from the bottom of what was at that time a flowing stream or river. Holliday's coring rig couldn't penetrate the gravelly stream bottom, so it isn't known what lies under the bed. Core samples show conclusively, however, that flowing water gradually gave way to marshy, wetland conditions and eventually to the arid conditions seen today.

Tomorrow at Mockingbird Gap

Huckell and Holliday hope to lead future excavations. Much more research is needed to get a better handle on the patterns of Clovis land use reflected at Mockingbird Gap and to sharpen our knowledge of the patterns of movement that brought people to this spot on a vast plain. Mystery still surrounds some of the chert found at the site: Abundant chert from an unknown but presumably local source; and a rare chert that sources from Texas but refuses to fit neatly into the theorized pathway from northwest New Mexico suggested by other artifacts. A better understanding of Clovis lithic technology might also solve the mystery behind the conspicuous absence of blades among the artifacts at Mockingbird Gap.

Holliday hopes microscopic examination of the Chupadera Wash coring samples may reveal phytoliths, pollen, and perhaps diatoms that will prove useful in paleoenvironmental analysis. For his part, Huckell is eager to continue work at Mockingbird Gap. "The material on the northern ridge that has remained buried," he says, "probably has the greatest research potential for us and for future investigations at the site." Naturally, more work on artifact assemblages and more excavations would round out the next stage of research, provided sufficient funding can be found.

With luck, Mockingbird Gap won't make us wait another 35 years to learn the rest of its secrets.

–Dale Graham

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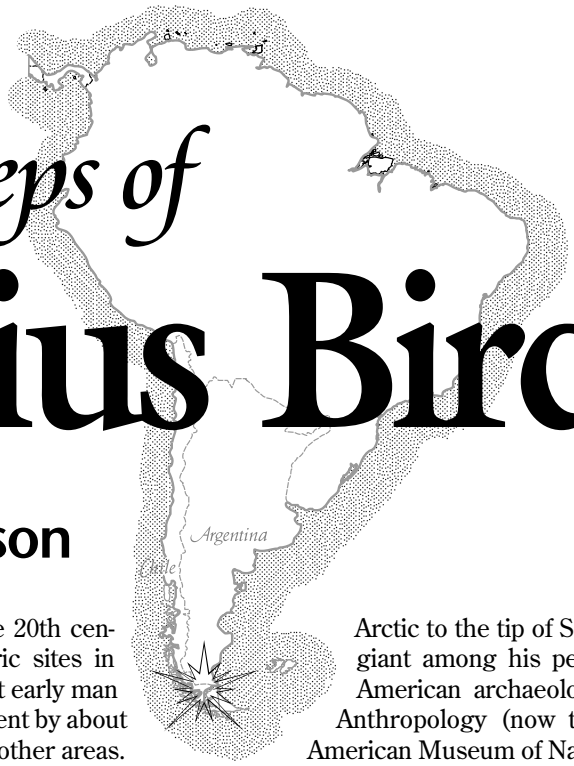


In the footsteps of Junius Bird

Part I: Bird the Person

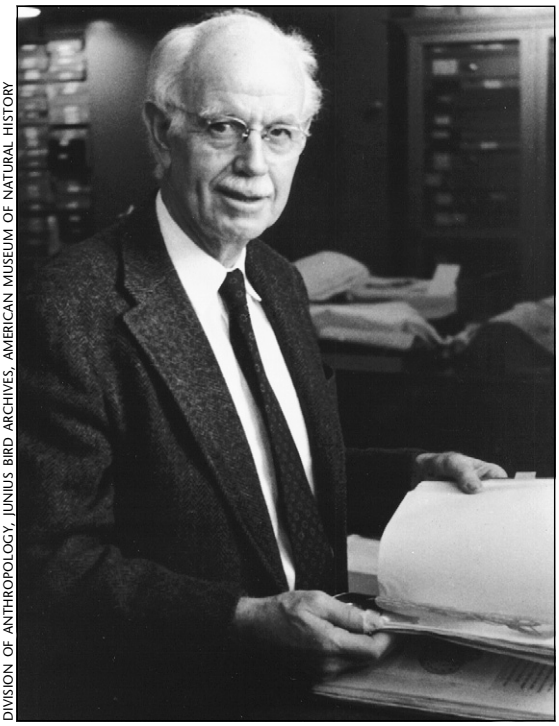
DURING THE LATTER PART of the 20th century, the excavation of prehistoric sites in South America left little doubt that early man occupied the southernmost tip of the continent by about 11,000 radiocarbon years ago, far earlier in other areas.

But that wasn't true of mainstream thought in archaeology earlier in the century. Finds at sites near the towns of Folsom and Clovis in New Mexico in the late 1920s and early 1930s carved into archaeological bedrock the Clovis-First paradigm: That humans arrived first in North America no earlier than about 11,200 radiocarbon years ago, and that these First Americans were identified by a unique cultural marker, a fluted stone projectile point that became known as the Clovis point.

Then along came archaeologist Junius Bouton Bird. He shook the foundations of American archaeology by finding evidence of Clovis-age humans—with similar, yet strikingly different lithic technology—preying on Pleistocene-age mammals nearly at the tip of South America. Finds from Bird's 1930s expeditions kindled an academic firestorm over the timing of human entry into the New World that has been raging for more than half a century. The big question, says James Adovasio in his book *The First Americans*, is, How was it possible for people to migrate from North America to the tip of South America as quickly as it appears from Bird's evidence that they had done? It's a question still being hotly debated.

Bird's remarkable discoveries, along with other contributions to archaeology throughout a stellar career of field research from the Arctic to the tip of South America, have made him a giant among his peers. He was curator for South American archaeology at the then Department of Anthropology (now the Division of Anthropology), American Museum of Natural History in New York, from 1957 until 1973; he then reigned as curator emeritus until his death in 1982. Not bad for a man who lacked a university degree in a field where today a doctorate is common currency.

Bird died of cancer in 1982. Collections from his research, some as yet unstudied, are housed in the United States and Chile. Tom Amorosi, Research Associate in the Division of Anthropology of the Museum, is forming an international team of scholars to probe those collections with state-of-the-art technology and methods in a quest for new data and a deeper understanding of the significance of Bird's original research. In this series we'll probe that ambitious project and examine in detail Bird's work.



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Junius Bird as Amorosi remembers him in the late 1970s.

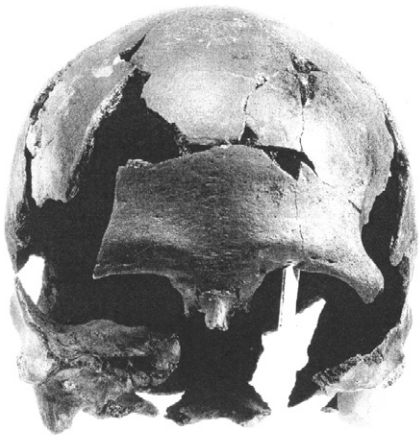
A closer look at Bird

Words to describe him come easily to those who knew him. Adventurous. Modest. A first-class, meticulous researcher. A good story teller. An innovative expert on textiles. Pragmatic. Enthusiastic. Eager to help student archaeologists. He was also a man whose knowledge of stratigraphy and artifacts was unquestioned.

Craig Morris, dean of science and curator of South American archaeology at the American Museum of Natural History until his death in 2006, describes Bird in a 1985 obituary in *American Anthropologist* as "a guiding force in Ameri-

can Archaeology for nearly half a century. His work on the early occupation of South America and on numerous aspects of Andean technology, especially textiles, set new standards of excellence and innovation." Morris wasn't alone in his praise.

Bird was born in Rye, New York, in 1907 into a family of scientific traditions. His father, Henry Bird, was a well-known entomologist; his mother, the daughter of naturalist Seymour Bouton; an older brother became a paleontologist. Reportedly, Bird became fascinated with archaeology at the age of nine.



ORIGINALLY IN BIRD 1988: 117, FIGURE 40

ORIGINALLY IN BIRD 1988: 117, FIGURE 41

Above, anterior view (*left*) and left lateral view of the cranial vault (*right*) of individual #1 from Pali Aike Cave, a male 45-plus years old at time of death. Below, the left lateral view of the mandible of individual #1 (AMNH 99.1/77). Although an early radiocarbon bulk sample dated the lower levels of Pali Aike to the early Holocene (8639 ± 450 RCYBP), Amorosi believes the lower levels may date to the late Pleistocene.

After high school, he attended Columbia University for only two years before being lured away to the Arctic by explorer Bob Bartlett. Upon his return, Bird decided to become an archaeologist and learn the skills in the field rather than return to Columbia.

A career with the Bird signature

After joining the American Museum of Natural history in 1931, he carried on work in New York, New Jersey, and Pennsylvania, as well as along the Caribbean coast. Bird began work in South America with a survey of Tierra del Fuego and Navarino Island in 1932–33. His seminal discoveries began in 1934, when Bird and his new bride, Margaret ("Peggy"), set out on their honeymoon searching for signs of early man in far South America. It was a search that had frustrated earlier researchers, and one that some thought delusive. The young couple launched their 1,300-mile honeymoon trip down the coast of South America in *Hesperus,* a 19-foot sailboat, followed by a bumpy ride across the windswept plains of South America in a Model T Ford.

Some 50 km north of the Straits of Magellan, Bird found the success that had eluded earlier investigators. At Fell's Cave he found projectile points, some fluted, known as fish-tail points, as well as hearths and other artifacts in direct association with the bones of extinct mammals such as horse and ground sloth—finds radiocarbon-dated in the 1960s to approximately 11,000 radiocarbon years ago. Similar finds emerged from a nearby lava-field cave known as Pali Aike (formerly spelled Palli Aike).

Archaeologist and longtime First Americans researcher Ruth Gruhn puts the importance of his research this way: "It certainly woke up North America to the fact that there was some very early stuff all the way down to the tip of Tierra del Fuego. He [Bird] demonstrated quite conclusively that there were already people at the Straits of Magellan about the same time as the Clovis horizon in North America. If you were a Clovis Firster, then you would have to account for that. He was definitely a pioneer down there."

Bird followed up his success at Fell's Cave with investigations in the Atacama Desert of northern Chile and excavation of sites of early coastal dwellers in northern Peru. Further research took him in 1941–42 to the shores of northern Chile, and in 1946–47 to Huaca Prieta on the north coast of Peru. He also conducted early-man research in Panama with Richard Cooke in the early 1970s.

After 1950, Bird devoted most of his energy to laboratory analysis, particularly of textiles. In that specialty, Bird gave the world a new view of the intricacies and sophistication of this ancient craft and its practitioners.

Without question, Bird was a dominant force among his fellow archaeologists, who showered him with academic awards; a *New York Magazine* accolade once named him among "The top 100 most interesting New Yorkers."

Passing the torch

He also molded the careers of future archaeologists, including Dr. Amorosi, whose interest in Bird's collections is partially personal. "I'm an old museum brat at the American Museum [of Natural History]," Amorosi confesses. "My father was a staff illustrator there in anthropology for more than 30 years, and I used to come in and visit my father all the time. One of the people I used to hang out there with was Junius Bird."

Bird, Amorosi explains, was not buying the arguments of Aleš Hrdlička and his fellow critics who strongly opposed the idea of very early man in the Americas. "There were rumors of ground sloth caves down there, and also finds of ground sloth hair and skin, and he [Bird] wanted to investigate to see the archaeological potential of those caves and see if he could find evidence of Pleistocene mammals and humans in those caves." Bird's idea that there might be a connection between Pleistocene mammals and humans was quite controversial at the time, Amorosi reminds us, probably akin to an archaeologist of

20 years ago talking about pre-Clovis-age materials. Pursuing such ideas could be career-destroying, not career-enhancing.

When Amorosi was near the end of his sophomore year in high school, looking for something "nontraditional" for a science project, Bird became a guiding light. "Junius suggested that I come in as an intern with him," Amorosi recalls. "This was in the early 1970s, and Junius asked if I would come in and help in his lab. That is how I came to know him and what he was doing in South America.

"Junius wasn't doing Paleoamerican studies as much as he was doing textile studies at the time. When he saw I had a real interest in working with fossil materials he took me over to the Fell's Cave materials and the Pali Aike materials and showed me the ground sloth and things and said that, when I had a slack moment or two when I wasn't looking at textiles for him, I could help catalog some of the bone material. Then he would bring out some of the Fell's Cave points to show me and that sort of thing. I got really fascinated with the whole concept of being at the end of the world. I guess that's why I am in it today."

A gutsy scientist

As a bonus, Bird often reminisced about his expeditions and adventures. "Junius certainly had all sorts of adventures," Amorosi says. "He would tell me all about sailing down there with his wife, Peggy, on their honeymoon. It's just like all the romance tales, all the high-adventure tales you could possibly want as a teenager.

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Junius and Peggy Bird in Chile using the wind to push their Model T Ford. Says Amorosi, "I guess we could call this the first hybrid car."

"You know, when he went down there he decided to do it on the inner channel on an open boat. It's a pretty vicious channel for sailing, but Junius didn't think twice about it. My God, this was a time when there were only a few mail boats, no Coast Guard to rescue you, and no GPS [to pinpoint your location or help chart a course], and if you did get into trouble—and they did get into trouble a few times—there is no one there to help.

"From Peggy's notes, it appears they almost were swamped by some swells, so it really was a high adventure story just getting there. And he came back with our first real archaeological assessments of the coast of Chile."

Amorosi chuckled when remembering Bird's adventures with the Model T Ford. "There's even a wonderful picture where the Model T breaks down and he hires two oxen to chain to the front of the Ford to carry out the finds from Pali Aike to Punta Areneas, where he could then catch a mail boat back to New York. "You know," he concluded with considerable awe in his voice, "you and I probably would not want to do this."

Archaeology done the Bird way

Bird's work was so meticulous, and he became so respected in his field, that his lack of academic credentials didn't really matter. Amorosi tells us that "when you read his field notes, they are absolutely amazing for the time he was working. . . . His understanding of stratigraphy, the way he could understand a variety of things and work out problems, he was way ahead of his colleagues at that time."

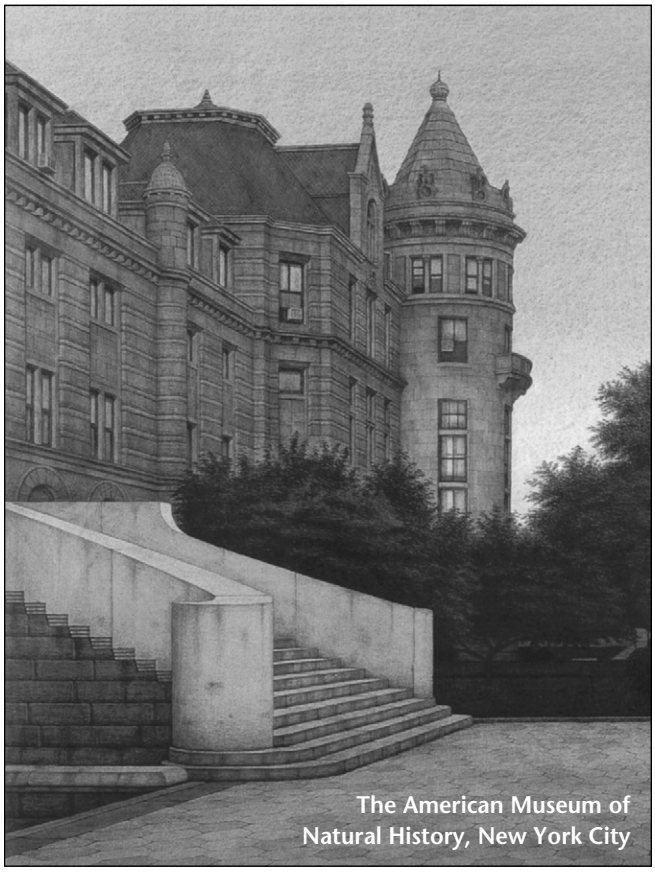
Bird collected everything, something unique for the time, as was his screening of excavated dirt through ½-inch-mesh screen (Today, ⅛-inch-mesh screen is the standard.) "It's the first real instance, that I am aware of anyway, of such sifted collections," Amorosi confides. "It was totally unusual for his time period."

Bird also bagged all faunal material, not just primary examples of bone or teeth as his contemporaries did. "He also took fragmentary long bone," says Amorosi, "which was unheard of, and not just below Paleoamerican levels, but up the entire column to today, even surface finds. He was extremely thorough and far-thinking, far-seeing into the future of how archaeology might work. . . . He set things in motion for all of South American archaeology."

Other archaeologists who knew Bird also praise his knowledge of artifacts and his far-thinking, meticulous ways. They include Dr. Ruth Gruhn and her husband, Dr. Alan Bryan, professors emeriti at the University of Alberta, Edmonton. They knew Bird professionally and personally, initially as a result of a trip they took to South America in 1969 and 1970 as part of a university sabbatical. Their trip took them to a variety of sites all the way to the tip of South America, including Fell's Cave. Gruhn vouches that "Bird did a heck of a lot of good archaeology in South America, I can tell you that."

Bryan and Gruhn later visited Bird at his home in New York, and welcomed him as a house guest in Canada when he was visiting there in the 1970s to speak on work he had earlier done in the area.

"What really impressed me was the extent of his knowledge of South American artifacts," Gruhn says. Among artifacts she and Bryan had collected earlier while doing post-doctoral work in England were some unidentified arrows in their collection. Bird only needed one look to identify them as Ona arrows from the Straits of Magellan. "Junius wrapped the fletching in paper to



FREDERICK BROSEN

The American Museum of Natural History, New York City

protect it, being a curator-type person and all," Gruhn recalls. "We were quite impressed with the guy."

Bird also deeply impressed Mario A. Rivera, who toured archaeological sites with him in the 1970s and in 1980. Rivera first met Bird in the 1970s while doing graduate work in the United States, and again in the 1980s when Rivera was head of the Institute of Archaeology and Monumental Research at the University of Chile, Antofagasta. Now a visiting professor of anthropology at Beloit College in Wisconsin, Rivera attests that Bird was "a really great person." He describes Bird as "a first-class researcher, a very meticulous researcher," whose work in Chile was a "milestone that we rely on up until today, particularly his stratigraphic studies and the sequence of human habitation" that he developed for the region.

Bird was also a renowned storyteller. "Oh, he just had all kinds of stories," Gruhn says. "He was quite the raconteur."

Gruhn remembers also that Bird was an excellent student of material culture. "I am sure he has a bibliography as long as your arm." That bibliography, indeed extensive, includes several papers on textiles. She also remembers that as well as his dirt archaeology, Bird did some excellent ethnographic work, particularly on the surviving Alacaluf Indians in the Chilean archipelago. "It's a good thing, too," she notes, "as they were gone soon after that."

Gruhn and Bryan last saw Bird in 1979 when he showed up to view a site they were digging in New York State. As it turned out, it was a scant three years before his death.

"No question about it," Gruhn said. "He [Bird] was an old-time archaeologist. He went everywhere, complete with fedora. He was a very interesting fellow." (A fedora, Gruhn reminds us, was the trademark headgear for archaeologists of the 1930s and 1940s. Some archaeologists claim Bird later became the prototype image for the academic adventure character Indiana Jones.)

We'll discuss more details of Bird's work in Part II of this series.

–George Wisner

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