ARCHAEOLOGY SOUTHWEST *magazine*

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Paleoindians in the American Southwest and Northern Mexico

Vance T. Holliday, University of Arizona
Michael Bever, ICF Jones & Stokes
David J. Meltzer, Southern Methodist University

PALEOINDIAN RESEARCH encompasses a number of broad questions of far-reaching significance. Who were the first peoples to reach the Americas? When did they arrive? What was the relationship between the makers of Clovis spear points and the extinction of megafauna, such as the horse, mammoth, dire wolf, and other animals? Although these issues have long been debated, no consensus has been achieved. Big questions can persist because of insufficient evidence or because researchers have not adequately or fully interpreted the available information. A few researchers have proposed dramatically new ideas—such as the possibility of a comet colliding with the earth (page 18)—and others, like Joe Cramer, have decided that these questions will be resolved only by supporting many more researchers who will generate new data. Both approaches are examined in this issue of *Archaeology Southwest*.

Henry D. Wallace

El Fin del Mundo is an important Paleoindian site in Sonora that was recently discovered by researchers from the Argonaut Archaeological Research Fund at the University of Arizona and researchers from the Instituto Nacional de Antropología e Historia.

Joe Cramer is a retired petroleum geologist with a lifelong interest in archaeology. When he developed a particular interest in Paleoindian archaeology, especially the timing of the arrival of the First Americans, he and his wife Ruth decided to share their financial good fortune with research archaeologists who had similar interests. In the early 1990s, the Cramers began to establish a series of research endowments at universities across the United States, focusing on the peopling of the New World. This philanthropic gesture is changing the direction of Paleoindian research throughout North America.

The Sundance Archaeological Research Fund, the Cramers' oldest enduring endowment, was established in 1994 at the University of Nevada–Reno. Over the next eight years, the Cramers established the Quest Archaeological Research Fund at Southern Methodist University, the North Star Archaeological Research Fund at Texas A&M University, the Odyssey Archaeological Research Fund at the University of Kansas/Kansas

Issue Editors:
Jesse A. M. Ballenger and Vance T. Holliday

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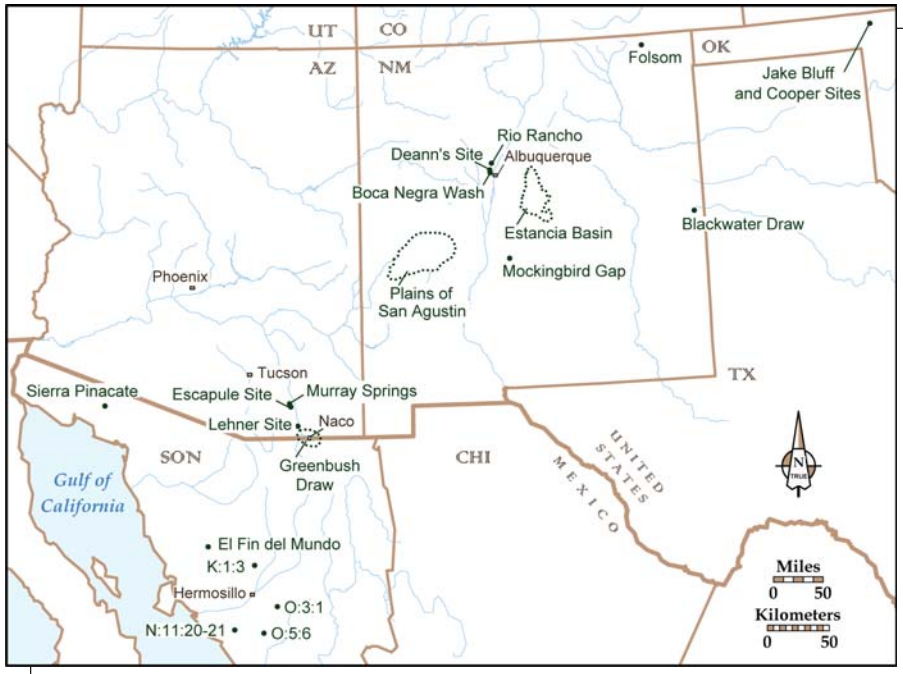


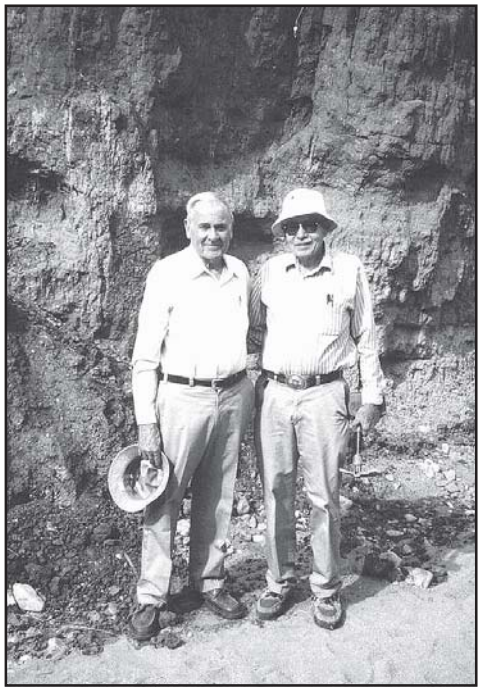
Sites discussed in this issue of Archaeology Southwest.

Geological Survey, and the Argonaut Archaeological Research Fund at the University of Arizona (page 20).

Although each Cramer-funded program has a mission statement unique to its geographical area of interest, all of the programs have a common goal of assessing the antiquity and origins of human populations in the New World. Consequently, the executive directors of these programs collaborate with both national and international research teams, and have been involved in examining many sites that contain Clovis and potentially pre-Clovis artifacts. New finds have been few, and the discovery of well-preserved Clovis sites and possible pre-Clovis sites, such as Monte Verde in Chile, is a serious limitation in American archaeology. However, it is also true that understanding the human colonization of America is not strictly a matter of finding pre-Clovis sites. In 2000, most Paleoindian archaeologists thought that Clovis dated between 13,500 and 12,900 years ago. Today, based on a greater sample of precise bone dates from existing sites, some archaeologists argue that Clovis is restricted to a narrow window between 13,100 and 12,700 years ago. This revision is not absolute, but it makes the point that archaeologists still have questions about when Clovis began. Therefore, recognizing pre-Clovis sites depends on a larger sample of radiocarbon-dated Clovis sites.

Nearly all of the Cramer funds also support the study of sites that postdate Clovis. This may not seem like an obvious strategy for understanding the initial peopling of the continent. However, investigating the transition from Clovis to, for example, Folsom technology, subsistence, and demographics, is critical for evaluating how colonization occurred in different settings.

Radiocarbon dates from the Jake Bluff Clovis bison kill and the Cooper Folsom bison kills in Oklahoma indicate that people using Folsom points appeared on the heels of the Clovis people, but the duration of any perceptible radiocarbon gap is difficult to measure in terms of years or human generations. Why then do we not find more stratified sites that contain both Clovis and Folsom? The answer probably has much to do with early Paleoindian mobility, the relatively brief duration of each technology, and small populations, all of which limit the opportunity for stratified Clovis/Folsom occupations to occur. To date, only two sites, Blackwater Draw and the Jake Bluff site, contain uncontested Clovis artifacts stratigraphically below Folsom artifacts, a fact used to support recent claims that an extraterrestrial event hastened the demise of many Clovis peoples 12,900 years ago (page 18). Archaeologists critical of the comet-impact theory observe, however, that multicomponent Paleoindian sites of any age are rare, and point to an increase in Paleoindian sites after Clovis. Thus, the study of post-Clovis sites is also an important part of understanding Clovis.

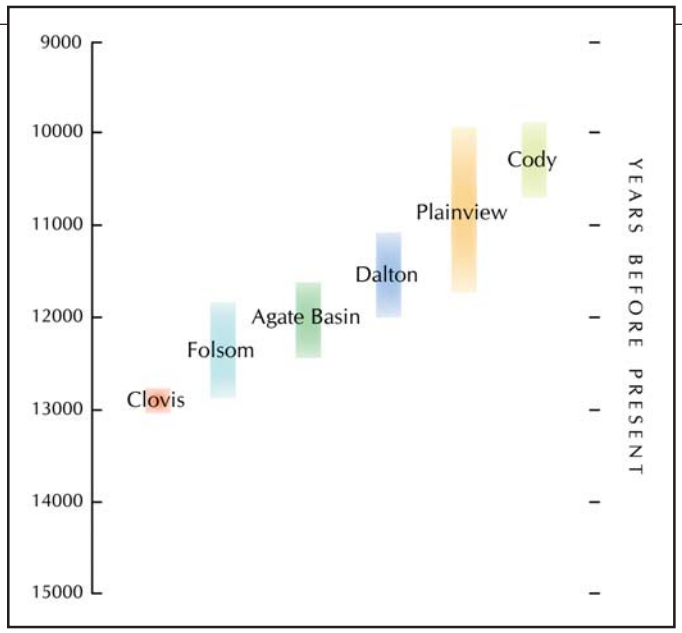


Joe Cramer (at left), founder of several archaeological research endowments at universities across the United States, with archaeologist C. Vance Haynes Jr., at the Murray Springs Clovis site, in southeastern Arizona, in 2000 (courtesy of the Mammoth Trumpet *and Michael Waters).*

The Cramer research programs have not resulted in numerous new Clovis or pre-Clovis sites, but we do not find that discouraging. Although funds like Argonaut cannot and should not be a substitute for investments by the National Science Foundation and other granting agencies, we firmly believe that the great strength of these research funds is that they are long term—enabling careful study of available sites and fostering the development of

social and scientific networks that increase the likelihood of discovering new sites. Also necessary is the reinvestigation of sites such as Folsom and Blackwater Draw (pages 11–12) by archaeologists with new research questions, strategies, and technologies, such as the measurement of stable isotopes (page 9).

The Quest excavations conducted at the Folsom site from 1996 to 1999 included a restudy (or, in many cases, the first study) of materials from the original work done at the site. Part of the Sundance research program includes the reanalysis of many of the same sites and artifacts discovered by archaeologist Malcolm Rogers and avocational archaeologists Elizabeth and William Campbell in the 1930s. Field efforts are focused on establishing chronologies of beach ridge development, which will help date the sites and situate the occupations within the dynamic landscape of late Pleistocene lake basins.



Timeline for sites discussed in this issue of Archaeology Southwest.

Some of the results of the Argonaut program are presented in this issue of *Archaeology Southwest*. The research has included archaeological survey, testing, and excavation, as well as significant paleoenvironmental studies. The survey work has been some of the most extensive and intensive systematic reconnaissance in the history of North American Paleoindian archaeology. One of the first efforts was systematic survey in the upper San Pedro Valley. Previous work by Emil Haury, C. Vance Haynes Jr., and others raised two immediate questions: why are there so many Clovis mammoth sites in the upper San Pedro Valley, and does the concentration of sites persist south of the border? In New Mexico, much of our work focused on Paleoindian sites in some of the many paleolake basins throughout central and southern New Mexico, including the Plains of San Agustin (pages 12–14) and the Estancia Basin (pages 14–15). Paleolakes and *playas* (dry lake basins) underwent dramatic changes before, during, and after the Paleoindian occupation of the region. Understanding the relationship of sites to lake and *playa* histories is an important first step in understanding the distribution and formation processes of sites and in predicting site locations, including likely pre-Clovis localities. Central New Mexico is also a critical region for looking at Clovis sites between the localities on the High Plains and those in the upper San Pedro Valley area.

Paleoindian research has evolved dramatically since the early twentieth century, when artifacts and sites were often found by ranchers, cowboys, and other amateur archaeologists. These two photographs from 1926–1927 show Charles Schwachheim (in coveralls), a blacksmith from Raton, New Mexico, and Barnum Brown (wearing a bowtie), of the American Museum of Natural History, during excavations at the Folsom site, in New Mexico.

In Sonora, Mexico, survey and undocumented collections have revealed a number of Clovis sites near the lower Río Sonora. This drainage shares a low divide with the upper San Pedro, creating a possible "Clovis highway" between the classic Clovis-mammoth sites and the Mexican coast. The survey also resulted in discovery and excavation of the first in situ Clovis site in Mexico and the southwesternmost Clovis site in North America. This site, El Fin del Mundo (pages 6–7), contained the remains of two gomphotheres—extinct, elephantlike mammals—in association with stone tools, the first such finding in North America. We believe this represents a significant upsurge in the pace of new explorations and a discovery that will undoubtedly broaden current our understanding of Clovis in the Southwest and northern Mexico.

Current Paleoindian Research in Sonora, Mexico

Edmund P. Gaines, University of Arizona
Guadalupe Sánchez, Instituto Nacional de Antropología e Historia

A SPECTACULAR RECORD of a terminal Pleistocene and early Holocene Paleoindian occupation is being revealed as the pace of research increases in the Mexican state of Sonora. This area yielded the first Paleoindian evidence known outside the boundaries of the United States when archaeologist Charles DiPeso reported two fluted points from the vicinity of Guaymas. This discovery came just two years after the University of Arizona's 1952 excavation of the Naco mammoth kill site in neighboring Arizona (pages 7–9). Prior to the establishment of the Instituto Nacional de Antropología e Historia (INAH) Sonoran center in Hermosillo in 1973, Manuel Robles, then director of the University of Sonora Museum, was responsible for documenting Sonora's cultural resources. In the early 1970s, Robles reported eleven localities, with a total of twenty-five Clovis points, in the northern half of the state. Later, Julio Montané Martí recorded early sites and excavated at SON K:1:3, though his investigations were never completed.

Henry D. Wallace

SON N:11:20–21 is located in the midground of this image, where Clovis material was found on the surface. (Note the Gulf of California in the background.)

Current interest in the Paleoindian occupation of Sonora began in 1997, with work by archaeologists Guadalupe Sánchez and John Carpenter. In 2003, these informal inquiries resulted in the formation of a collaborative, interdisciplinary investigation program conducted by the University of Arizona and INAH, and supported by Vance Holliday and the Argonaut Archaeological Research Fund (pages 1–3).

In Sonora, Clovis artifacts have been found at thirteen sites and as twenty-one isolated finds. The largest and best-known site is SON K:1:3, an extensive quarry and habitation site located in the Río Zanjón basin north of the capital city of Hermosillo. The recently discovered El Fin del Mundo site (pages 6–7) contains several Clovis activity areas, including an extensive campsite and gomphothere remains. Other significant sites include SON O:3:1, about twenty-five miles southeast of Hermosillo, and SON N:11:20–21, a large site located about ten miles from the Gulf of California. Particularly intriguing are two fluted points reportedly found in coastal shell midden contexts near Tastiota and Desemboque de los Seris, and a fluted basal fragment found at the large rockshelter site, SON O:5:6.

Clovis artifacts from Sonora are very similar to those found at sites in Arizona and New Mexico. There are, however, apparent differences in the materials from which they were made. Clovis artifacts from the southwestern United States tend to be made of very high-quality cryptocrystalline materials obtained from distant sources, whereas in Sonora, there was a greater reliance on locally available basalt, rhyolite, quartz, and quartzite. We hope to determine whether this phenomenon represents decreased mobility on the part of early Paleoindian groups

or raw material constraints in a region dominated by volcanic geology, or both. Currently, the only known source of good knapping material in the region that contains evidence of Paleoindian exploitation is an outcrop of vitrified basalt at SON K:1:3. The overwhelming majority of the Paleoindian artifacts at the site are made of this stone. We have also seen artifacts made from this material at other Clovis sites in the region, including SON N:11:20–21 and El Fin del Mundo.

Henry D. Wallace

Another goal of our investigations is understanding the timing and nature of this occupation. Evidence of a late Paleoindian occupation of Sonora currently occurs in the form of at least fifty unfluted lanceolate points from twelve locales. Many of these points are most similar to Golondrina and Plainview specimens from the southern Great Plains of the United States. However, at least five specimens from Sonora are most similar to Dalton projectile points, a transitional late Paleoindian/early Archaic style from the southeastern United States. These materials evidently represent the first traces of a late Paleoindian habitation of the Sonoran desert ecosystem.

Our work to date has primarily involved revisiting sites originally discovered by Robles and local collectors. Nearly all of the currently known Paleoindian sites are located within a day's drive from the state capital, Hermosillo, where search efforts have been concentrated. As our explorations expand to include new regions, it seems certain that we will locate additional evidence of Paleoindian occupation in the area.

Henry D. Wallace

Top: SON O:5:6 is located just above the trees at the base of the isolated hill in the middle of this image. A Clovis point was found here, and future work is planned. Bottom: SON O:3:1, located in the midground, yielded Clovis material from the surface and was tested by Guadalupe Sánchez.

El Fin del Mundo

Guadalupe Sánchez, Instituto Nacional de Antropología e Historia

Edmund P. Gaines and Vance T. Holliday, University of Arizona

Joaquin Arroyo-Cabrales, Instituto Nacional de Antropología e Historia

Edmund P. Gaines

Manola Garibay

Two Clovis points from the surface of El Fin del Mundo.

OUR SURVEY TEAM first set foot on this remarkable Clovis site in February 2007. Known as El Fin del Mundo (which means "the end of the world"), its potential had been suspected a decade earlier, when C. Vance Haynes Jr. and Guadalupe Sánchez saw fossilized animal bones in a local museum and were told that they came from a ranch in the vicinity. With support from the Argonaut Archaeological Research Fund (AARF), the 2007 field survey season provided an opportunity to visit the ranch and investigate the possibility of Paleoindian archaeology with the fossil material.

Almost immediately upon arriving at the site, we found large tusks and the bones of horse- and bison-sized animals and a large cutting tool that had apparently fallen out of the upper bone bed. Within minutes of the initial discovery, we also found a large biface and a quartz crystal projectile point. The next day, we found a complete gray chert Clovis point less than thirty-five feet away from the fossils. The site clearly merited more intensive research.

So far, two full field seasons of excavation and survey have been conducted at the site, with the financial support of the Instituto Nacional de Antropología e Historia (INAH), the National Geographic Society, and AARF. Although analyses are ongoing, a few preliminary conclusions can be offered.

The site consists of nine archaeological/geological localities. Locality 1, the scene of the initial site discovery, contains two bone beds. The upper bed consists of the remains of two juvenile elephantlike mammals called gomphotheres. The definitive identification of these remains as gomphotheres was made by our coauthor Joaquin Arroyo-Cabrales.

Previously, it was unknown whether gomphotheres survived until Clovis times. Five flakes have thus far been found with the gomphothere bones. Two additional Paleoindian projectile points—a complete fluted point made of quartz crystal and a complete reddish brown chert point—have been found near the bones, albeit from disturbed contexts. The flakes associated with the bones provide compelling evidence of a human association, and the projectile points strongly suggest that hunting, and perhaps butchering, was involved. Radiocarbon dating indicates that the bones and artifacts were deposited around 13,000 years ago, which is consistent with the timing of

This illustration depicts, from left to right, a mastodon, a mammoth, and a gomphothere (all proboscideans), showing their relative size, body shape, and tusk form (courtesy of Sergio de la Rosa, artist/illustrator).

the Clovis occupation reported from other sites across North America.

The lower bone bed contains the remains of a Pleistocene horse, a tapir, adult mastodons, and bison. One large tusk, probably from a mammoth, was also recovered. We have found no evidence for human association with the lower bone bed.

Survey efforts in the uplands surrounding Locality 1 have identified several additional areas of Paleoindian activity. Excavation in the largest area, Locality 5, has yielded several hundred probable Paleoindian artifacts. The assemblage recovered to date consists of at least seven fragmentary fluted points, twenty blades and blade tools, twenty-five endscrapers, three blade core rejuvenation tablets, twenty-seven bifaces, and hundreds of expanding bifacial thinning flakes, as well as toolmaking debris. The artifacts found here are evidence of a variety of activities at the campsite, including tool maintenance, retooling, animal processing, and hideworking.

Locality 8 was recently identified on the basis of a fluted basal fragment and large retouched blade. Limited testing at Locality 8 revealed buried materials. Locality 9 produced a lanceolate projectile point and a large bifacial thinning flake made of a tan rhyolite identical to the large biface found at Locality 1.

Henry D. Wallace

Aerial view of the excavations at Locality 1 at El Fin del Mundo.

El Fin del Mundo has a clear connection to other Paleoindian sites in Sonora. Several tools from Locality 5 are made of basalt from the SON K:1:3 quarry site, which is located more than sixty miles to the east. Several tools from the SON K:1:3 Clovis assemblage are made of chert varieties also present at El Fin del Mundo. Many of the bifaces at Locality 5 and the large biface from Locality 1 are made of tan rhyolite that is known from fluted point sites throughout northern and central Sonora.

El Fin del Mundo is notable because it represents the first extensive collection of Clovis material and proboscideans occurring outside the United States; it is the first co-occurrence of Clovis with gomphotheres; and it preserves a 25,000-year stratigraphic record. It also allows us to consider various topics, such as environmental change, Paleoindian subsistence and regional interaction, the role that humans may have played in the extinction of Pleistocene fauna, and how early peoples adapted to the Sonoran region.

Reassessing Naco, Arizona's First Clovis Site

Jesse A. M. Ballenger, University of Arizona

SEVERAL PALEOINDIAN SITES in the vicinity of the San Pedro River, near the Arizona–Sonora border, have contributed greatly to archaeological research because of cooperation among scientists, landowners, and local residents. This collaboration began in 1951, when the partial skeleton of a mammoth was exposed by summer flooding along Greenbush Draw near the town of Naco. These bones were encountered by Naco residents Fred and Marc Navarrete, who discovered two Clovis points among the remains and reported their findings to the Arizona State Museum, at the University of Arizona. The museum's director, archaeologist Emil Haury, contacted landowner Reid Gardner, president of the Arizona Public Service Company, who gave Haury his permission to excavate the mammoth.

Haury first visited the Naco site on November 17 and 18, 1951, accompanied by geologist Ernst Antevs, curator E. B. "Ted" Sayles, and Sayles's wife Emily. Antevs's field notes indicate that while he remained in the arroyo observing the stratigraphy, Ted and Emily Sayles explored the terraces overlooking the site, where, Antevs wrote, "Ted found a scraper."

In April of the following year, Haury and a research team returned to Greenbush Draw to excavate the Naco mammoth site. They recovered the partial remains of one mammoth and six additional Clovis points, now curated,

and frequently on display over the past several decades, at the Arizona State Museum.

The placement of Clovis points in the Naco mammoth indicates a catastrophic and lethal attack targeting the neck and rib cage. Does the fact that the points were not retrieved suggest that this animal escaped butchery? Haury rejected this idea in his 1953 report, concluding, "I do not believe the wounded animal escaped the hunters and died far from the scene of the attack." Perhaps that would have been the last word on the matter, but in 1955, Haury commenced excavations at the nearby Lehner site, where the remains of thirteen mammoths were eventually found in association with thirteen Clovis points, a chopper, a few large scrapers and knives, and perhaps three individual hearths.

Henry D. Wallace

Greenbush Draw was the location of several early excavations where Clovis-era artifacts were associated with mammoth remains. The Naco site was in the foreground, and the Leikem site was just beyond the road that crosses the midground. Naco, Arizona, is in the right, midground, and Sonora lies just beyond the dark line of the international border.

This kill-camp combination was replicated on a larger scale at the nearby Murray Springs site (page 19), where in 1966, archaeologists Peter Mehringer and C. Vance Haynes Jr. discovered separate mammoth and bison kills accompanied by a large campsite. In contrast to Naco, Murray Springs contained thousands of tiny resharpening flakes, most in discrete clusters, as well as two individual hearths, and many broken and discarded tools. In 1966, Haynes revived the hypothesis that the Naco mammoth escaped from a larger kill site. Two miles southeast of Murray Springs, the Escapule site—discovered by rancher Lou Escapule in 1966—is also interpreted as a mammoth wounded by two Clovis points but never found by Clovis hunters.

Is it possible that the Naco mammoth was "the one that got away"? Certainly it is. But fifty years of exploration along Greenbush Draw has complicated the picture. First, before they discovered the Naco mammoth, the Navarretes found a complete Clovis point a quarter mile upstream from the site. Then, in 1964, rancher Clarence R. "Slim" Leikem discovered a second mammoth locality nearly half a mile upstream. Also in the area, Haynes recovered another large, complete Clovis point that was probably associated with one of two mammoths there, though it was not discovered in place. In 1973, the Navarretes reported more bone only 150 feet upstream from the original Naco site. There, Haury and archaeologist Bruce Huckell uncovered the partial remains of an additional two mammoths, as well as a broken Clovis point and a possible bone tool; regrettably, the bone implement was not securely associated with the mammoth. Together, these finds paint a different picture of the situation at Naco. Did all of the mammoths escape from Clovis hunters? Probably not, but if one or more independent kills occurred in Greenbush Draw, where are the campsites?

Recent archaeological surveys have resulted in the discovery of four additional mammoth sites and a much older gomphothere (page 6) in the draw. To date, the mammoth localities have not produced artifacts, but an amazing collection of tools can be found on one prominent site overlooking the draw. The raw materials include exceptionally high-quality cherts, petrified wood, and obsidian. The largest artifacts consist of well-made spurred endscrapers, endscrapers made from blades, flake knives, and a biface fragment that exhibits overshot flaking, a flintknapping technique used by Clovis hunters. Is this the same site found by Ted and Emily Sayles in 1951? I suspect that it is. The only other relevant terrace site consists of a small amount of crude flake debris made from a local material.

Because the San Pedro Valley contains four of only fourteen uncontested Clovis-mammoth associations in all of North America, the question of whether the Naco site is an independent kill or a wounded animal that escaped from a separate attack is important. Should discoveries such as this be counted as "mammoth kill sites"? If they escaped from the Murray Springs and/or Lehner sites, then the answer is no. If that is the case, then the number of successful mammoth hunts that occurred in the San Pedro Valley is reduced to only two. On the other hand, if

the Naco, Navarrete, Leikem, and Escapule sites represent independent attacks, then the number of mammoth kills increases to six. Naco, Arizona, would be home to perhaps the densest concentration of mammoth kill sites documented anywhere in the world.

These competing hypotheses can be tested; this is one portion of my Ph.D. dissertation research. Thanks to the efforts of Jane and Bill Childress of the Bureau of Land Management, archaeological surveys in the vicinity of the Escapule site are ongoing. Scientific exploration upstream and downstream from the Naco site has also been made possible by longtime residents of the area, including Pauline and Charlie Miller, John Ladd and family, and Pete Lawson and Pete Campbell of Turquoise Valley Golf Course. Unfortunately, some key locations have not been available to me for research, but I continue to try to rekindle the sort of collaboration that has long been so productive in the Naco area.

Mammoths in the San Pedro Valley, Arizona

Jessica Z. Metcalfe, University of Western Ontario

MAMMOTHS WERE ABUNDANT in the American Southwest during the last Ice Age. By about 12,900 years ago, they were extinct. Their extinction coincided with drastic climate changes and with the first evidence for humans in the Southwest. Firm associations between Clovis artifacts and mammoth skeletal remains demonstrate that mammoths were hunted by Clovis people. However, the degree to which hunting, climate change, or both contributed to mammoth extinction is a topic of much debate.

Jessica Z. Metcalfe

Archaeologist C. Vance Haynes Jr. examines the distinctive "black mat" layer that immediately overlies Clovis deposits at the Murray Springs site and many others in the region.

A more complete understanding of mammoth behavior during Clovis times would provide important insights into Clovis hunting strategies and the ultimate causes of mammoth extinction. My research involves determining what kinds of plants mammoths ate and what water sources they sought out. Did they rely on a preferred local water source year round, or did they migrate seasonally? If the latter, how far did they migrate, and did they follow the same route each time? What behavioral changes, if any, can distinguish them from their colder-climate predecessors?

Stable isotope analysis can provide answers to some of these questions. The isotopic composition of mammoth bones, teeth, and tusks directly records the food an animal ate, the water it drank, and the bedrock geology of the area in which it lived. As part of my Ph.D. dissertation, I am studying the carbon and oxygen isotope compositions of mammoths from the San Pedro Valley, Arizona.

Just prior to mammoths' extinction, the Southwest was relatively warm and dry. Several researchers have argued that drought conditions forced mammoths to cluster around possibly dwindling water sources, such as that at the Murray Springs site. One of my research goals is to use dietary, climatic, and migrational information found in mammoth tooth enamel to test this idea.

Preliminary results suggest that the San Pedro Valley Clovis-age mammoths consumed a diet high in C4 grasses, which typically grow in warm environments with reasonably abundant summer rainfall; that is not what one would expect during the proposed Clovis drought. However, mammoth molars form over a period of several years and remain in the mouth for years, or even decades, after they are formed, so if the drought was relatively short, its occurrence would not be recorded in the teeth.

There is relatively little variability in the oxygen and carbon isotope compositions among individual mammoth tooth samples, which suggests that these animals did not travel long distances. However, seasonal variations are preserved in the tooth enamel, and preliminary results indicate that the consumption of C4 grasses peaked during summer. Research into the relationships between temperature, rainfall amounts, and mammoth isotope compositions is underway.

Many questions about mammoth behavior just prior to their extinction remain unanswered. However, stable isotope analysis of mammoth skeletal remains should fill significant gaps in our knowledge about extinct megafauna, climate change, and the Clovis people.

Among the First New Mexicans: The Mockingbird Gap Clovis Site

Bruce B. Huckell, University of New Mexico

ONE OF THE LARGEST but least known Clovis sites in New Mexico lies only about fifteen miles north of the Trinity test site in central New Mexico, where, in 1945, scientists detonated the first atomic bomb. The Mockingbird Gap site was discovered in 1959 by geologist Robert H. Weber, who mapped the locations of surface artifacts for nearly fifty years, collecting hundreds of Clovis artifacts from an area about a half mile long and 500 feet wide. These artifacts, which included more than 200 Clovis points and point preforms, and a few hundred endscrapers, gravers, and other flake tools, make up the largest sample of artifacts from any Clovis site in western North America. In partnership with George Agogino, an archaeologist with Eastern New Mexico University (ENMU), Weber explored one portion of this amazing site in the late 1960s using ENMU field school crews.

Bruce B. Huckell

View of the Mockingbird Gap Clovis site.

The site occupies the crown and flatlands adjacent to a low ridge—divided into two segments by a small drainage—that parallels the course of Chupadera Wash. On the southern segment of this ridge, the ENMU students recovered thousands of artifacts. Unfortunately, the results of these excavations were not widely disseminated, and most archaeologists have been unaware of the significance of Mockingbird Gap. To augment the previous ENMU research, between 2005 and 2006, archaeologists from the University of New Mexico and the University of Arizona conducted testing at the site, supported by the Argonaut Archaeological Research Fund; then, in 2007, the University of New Mexico held a five-week field school in a small part of the site.

Our 2005 excavations on the southern ridge segment suggested that although artifact density was high and deposits extended about two-and-a-half feet below the present surface, the distribution and soil characteristics suggested that this material had been eroded and then gradually reburied during the Holocene. Further, there was evidence of younger Archaic and Ancestral Pueblo occupations, complicating our interpretation of the Clovis occupation.

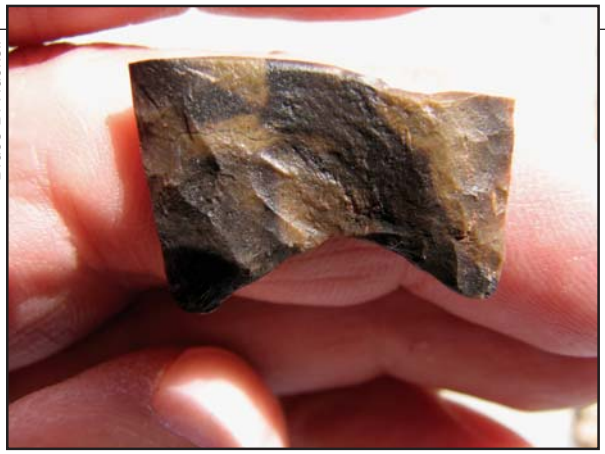
We had better luck in 2006, when we explored a portion of the flats just southeast of the northern ridge segment. Here, we encountered finer-grained deposits that showed late Pleistocene soil profiles; more importantly, from these older horizons, we recovered flaked stone artifacts. One location in particular, covering an area smaller than about sixty-five by fifty feet, produced a Clovis point fragment and abundant waste flakes. From the eroded northern edge of this area, Weber had previously collected three other Clovis point fragments.

In 2007, we focused the field school on investigating this locus, which we now recognize as one of a dozen areas across the site where concentrations of Clovis materials are localized. We recovered more than 1,000 artifacts, approximately two-thirds of which were found in place. Among these were another Clovis point base, four biface fragments, nine small flake tools or tool fragments, five gravers, four utilized flakes, and 956 waste flakes. Twenty-eight pieces of tooth enamel (probably from bison) were found, along with thirteen small splinters of highly weathered large mammal bone.

We suspect that this locus represents a short-term processing area and camp occupied by a few Clovis hunters, who appear to have reached Mockingbird Gap after traveling across northwestern New Mexico, beginning in the Chuska Mountains (about 200 miles away) and passing

by the Zuni Mountains and Mount Taylor near Grants (150 miles), and the rugged Chupadera Mountains southwest of Socorro (thirty miles) before arriving at the site. It is probable that the site was reoccupied at different intervals, perhaps seasonally, with returning groups creating small camps in slightly different portions of the site over time.

Bruce B. Huckell



The base of a Clovis point from Mockingbird Gap.

Our research suggests that Mockingbird Gap is as important as Blackwater Draw, also in New Mexico, where gravel-mining operations first revealed deeply buried Clovis mammoth kills and camp areas in the early 1930s (see sidebar). However, unlike Blackwater, the record of Clovis occupation at Mockingbird Gap is at or near the surface over an extensive area. We still do not know whether buried animal kills occurred along the nearby stream or marsh in the late Pleistocene.

Blackwater Draw

ONE OF THE BEST-KNOWN and important sites in American archaeology, the Blackwater Draw site, near Clovis, New Mexico, was found by Ridgely Whiteman in 1929. The site, which was situated in a gravel pit, was initially excavated from 1933 to 1936 by Edgar Howard and John Cotter from the University of Pennsylvania Museum, and then in the late 1940s and early 1950s by E. H. Sellards of the University of Texas. It was the first site to produce a well-documented, stratified Paleoindian record and the first to yield clear evidence that Clovis artifacts tend to be associated with mammoth and predate (and are technologically different from) Folsom points, which are usually associated with bison. Excavations also showed that unfluted, lanceolate projectile points (associated with bison) were stratigraphically younger than Folsom. This work produced a stereotypical view of Paleoindian artifact chronology and subsistence that in many ways is still with us.

Excavations at Two Folsom Sites in the Middle Rio Grande Valley

Bruce B. Huckell, University of New Mexico

Bruce B. Huckell

Fragments of Folsom artifacts from Boca Negra Wash.

THE MIDDLE RIO GRANDE VALLEY is a windy place. The sandy landscape on the Llano de Albuquerque, near the Albuquerque volcanoes, shows that this has been true since at least the Pleistocene. For Paleoindian archaeologists, this is useful because the area has surface exposures of Folsom, Plainview/Belen, and Cody sites; it is also a curse because these sites tend to be shallowly buried and subject to wind erosion over the last several thousand years.

Because most Paleoindian research conducted here has focused on surface survey and collection rather than excavation, we know more about site distribution than we do about individual sites and their assemblages. As shown by the extensive survey conducted by archaeologist Jim Judge, ancient lake basins appear to have been the focus of attention by Folsom people, perhaps because they attracted both humans and bison.

After the Rio Rancho Folsom site was excavated in the mid-1960s, there was a gap of about four decades before two other Folsom sites were investigated by the University of New Mexico. The Boca Negra Wash site was discovered in 1997 and excavated with the support of the Argonaut Archaeological Research Fund from 2001 to 2004, and Deann's site was found in 2001 and excavated between 2002 and 2006.

The Boca Negra Wash site consists of two areas (Loci A and B) separated by about 200 feet, adjacent to a small *playa* (dry lake basin). Excavation, often within a red, clay-rich Pleistocene soil, produced slightly fewer than 2,300 specimens,

mostly small, fragmentary flakes from stone tool manufacture and maintenance, as well as occasional channel-flake fragments from Folsom point manufacture, broken flake tools, and a few Folsom point fragments. Mixed with the stone artifacts, especially at Locus B, were more than 280 pieces of animal tooth enamel and forty-five highly eroded fragments of large mammal bone. These small fragments are all that remains of bison killed and processed at what we interpret to be a camp.

These raw materials indicate that the site's occupants had reached this place after stocking up on Pedernal chert and obsidian from the Valles Caldera in the Jemez Mountains. Raw materials from more-distant areas were present in smaller quantities, including Zuni Spotted chert from the Zuni Mountains area (about sixty miles west) and Chuska chert from the Chuska Mountains along the present Arizona–New Mexico border (135 miles away).

About two-and-a-half miles to the west, on the western flank of the Albuquerque volcanoes, is Deann's site, a flaked stone scatter measuring about 130 feet by 100 feet at the southern end of a *playa*. More than 900 specimens were collected from the surface and via excavation. As at Boca Negra Wash, most of these were small flake fragments, but channel flake and preform fragments, as well as two point fragments and several flake tools, were also recovered. The recovery of 140 pieces of animal tooth enamel and seventy-five weathered bone splinters suggests that here, too, Folsom hunters killed one or more bison, then lingered to process the animals and repair or replace damaged weapons. Despite the site's proximity to Boca Negra Wash, the lithic materials at Deann's site suggest that those who used the site approached the Llano de Albuquerque from the west rather than the north. The majority of the material at the site is derived from nearby secondary sources of cobble chert and chalcedony; the most abundant nonlocal material is derived from the Zuni Mountains. A very small quantity of Chuska chert was also recovered.

Bruce B. Huckell

Overview of the Boca Negra Wash site and surrounding terrain; the site is located just above the line of six junipers at the center of the photograph.

The artifacts found at these two Folsom sites give us a better understanding of raw material provisioning, as well as insight into the hunters' very conservative consumption strategy. While archaeologists have long known that bison were the most valued prey species for Folsom hunters, we can now demonstrate that the pursuit of bison brought small groups of highly mobile Folsom people to the Llano de Albuquerque.

Life on the Plains of San Agustin

Matthew E. Hill Jr., University of Iowa

A HIGH-ALTITUDE BASIN known as the Plains of San Agustin is located near the Colorado Plateau in west-central New Mexico. Today, the basin is the home of the Very Large Array (VLA) radio telescope, popularized in movies such as *Independence Day* and *Armageddon*. The basin has also been an important research site for more than eighty years, as geologists and archaeologists have visited to study climate change and human responses to these changes.

With the support of the Argonaut Archaeological Research Fund, archaeologists from the University of Arizona and the University of Iowa have worked in the San Agustin basin investigating human-environmental interactions. By conducting new archaeological surveys, geoarchaeological studies, and analyses of the artifact collections of avocational archaeologists, we are trying to determine the size and extent of the Paleoindian presence in the basin, how environmental conditions affected archaeological site preservation, and what strategies people used when faced with large-scale changes to the climate.

Decades of work in the Plains of San Agustin reveal that people living in the basin over the last 13,000 years

Top: Looking north along the cliffs that form part of the southern edge of the extensive Plains of San Agustin. The renowned site of Bat Cave is located in the cliffs in the foreground. Bottom: Looking southeast along the southeast edge of the Horse Springs Basin at the north edge of the Plains of San Agustin. A prominent beach line from the late Pleistocene lake is visible in the foreground and arcs toward the upper left.

have seen dramatic changes to the climate and environment. Although the basin is a dry grassland today, at the height of the last Ice Age, it was occupied by a huge lake more than 250 feet deep. As the cool, wet conditions of the Ice Age shifted to the warm, dry conditions of the modern period, the lake level began to drop rapidly. By the time humans appeared in the basin 13,000 years ago, the permanent pool of the ancient lake had dropped so far that several large, seasonal *playas* (dry lake basins) took its place. As the climate grew even drier, even these *playas* disappeared. By historic times, the only surface water available to ranchers moving their cattle through the basin came from a couple of springs.

Until recently, our knowledge of the prehistoric occupation of the basin was based on just two archaeological sites: Bat Cave and the Ake site. Bat Cave is actually a series of rockshelters first excavated in the late 1940s by archaeologists from Harvard University. In the early 1980s, a crew from the University of Michigan returned to the site to do more archaeological work. The site produced evidence of 3,200-year-old maize, and has an important role in the archaeological study of the spread of agriculture to the southwestern United States (see *Archaeology Southwest* 23[1]). Some geologic deposits at Bat Cave date to the Paleoindian period, but surprisingly, Paleoindian foragers do not appear to have lived here, even though the site was next to a permanent water source.

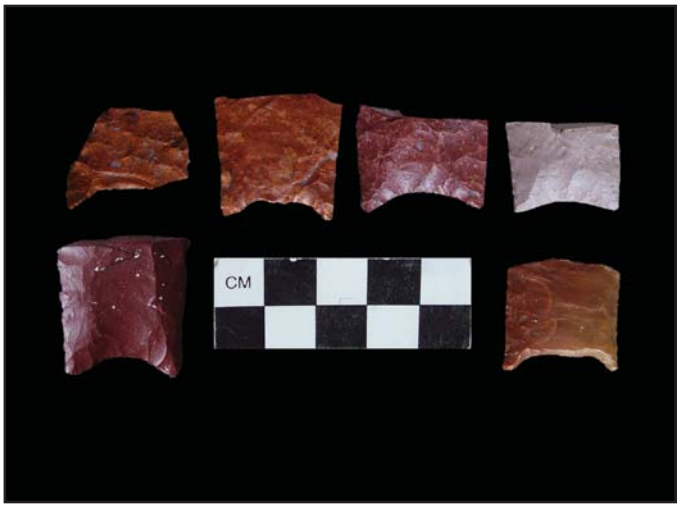
Paleoindians were, however, living at the Folsom campsite at the nearby Ake site. Archaeologists from New Mexico State University excavated Ake as part of the construction of the VLA in the late 1970s. Unfortunately, geoarchaeological work at the site demonstrates that the Folsom artifacts recovered by this project were likely redeposited. New work at the site suggests that the artifacts probably came from an intact Folsom occupation surface about 300 feet from where they were excavated.

Our current understanding of the Paleoindian presence in the San Agustin Plains also has been greatly increased by working with Robert H. Weber, a geologist. For more than fifty years, Weber made regular visits to the basin to collect and record Paleoindian artifacts. Although never formally trained in archaeology, Weber took great care in mapping the location of each find and in recording observations about local geology. Weber alone recorded

more than seventy-five new sites in the basin, and he collected more than 200 Paleoindian artifacts.

Based on information gained from our surveys, from prior archaeological efforts in the basin, as well as from Weber's surface artifact collections, approximately sixty Paleoindian sites are known from the basin, including six Clovis localities, twenty-four Folsom sites, and seventeen Cody localities. Paleoindian groups seem to have focused on the valley floor of the basin and ignored the surrounding mountains and foothills. Subsequently, Archaic and Formative period groups occupied both the lowlands and uplands.

Margaret Beck



Examples of Paleoindian projectile points in the Robert H. Weber collection from the northern basin of the Plains of San Agustin.

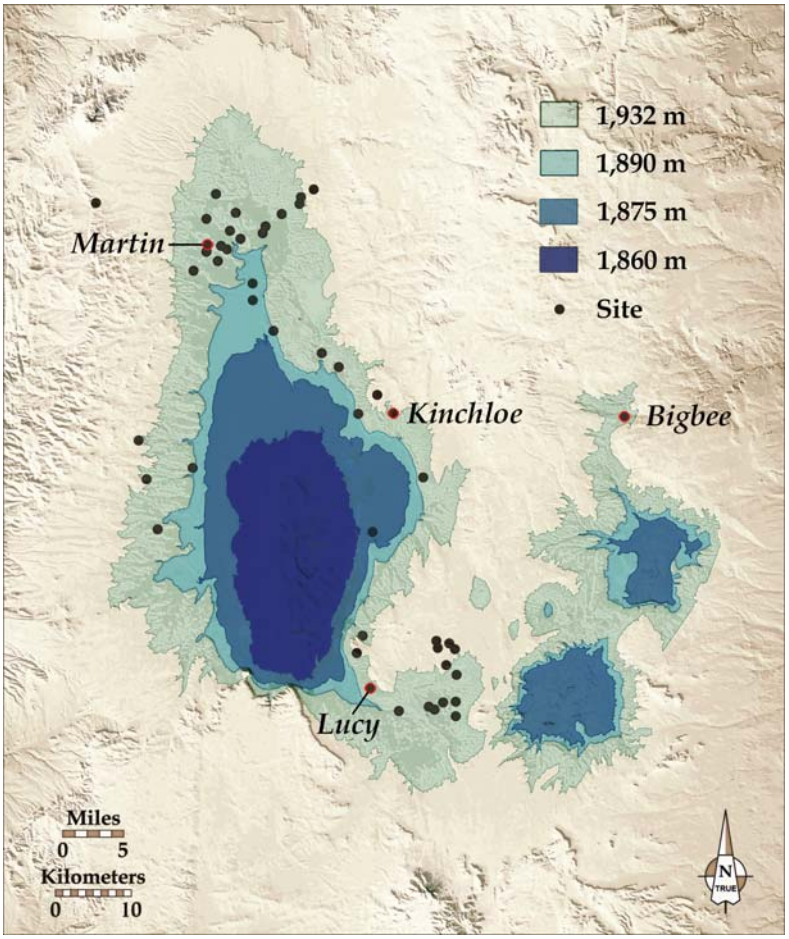
Our work suggests that differences in human use of the basin through time and across space probably relate to changing climatic and other environmental conditions in the basin. In general, the oldest occupants (that is, Clovis and Folsom) chose to live along the edges of the few existing water sources. As these dried up, Paleoindian and Archaic foragers were forced to roam more widely across the basin in search of food and other important resources.

The Estancia Basin

William Reitze, University of Arizona

A UNIQUE LANDSCAPE, very different from today's, greeted the first people to enter New Mexico at the end of the Pleistocene. Just east of the Sandia Mountains, Lake Estancia stretched towards the Pecos Valley. At its peak, this paleolake measured almost 300 feet deep and covered more than 1,700 square miles. As Lake Estancia receded and disappeared during the Holocene, the landscape and resources around it were dramatically altered. While the environmental history of the lake has been well documented, little work has been done on the changing human use of the landscape that accompanied the lake's decline and disappearance.

In the Estancia Basin, New Mexico, stable lake levels at different times in the late Pleistocene and early Holocene created beach lines that can be traced with aerial photography and by ground examination. Stratigraphy, radiocarbon samples, and diagnostic projectile points help to date these ancient shorelines. This map illustrates the known distribution of Paleoindian sites in relation to former lake levels. The 1,932-meter shading marks the maximum high stand of this lake. The 1,890-meter lake was stable at several points during the 6,000 years prior to Clovis. The 1,875-meter lake stand occurred during Clovis times around 12,700 years ago. The last high stand at the 1,860-meter level was probably during Folsom times sometime before the lake disappeared prior to 9,000 years ago.



Current archaeological research focuses on understanding how the use of this distinctive environment changed through time. By using data from previously documented sites, revisiting sites, and examining public and private artifact collections, at least fourteen sites with Paleoindian artifacts have been identified. At present, I have analyzed more than 2,500 artifacts. Of these, more than 300 were projectile points, including Clovis, Folsom, and various Late Paleoindian types, indicating that the basin has been occupied, at least periodically, for the last 13,000 years.

The earliest evidence of humans in the Estancia Basin includes at least six sites with Clovis components. The Lucy site—named after the nearby Lucy Ranch and originally documented by archaeologist William Roosa—is the most interesting of these. The site is situated on a low divide at the southern end of the basin, and at least three Clovis points (reportedly associated with mammoth) have been found. The Folsom occupation of the basin is better documented, with a dozen Folsom components reported throughout the basin. The most extensive of these is the Martin site at the northern end of the basin, which contained hundreds of artifacts.

In the Late Paleoindian period, both the number and diversity of components seems to have increased. Six Cody complex sites, five Agate Basin sites, and at least eight Plainview sites have been identified in the basin. The collections from these sites vary, but the Kinchloe site has nearly a dozen Agate Basin points, and the Bigbee site contains numerous Plainview, Agate Basin, and Folsom points, indicating its continued use through time.

The presence and later absence of this large and very different environment on the edge of the Southern Plains allows us to address various important questions. For example, some archaeologists argue that Paleoindians may not have relied on big game as much as the archaeological record indicates, but instead they took advantage of more readily available plants and small animals that are not preserved. The lake margin provided opportunities for Paleoindians to hunt small game. Although excavation is needed to learn what the Paleoindian occupants of this area were eating, if groups living on the lake margin were hunting small game, we might expect to find less imported raw material for stone tool manufacture at their campsites.

In the 1960s, archaeologist Thomas R. Lyons demonstrated that Paleoindian sites cluster along the former lakeshore. After the lake receded during the early Holocene, settlement patterns changed, and Archaic period camps occurred throughout the basin. By itself, the concentration of repeatedly occupied Paleoindian sites around a lake margin lends support to a generalist economy, however, preliminary results from my research suggest otherwise.

Lucy, Martin, Bigbee, Kinchloe, and other Paleoindian sites in the basin have very high amounts of exotic raw material (mostly from the Southern Plains) and in some cases contain dozens of points and tools made from raw material sources located hundreds of miles away. This is not what we would expect from prehistoric foragers who focused on lake margin resources for any length of time.

Vance T. Holliday

In 1998, test excavations of Lake Estancia's shoreline, at the Lucy site, were directed by David Meltzer of the Quest Archaeological Research Program at Southern Methodist University.

Site distributions and raw lithic material use during the Archaic period better follow our expectations of broad-spectrum resource use. Archaic assemblages are composed of local lithic material, suggesting that these groups were spending more time in the basin and that their mobility had generally decreased. In other words, the resource opportunities provided by the lake do not appear to have significantly affected the frequency or magnitude of Paleoindian mobility based on raw material use. The question is, why not?

Several high stands of the former lake occurred during the 6,000 years prior to Clovis times. This indicates that the general environmental conditions characteristic of Clovis times and later would have been in place in pre-Clovis times. Although some material has been suggested to predate Clovis, archaeologists have yet to resolve the exact relationship of Clovis and pre-Clovis in the Estancia Basin. Through my research, I hope to contribute to our understanding of how and why human use of the basin changed during the late Pleistocene–Holocene transition.

The Malpais Model: Pre-Clovis in the Sierra Pinacate, Mexico?

Michael P. Heilen, Statistical Research, Inc.

Steve Hayden

Julian D. Hayden examines an artifact in the Sierra Pinacate.

NO SITE EARLIER THAN CLOVIS has been universally accepted by a majority of researchers since C. Vance Haynes Jr. proposed that the big-game hunters who made Clovis points were the first settlers in the New World. To be accepted, so-called pre-Clovis sites should have legitimate artifacts and deposits that are consistently and reliably dated, with clear, verifiable relationships between artifacts and dated materials. Just as important, an extensive geographic pattern of temporally and technologically related sites should also be apparent.

One pre-Clovis claim that deserves further scrutiny is Julian Hayden's Malpais model. Hayden, considered by some to be one of the finest field archaeologists to work in the American Southwest and northern Mexico, created the model after more than a decade of survey in the Sierra Pinacate. To reconstruct and evaluate Hayden's model, I examined his field notes and artifact collections from the area as part of my Master's thesis research.

Julian D. Hayden

Ancient trail and sleeping circle in the Sierra Pinacate, Mexico.

Located in one of the hottest, driest, and most remote deserts in the Greater Southwest, the Sierra Pinacate, in northern Mexico, is a volcanic landscape dominated by a massive shield volcano, El Pinacate. Dotted with cinder cones and craters and mantled with desert pavement and lava flows, the landscape is harsh and forbidding, but also strikingly beautiful. Hayden likened it to the moon.

Hayden argued that a unique characteristic of the Sierra Pinacate is its desert pavements, the result of thousands of years of eolian deflation and erosion. Unlike many areas of the Greater Southwest, in the Sierra Pinacate, archaeological remains of all periods and cultures were compressed into a single surface layer. Hayden referred to these surface distributions of remains as fragile-pattern areas where intricate geological, climatological, and archaeological relationships could be inferred from a variety of clues. To Hayden, the archaeology of the Sierra Pinacate represented a unique opportunity to develop a continuous culture history for the entire period of human occupation in the Greater Southwest.

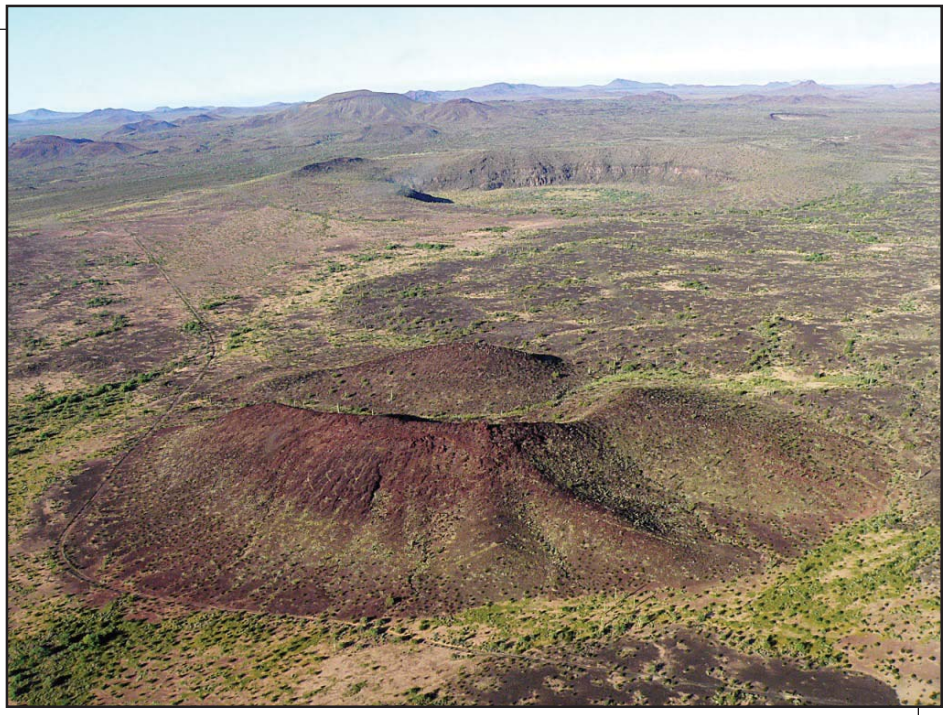
Desert pavements are rock mantles consisting of small cobbles and pebbles resting on a thin layer of very fine, vesicular soils. Rocks within desert pavements are often coated with rock varnish on their upper surfaces and "ground patina" on their lower surfaces. In the Sierra Pinacate, Hayden noted two degrees of varnish formation, which he correlated with two anomalously dry periods, or altithermals—one from 5,000 years ago to 9,000 years ago, and an earlier episode from 17,000 years ago to 21,000 years ago. He believed that the extreme dryness of the two altithermal periods promoted varnish formation and hypothesized that artifacts coated with a thick black varnish were made earlier than 21,000 years ago, whereas artifacts coated with a thin reddish var-

nish were made between 17,000 years ago and 9,000 years ago.

Using techniques pioneered by archaeologist Malcolm Rogers, his mentor, Hayden combined geoclimatic dating, relative and numerical dating of artifacts, features, and landscape elements, and changes in artifact and feature types to develop a culture history for the area. The multidisciplinary approach Hayden used to identify and interpret temporal markers in Sierra Pinacate archaeology is remarkable.

Ultimately, Hayden argued that human use of the Sierra Pinacate stretched back at least 33,500 years, well before the arrival of Clovis people. Following the work of Rogers, Hayden recognized a pattern of flake and core technology, trails, ground figures, trail shrines, sleeping circles, and worked shell tools that he believed represented the pre-Clovis Malpais (33,500 to 17,000 years ago) and the subsequent San Dieguito I (17,000 to 9,000 years ago) cultures.

Unlike other pre-Clovis claims that are based on the investigation of a single, idiosyncratic site, Hayden recognized an extensive, coherent pattern of Malpais sites in the Sierra Pinacate and other parts of the Greater Southwest. The numerical dates that Hayden assigned to the Malpais and San Dieguito I cultures have not been universally accepted, but his relative geoarchaeological and cultural sequences appear sound. For these reasons, Hayden's Malpais model deserves further scrutiny.



Julian D. Hayden

Julian D. Hayden

Top: Celaya Crater, in the Sierra Pinacate, Sonora, Mexico, photographed during a rare instance of the landscape in bloom. Bottom: An intaglio geoglyph in the Sierra Pinacate.

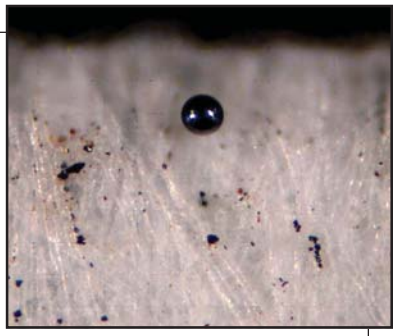
Julian D. Hayden

Julian D. Hayden

Left: Malpais tool embedded in desert pavement. Right: Varnished Malpais tools.

Extraterrestrial Impact in North America 12,900 Years Ago?

Todd A. Surovell, University of Wyoming



An example of an impact marker measuring about 35 micrometers in diameter. Firestone and his colleagues found these enigmatic objects in high concentrations in 12,900-year-old sediments. Although we also found them in sediments of this age, we did not find them in increased concentrations.

The end of the last Ice Age in North America was a time of enormous change: mile-thick glaciers were retreating rapidly, the sea level was rising, and large mammals—such as mammoths, ground sloths, camels, and dire wolves—would soon disappear. At the same time, a clever, two-legged, Old World primate wielding tools of stone and wood first appeared on the scene. Of course, I'm referring to us. Although the relationship among human colonization, climate change, and the extinction of the American Pleistocene megafauna has been studied for more than century, researchers still do not know exactly what happened.

Recently, chemist Richard Firestone, of the Lawrence Berkeley National Laboratory, and a team of researchers have argued that around 12,900 years ago, a comet or asteroid collided with or exploded over the earth. This unfortunate intersection of orbits, they suggest, forever changed the course of history on our planet. It sent a massive amount of glacial meltwater into the North Atlantic, halting oceanic circulation, and returning the climate to glacial conditions for 1,200 years. It also sent an intense shockwave across North America, which devastated everything in its path. It set forests ablaze, drove our native large mammals to extinction, and very nearly did the same to Clovis peoples.

It was not a large crater that inspired what is now known as the Younger Dryas extraterrestrial impact hypothesis, but instead, tiny particles that accumulated in sediments dating to this time period. Firestone's team found high concentrations of what they called "impact markers" in sediments dating to 12,900 years ago in many stratigraphic sections across North America. These markers include grains of magnetic minerals, charcoal, iridium, nanodiamonds, and magnetic spherules (tiny spheres of iron-bearing minerals).

Having worked on half a dozen sites dating to this period, I wanted to see this evidence for myself. With many colleagues, including Vance Holliday and C. Vance Haynes Jr. of the University of Arizona, I began eighteen months of research trying to replicate the results of the previous study. We collected columns of sediment samples from seven Paleoindian sites across the country and then examined concentrations of magnetic grains and microspherules at each.

In contrast to the Firestone team's study, we found no evidence for enhanced concentrations of either marker 12,900 years ago. Instead, both markers appeared to vary more or less randomly in sediments dating to this time period. Another group of researchers, led by Jennifer Marlon of the University of Oregon, examined charcoal in pollen cores and also found no evidence for large-scale continental burning at this time.

Our results have not invalidated or refuted the idea proposed by Firestone and his team, but it is clear that the foundation of his hypothesis is showing some large cracks. However, this debate is far from over, as more researchers will soon weigh in with additional evidence. As for me, I spent hundreds of hours in the lab and found no support for an extraterrestrial impact. I will be happy to watch the rest of the game from the sidelines to see how it unfolds.

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Murray Springs: A World-Class Site is Threatened

William H. Doelle, Center for Desert Archaeology

Recently, C. Vance Haynes Jr., one of the nation's preeminent Paleoindian researchers, gave a lecture titled "Clovis in Arizona" during a Center special event. At the close of his talk, he shared these two images of the Murray Springs Clovis site—one of the most significant Paleoindian sites in North America. The site was discovered in 1966 by Haynes and Peter Mehringer. Some 13,000 years ago, in the upper San Pedro Valley of southeastern Arizona, a band of Clovis people attacked and killed a dozen bison, and on a separate occasion killed and butchered a mammoth. The site was preserved in remarkably good condition by a "black mat" of organic clay that buried the Clovis-age land surface. Over the past forty-odd years, the magnitude of the change in this place has been dramatic. Of greatest concern is the fact that the change has been caused by humans.

C. Vance Haynes Jr.

C. Vance Haynes Jr.

The photograph at top shows the dry, eroded landscape within Curry Draw that allowed archaeologists to observe the "black mat" and the underlying evidence of a very rich Clovis site that was partially excavated in 1966. The photograph below, taken from approximately the same location, shows flowing water, whose ultimate cause is from recent recharge efforts upstream from Murray Springs. This has created a lush appearance that masks the ongoing destruction of this archaeological site. The Bureau of Land Management is working to achieve both successful recharge and protection of this important archaeological site.

Ironically, efforts by the nearby City of Sierra Vista to recharge the regional aquifer of the San Pedro River are having dire unintended consequences for the Murray Springs site. The recharged water displaces natural groundwater, causing it to flow to the surface within the normally dry streambed of Curry Draw at the Murray Springs site. This excess water has saturated the steep banks of the arroyo, causing them, and the associated "black mat," with its rich cultural deposits, to slough off into the now-flowing stream. If these conditions persist, this world-class site may be destroyed.

Fortunately, some action is being taken. Andy Laurenzi, who heads the Center's Site Protection Program, contacted Bureau of Land Management (BLM) spokesperson Kristen Lenhardt and received the following response: "The BLM considers this our most critical management responsibility within the San Pedro Riparian Conservation Area. Most recently, after consultation with our staff archaeologists and hydrologists, we are planning to move forward with a pilot project that will attempt to divert water at Murray Springs around the site and discharge the groundwater directly to the San Pedro River. Regular monitoring will determine if the pilot project is successful."

We will continue to work with BLM personnel to keep attention focused on the critical protection measures being taken to safeguard this important site.

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Back Sight

THE PEOPLING OF THE AMERICAS is one of the great ongoing research topics and debates in the discipline of archaeology. Many different ideas have come and gone, but consensus remains elusive. One reason for this has been a lack of funding. Remarkably, the generosity (and curiosity) of Joe and Ruth Cramer has brought forth five new research programs. As a result, the pace of intellectual investment is increasing rapidly. Even so, the on-the-ground work is slow, and progress is measured in small increments. Nevertheless, the institutional framework created by the Cramers holds great promise for closure on this long-term research issue.

The five Archaeological Research Funds established by Joe and Ruth Cramer.

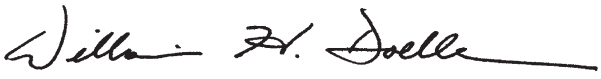
There are institutional parallels with the Center's history. When we received our first major donation of nearly two million dollars back in 1997, we began putting in place a significantly expanded institutional structure. We began intensive research focused on another of archaeology's intractable big research issues: accounting for the dramatic population decline in late precontact times in the southern Southwest. That problem is not resolved, but a great deal of new data has been gathered and new models have been developed.

We have also expanded our institutional breadth. Most recently, we added full-time staff to create our Site Protection Program. Public outreach activities now include our recently redesigned website, *Preservation Archaeology News*, *Southwest Archaeology Today,* and two traveling exhibits—*From Above* (now in El Paso) and *Pieces of the Puzzle* (soon to open at the Salt River Pima–Maricopa Indian Community's Huhugam Ki Museum), as well as this magazine, *Archaeology Southwest*. The Center's own Paleoindian research fund, established six years ago by a loyal donor, is helping to print extra copies of this issue, and has supported Jesse Ballenger's research.

The richness of our human history is particularly evident in the American Southwest and Mexican Northwest. Sharing this deep history with people new to the area is an essential strategy to enlist new supporters. Population growth has been brisk, and establishing connections to new places is essential to build an infrastructure for preservation.

At the Center, we have found it to be absolutely essential to continue to expand our donor base and increase our endowment. The economic collapse in 2008 hurt the Center, but because we had expanded our original endowment dollars with donations from multiple sources, we were not severely harmed. We will continue to build partnerships and search out new donors who believe in the Center's mission as deeply as we do. I suspect that the Cramer research centers will need to do the same if they are to fully realize the vision of their generous benefactor.

back sight (băk sīt) n. **1.** a reading used by surveyors to check the accuracy of their work. **2.** an opportunity to reflect on and evaluate the Center for Desert Archaeology's mission.



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