INVESTIGATIONS AT OHIO SITE PUSH BACK DATES FOR CLOVIS
Discovery May Be East's Earliest Structure

The 12,000-year-old Paleo Crossing site near Akron, Ohio, is one of the earliest-known human occupations in the eastern United States. Recent discoveries there include radiocarbon-dated charcoal from what may be the oldest human structure in North America. The site represents a unique record of post-glacial Ohio.

Crews of archaeologists and students under the direction of Dr. David S. Brose of the Cleveland Museum of Natural History are in their third season of excavations at the prehistoric site in Sharon Township, Medina County, Ohio. The site, about 2½ acres in extent, is part of a larger property now owned by Terri-Jon Management and Development Company. Formerly known as the old Dague Farm site, it lies on a south slope below the crest of a knoll, or glacial knoll, that rises on the west side of a series of kettle lakes, or glacial depressions. The overall site area is defined by Clovis lithic artifacts and waste flake deposits from the manufacture and/or use of these tools.

A Federal Policy for Archaeology
Public lands, especially in the West, harbor most of United States' archaeological sites. Thus the federal government's policies toward America's archaeological heritage is critical to all who are interested in the quest for the first Americans. The Secretary of the Interior, the steward responsible for the greatest number of archaeological sites on public lands, recently issued what is titled "A National Strategy for Federal Archaeology."

"The number of archaeological sites from bygone times never increases; it is only reduced, by modern development, by looting, and even by the very best of archaeological research," says the policy statement, signed by Secretary Manuel Lujan Jr. "It is important that we make the most of the sites that we have left, continued on page 8

ARCHAEOLOGY HAS ADOPTED COMPUTERS
Sophisticated Methods Reveal Hidden Answers

When you think of an archaeologist's tools, do you think of brushes, trowels, plumb lines, and buckets? Perhaps you also think of cameras, microscopes, and laboratory instruments like radiocarbon dating equipment. And, if you haven't already added computers to your list, now is the time to do so. In the last 10 to 15 years, archaeologists have used computers in increasingly powerful and sophisticated ways.

A recent round of interviews with archaeologists at the Smithsonian Institution in Washington, D.C., the Center for Advanced Spatial Technologies at the University of Arkansas in Fayetteville, Ark., and the Illinois State Museum in Springfield, Ill., revealed a wide range of exciting new uses for computers in archaeological research. Archaeologists are using data bases, geographic information systems, CAT scanners, ground sensing equipment, satellites, and three-dimensional visualization technology to advance their understanding of the past.

Geographic Information Systems
Data-base technology is making it possible for archaeologists to synthesize masses of data that no individual person, or team of people, could possibly handle. In seconds, a data base can compare data drawn from hundreds of sites. With appropriate mapping and plotting capabilities, a computer can create maps and charts that illustrate patterns of information that would be extremely difficult, if not impossible, to infer from many pages of raw data.

Dr. Russell Graham, a vertebrate paleontologist at the Illinois State Museum, has been working with Dr. Ernest Lundelius of the University of Texas to develop a massive automated data base. "It's a pretty continued on page 4

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Montana Site Proving Rich In Old Hair
As Complexity Increases, Plans Proceed for 1993

MAMMOTH MEADOW, MONT.—The seventh season of investigation has proven this high-altitude site in southwestern Montana even more complex and interesting than Robson Bonnichsen, principal investigator, had expected. As of this early August writing, the site is continuing to produce an abundance of artifacts from below what had been considered the oldest level.

Even more interesting is the abundance of hair being discovered from the lowest levels. At this point, discoveries are only beginning, but it is clear that human utilization of this rich resource site dates back to before 11,000 years ago. The record of hair already identified establishes the presence of a wide variety of mammals including mammoth, bison, bear, caribou, ancient horse, human, and many smaller mammals. This season’s discoveries may lengthen the list. The hair, most recovered from below the 9,000-year-old Cody level, offers great promise for dating and genetic analysis.

Project leaders, including archaeologist Bonnichsen, geologists Joanne and Morton Turner, and soil scientist Marvin T. Beatty, are already making plans to return to the site during the summer of 1993. They expect to continue and broaden the multi-disciplinary investigation of this site, which lies near a rich source of tool-grade chalcedony along a small stream near the 7,000-foot level a few miles east of the Continental Divide. The area was used as a quarry by people from both the Great Basin and the Plains. These early miners left behind millions—perhaps billions—of flakes as they processed the raw material. Bonnichsen believes the chalcedony was shaped into pre-forms at the site before it was exported.

Investigations this summer were conducted in two large units several meters apart. Excavation has proceeded down through an interesting layer of cobbles, clay and cultural materials that formerly was seen as the floor of the site’s lowest level.

Center Has New Books in Production

The Center for the Study of the First Americans is in the process of publishing new books in its Peopling of the Americas series.

The first, scheduled for publication later this year, is Method and Theory for Investigating the Peopling of the Americas edited by Robson Bonnichsen, Oregon State University archaeologist, and D. Geary Steele, Texas A & M University physical anthropologist.

Combining expertise from a variety of disciplines, Method and Theory is composed of the work of 23 authors whose 17 papers are grouped into general sections on methods, biological approaches, linguistic approaches, material culture, geoastronomy, discussions and conclusions. It grew out of presentations at the 1989 World Summit on the Peopling of the Americas.


Swante Paabo provides comments on the chapters by Turner and Satham, and Jane Kelley provides a discussion of the Method and Theory symposium. The editors provide a final chapter of conclusions.

A new book scheduled for publication early in 1993 is Archaeological Research at Six Cave or Rockshelter Sites in Interior Baja, Brazil, by Alan L. Bryan and Ruth Gruhn of the University of Alberta. After an introduction to archaeology in the region, Bryan and Gruhn have separate chapters detailing stratigraphy and artifacts of Toca dos Buzios, Toca de Manoel Lattas, Abrigo da Lema, Abrigo do Pioxe, Toca do Cosmos and Toca do Gamedeira. Bryan provides a section on the Sambuqui at Forte Marechal Luz in the state of Santa Catarina, Brazil.

-DARR

MAMMOTH TRUMPET

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Paleo Crossing

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eity of non-local sources. All these Paleoindian lithic materials have been found in a 26-acre area curving around the south and west sides of the lake upon which 1893-era farm buildings stand. In that 26-acre area the archaeologists employed controlled plotting of Clovis artifacts within and upon the plowed surface. In the process they identified three concentrations apparently representing areas of ancient human activity. Field crews led by Barbara Barrish have conducted test excavations at these concentrations. They have discovered 24 complete and fragmentary Clovis spear points, more than 300 small, single-sided, stub-onished scrapers, and thousands of used and unused flakes from the manufacture and use of tools.

Distant Sources

Widespread contacts or travel by the tool makers is evident by the sources of materials. Approximately 50 percent of the Paleo Crossing site’s Clovis lithic materials are light gray to bluish-gray Wyanadotte chert, or Indiana hornstone, which outcrops 250 miles southwest of the site, beyond the Falls of the Ohio River.

Another 20 percent of the Clovis lithic materials from the Paleo Crossing site analyzed to date are cherts of the Plum Brook or Pipe Creek outcrops of Mississippian Vanport formation (a facies of the more-southerly and better-known Flint Ridge chalcedony). Plum Brook outcrops about 50 miles east and Pipe Creek about 50 miles west of the site.

Another 15 percent of the lithic materials are an unusual variant of Upper Mercer or Zaleski flint from outcrops 50 to 70 miles south of the site. The remaining 10 percent of the site’s Clovis lithic materials represent a variety of gray to tan white cherts and flints of many lagers and compositions. Although some are from similar chert beds which outcrop approximately 150 miles northeast of the site at the west end of Lake Ontario, all were likely to have been obtained from local glacial outwash deposits.

Less than 5 percent of the Clovis lithic artifacts are of Ohio Flint Ridge flint, and very little Ohio Flint Ridge debitage occurs on the surface or in the colluvial (incoherent) soils within the 26-acre Clovis area. No materials of Ohio Flint Ridge flint were found in situ there.

Post Holes, Drain Tiles

To sample portions of the Clovis site on the bench, excavation of six 2 by-2-m test units adjacent to areas of surface concentrations was done during the summer of 1991. One excavation unit revealed remains below the plow zone of at least two post holes in one of the activity concentrations where preliminary analyses had suggested the potential of a paleosol.

By the end of the 1991 season, Cleveland Museum crews supervised by Barbara Barrish had excavated two 1 m-by-1 m test units in the southeast corner of the field. The work demonstrated that the presence of a Clovis point fragment, which had been found in the lowest portion of the field, was due to disturbance of soils in the 1950s when drain tiles were installed and fill added. Museum archaeology crews also excavated two other series of 2 m-by-2 m test units in one of the areas of lithic concentration where no previous test units had been dug. Five checkboarded 2 m-by-2 m test units were also dug adjacent to the areas where test units during the previous summer revealed a possible subsurface soil zone and post holes. In these test units three buried features were encountered that apparently represent subsurface cylindrical pits, about 35 cm in diameter and 50 cm in depth. These features originated in, and were sealed by, colluvial sediments washed from the kame to the north and west. Although organic staking had almost entirely disintegrated, the lower portion of these features was refilled with sediments much less well sorted than the surrounding matrix.

Many of these pits contained small fragments of lithic debitage or charcoal, which the team recovered in 10-cm-thick zones. One pit contained, within such a matrix, the end-shock broken base of a Clovis projectile point, fluted on one face. By screening plow-zone soils from the same unit, the base of a small and serrated Kirkl corner-notched point was recovered.

Three Samples Dated

In November 1991 the museum sent three samples of charcoal recovered from the unexcavated soils taken during the course of excavation to the University of Arizona’s National Science Foundation Accelerator Mass Spectrographic Radiocarbon Facility for dating. The charcoal sample (AA8550) from one of the three post holes, which the museum investigators believed to be associated with the Clovis horizon at the site, was dated to 12,250 ± 100 B.P. That dates the Clovis structure at the Paleo Crossing site as the earliest in North America. (Proponents of the conventional late-entry theory for the peopling of the Americas have held that the first people arrived in North America about 11,500 years ago. —Ed.)

The museum sent two samples from the cylindrical pit that contained the Clovis point base. One sample (AA8551) of partially clarified organic fragments, which came from a thin lens in the wall at the bottom of the pit, was dated to 13,100 ± 100 B.P. It may well represent the leafmold and forest litter on the surface of the post-glacial landform before occupation.

The third radiocarbon sample (AA8252) consisted of charcoal flecks in a thin colluvial lens below the plow zone at the upper part of this same cylindrical pit, stratigraphically overlaying the horizon containing the Clovis spear-point base. This sample was dated to 9,230 ± 80 B.P. It appears to represent colluviual sediments (slope wash) on the surface of the pit, originating from the Kirk phase occupation on the upper portion of the kame, long after Paleoindians left the site.

In all, the Paleo Crossing site appears like a much smaller, earlier, but far richer version of previously found, plow-down sites such as the Clovis site in southern Michigan or the Nobles Pond site, about 35 miles farther east in Ohio. The 12,000-year-old Paleo Crossing site is among only a handful of partially intact Paleoindian-period occupations in the eastern United States, and it is the only one to have evidence of any structure.

As a preliminary step in archaeological site conservation, the owner of the Paleo Crossing site agreed to have the Cleveland Museum of Natural History nominate the site to the National Register of Historic Places. The owner is allowing the museum to excavate this season and in 1990.

Proposed Investigations

A site of such significance requires careful and well-supported investigation that involves several years. During the 1992 season, the museum’s continuing excavations of the site involve detailed pedological and geomorphological studies and appropriate controls. Recovery of a pollen core from a nearby bog area is to be implemented this year if time and funding permit.

Accurate and rapid mapping of all prehistoric remains exposed at the site in time be accomplished with a computerized laser theodolite "total data station." These data will be linked to GIS/CADD software for additional computer analyses of archaeological and geomorphological site surfaces and artifact distributions.

Chronological control of archaeological data is essential for understanding this early period of prehistory. Fine control is especially needed to maintain possible interactions among groups of peoples or to understand changes in environmental-human interactions in this recently deglaciated region of Ohio. Not only will we attempt to confirm the precise dating of this oldest occupation in the state with a suite of radiometric dates, we will attempt dating with materials other than wood charcoal and we will cross-check dating results by using several laboratories.

The analysis and interpretation of results from the current field season will take place in the museum’s laboratories during the spring of 1993. The museum is exploring a variety of "paleo-forensic" methods reported to be capable of revealing the nature of organic residues on lithic artifacts. Further analysis of lithic material sources is to involve specialized laboratories and experts throughout the region.

Research based on the results of geomorphological, paleoecological and archaeological analyses will be designed to maximize the return of critical data while preserving for the future as much of this unique site as possible. Next spring the museum plans to prepare proposals for additional investigations, and for interpretive publications.

—David Brose & Barbara Barrish

Map of Paleo Crossing site shows 2 m-by-2 m test units from 1991. Arrow locates the position of the post hole associated with Clovis horizon dated at 12,250 ± 100 years B.P.
interesting program," Graham says. "We call it FAIMAP, and it’s for mapping the distribution of North American mammalian species for the last 40,000 years." In the last year and a half, Graham and Landelius and their team have entered data from most of the sites in the western United States; they are now working on eastern sites. Well over 1,700 sites have been coded in the computer, and Graham anticipates at least 2,500 altogether. Using the relational data base Paradux, made by Borland, on an IBM PC-compatible computer, they encode information about each site in a cultural associations, geographic location, depositional systems, and species of mammals.

As with all computer systems, the results are only as good as the quality of the data that are entered. Fourteen collaborative scientists from the United States and Canada provide Graham’s team with access to scientific literature containing useful data and also serve to check quality control. Three criteria are used to select the data that are entered:

1. The data must contain good locational information for each site so that it can be mapped; the site must be identified by at least the county in which it is found.
2. The site must be associated with an absolute date, have clear stratigraphic dating information, or have a strong cultural association to date from.
3. The site must have a voucher specimen in a public institution.

Data captured on the personal computer can be transported over an Ethernet network to a Geographic Information System on an IBM 6000 minicomputer. Geographic Information System, or "GIS," is an umbrella term that refers to any computer system of hardware, software, and data that can handle spatial references in a sophisticated way. On the IBM 6000, Graham uses the Arc/Info software package designed by the Environmental Systems Research Institute, in Redlands, Calif.

This two-part software package includes a relational data base (the "Info" segment), which contains the attribute information that has been transported from Paradux on the IBM PC.

The "Arc" segment of the program can generate maps using any of the data contained in the "Info" section. And, says, Graham, "The real power is in generating these maps. Some of the things we’re seeing we didn’t think we would see ... We’re just really getting into it now; I think we’re going to see lots of surprises before we’re done with it." Arc/Info’s ability to overlay different types of maps and look at spatial relationships is especially powerful, Graham says.

Graham notes that Arc can generate maps of different species through different slices of time, for example 15,000 to 20,000 years ago, 10,000 to 15,000 years ago, or at a particular span of time during the Holocene. "So we can see how individual species have moved in the past, in relationship to environmental changes."

Graham has also used the GIS to develop predictive models for paleontological sites. He explains that a predictive model is "a model you develop by taking all available information you have about the location of known paleontological sites. You look at where they are, what the relationship is to soil type, geological deposits, the nearness of streams, etc." These data can then be used to identify how the sites relate to the physical attributes of the landscape on which they are located; for example, mammals may frequently have congregated in sheltered wetter holes. "Then you take that model and apply it to an area where you know nothing about paleontological sites, and predict where sites might be with the construction of a probability map."

In seconds, a data base can compare data drawn from hundreds of sites.

From Field to Lab to Curation Another institution making extensive use of data bases is the Center for Advanced Spatial Technology at the University of Arkansas in Fayetteville, Arkansas. Dr. W. Fredrick Limp, director of the Center, and his staff of 26 people have been developing new uses for data bases and geographic information systems. The Center’s staff has worked closely with the Arkansas Archaeological Survey, a statewide archaeological research organization, as well as other organizations.

So far, they have been using 25 UNIX workstations made by Sun Microsystems and Digital Equipment Corporation. In time, they may have to move up to more powerful systems.

Limp notes that computer applications in many fields are often afterthoughts; the researchers first perform their experiments, or make their excavations, "and then automate the results to do a particu-
unique artifacts that need careful description are chosen for scanning. Not only are the CAT-scan images useful records of existing artifacts; they will also be useful in determining the origins of artifacts that are studied in the future. "If the dispute over where material belongs, in terms of geographical distribution or tribal distribution," Frohlich says, "then maybe statistical analysis can help us document a certain specimen. By documenting material presence, then we can use statistical procedures to document material we do not know."

Thus, he says, his goal in the repatriation project is to record as much data as possible about each specimen—more data, in fact, than he now knows a use for, because it may be useful later.

Ground Sensing
Dr. Frohlich has used ground-sensing technology, or geophysical equipment, to locate archaeological sites. Since 1981, he has used this equipment in Jordan, Saudi Arabia, Egypt, Bahrain, Kuwait, and Pakistan.

In Kuwait, he used the Geonics EM-31, an electromagnetic conductivity meter made by Geonics Limited of Ontario, Canada. The Geonics EM-31 measures the ground's conductivity and produces data that can be analyzed by computer. By analyzing the conductivity of an area, scientists can begin to map the anomalies of the ground's conductivity. Working closely with geophysicists, they can distinguish the areas created by the presence of human-made artifacts below the surface of the soil. For example, Frohlich says, there is a difference in conductivity between ground that lies inside or outside the walls of a house, even if the walls are completely covered with additional layers of soil. By studying patterns of conductivity, archaeologists can locate sites below the surface of the ground.

Satellite Technology

The Center for Advanced Spatial Technology is also using remote sensing data gathered by satellites to define the characteristics of landscapes in which archaeological sites might be found. "The satellites aren't in fact finding archaeological sites," says Dr. Albert Green, director of the Center for Advanced Spatial Technology. "They're finding complex sounding of soil characteristics," which can indicate likely locations for archaeological sites.

They can distinguish anomalies created by the presence of human-made artifacts below the surface of the soil.

As an example, he explains that the Mississippi Valley is a subtended geography of small sandy rises with clay around them. Many archaeological sites are located on the rises. "The satellite can't find the archaeological sites, but it does a really good job at finding the kind of vegetation that grows on those little rises." By examining satellite images of the landscape, Limp may be able to find additional archeological sites.

Frohlich is also using satellite data to identify possible archaeological sites in southern Greenland. He has been looking at Viking and Norse settlements that were left behind by their ancestors. By analyzing satellite images of the landscape, Frohlich says, he may be able to locate additional archeological sites.

Three-Dimensional Visualization

Perhaps the most exciting use of computers in archeology is in the area of three-dimensional visualization. This technology is closely related to what is known as virtual-reality technology. Both systems create three-dimensional images that the viewer can explore independently. However, instead of displaying the image in a headset worn by the virtual-reality user, a three-dimensional system displays the image on a computer screen.

To get an idea of what a three-dimensional visualization is like, imagine a television screen that responds to your initiative. If you want to explore the view to your left, you touch a button and the view changes to show you what is to your left. If you want to look at the ground or the sky, you can do so. You control what you look at. In a three-dimensional visualization, this is exactly what you can do.

As part of a project at the Illinois State Museum, the Center for Advanced Spatial Technology is proposing to use three-dimensional visualization to create views of the landscape as it appeared in previous eras. Limp finds the possibilities of visualization very exciting. "With the developments in virtual reality, I'm convinced we'll have tours of the past," he says.

The Illinois State Museum and the Center for Advanced Spatial Technology hope to create such a tour of a Cahokia site, a massive archaeological site near St. Louis. This culture had 30,000 inhabitants at its height; and it has left behind a large complex of mounds. Limp hopes to use visualization software packages to create archaeologists' alternative visions of what this culture was like.

The task of creating a factually based representation of a past culture requires all the power of three-dimensional visualization software. "Archaeology is a very complex science. In fact, it's a complex science of real people. It's a complex science of all the things that can happen in a culture," Frohlich says. "Archaeology isn't really archaeology, it's psychology and biological mapping and the mathematics of human relationships, and species. It's basically everything—just in the past. It's an enormously complicated set of data that is interconnected. And within the last decade, really, we're beginning to see some of the automation tools that are allowing us to manipulate that data in really complex ways. Ultimately, visualization is just one way of seeing complex data."

The Impact of Computers on Research

Computers have added many new tools to the archaeologists' tool kit. The development of these tools is a great benefit to archaeologists, but it also poses one overriding danger to their research: It is essential that archaeologists identify the potential dangers of their research and be aware of the risks involved.

Frohlich tries to maintain a balance between his need for computers, and his primary commitment to technological research: "I like to see the computer as a tool. It helps me manipulate data and get an overview of it. . . . But I use it as a tool, as a shovel to move soil; the shovel makes it easier for me to move the soil, and the computer makes it easier for me to look at my data. . . . I go buy a shovel; I use it as a tool, as a shovel to move soil; the shovel makes it easier for me to move the soil, and the computer makes it easier for me to look at my data. . . . I go buy a shovel;"

UPCOMING CONFERENCES

Contact: Max Pavek, Idaho State Historical Society, 210 Main St., Boise, ID 83702 (208) 334-3847.

Oct. 16—17—Second Gender and Archaeology Conference, Boone, N.C. Theme is "Women in the Profession—Histories, Cultural Resource Management."
Contact: Cheryl Claassen, Department of Anthropology, Appalachian State University, Boone, NC 28608 (704) 262-2285.

Nov. 21—24—Southeastern Archaeological Conference, Little Rock, Ark.
Contact: John House, P.O. Box 136, UAPB, Pine Bluff, AR 71601 (501) 557-1151.

Nov. 5—8—90th Annual Meeting of the Eastern States Archaeological Federation, Pittsburgh, Pa.

Nov. 12—15—200th Annual Chicago Council, Calgary, Alberta.
Contact: Programme Committee, Department of Archaeology, University of Calgary, 2500 University Drive N.W., Calgary, Alberta T2N 1N4.

Contact: William L. Eades, Kansas State Historical Society, 120 West 10th, Topeka, KS 66612 (913) 296-2625.

Nov. 20—21—First Discovery of America, a Conference on Ohio's Early Inhabitants. The Ohio Historical Society, Columbus, Ohio. The goal of the conference is to expand understanding of the earliest human inhabitants of Ohio and the Great Lakes region. Contact: Bill Dancy, Department of Anthropology, The Ohio State University, 245 Land Hall, 124 West 17th Ave., Columbus, OH 43210-1364 (614) 292-9770.

Mammoth Meadow

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level, and into a sandy layer below the present water table. Thus water pumps and generators to power them are a necessary part of the project's field equipment.

The pumps remove water from pits and also provide water to screen excavated material. Not only does water help to remove soil from still-abundant lithic artifacts, but it is also used to separate hair from the clay. After material is scooped from the pits, it is soaked in a commercial water-softening solution to break down the clay. Then it is passed through flotation tubs equipped with fine-screened outlets to catch any hair that might have been trapped in the clay and hidden from archaeologists. Waste water is caught in a holding pit and recycled as needed.

Early miners
left behind millions—
perhaps billions—of flakes.

Analysis of the hair will continue through the coming months. The extensive hair record is considered innovative and is potentially the most significant aspect of Mammoth Meadow.

Down through the Cody level, a previously dated and readily apparent cultural horizon that varies in depth from about a meter to more than two meters below the surface, Mammoth Meadow has produced an extensive record of bone. Below the Cody level, there is little bone but there are many samples of hair.

Hair can be identified, dated and even used as a source of genetic information. "Hair, here, is the key," says Bonnichsen, who considers the study of hair as a new subfield of archaeology. "And we have been throwing it away."

Specialists at Simon Fraser University and Penn

PENDEJO INVESTIGATION IS CONTINUING

As an associate of Richard S. MacNeish, principal investigator of Pendejo Cave near Oregrande, N.M., brought faunal and fingerprint evidence from the investigation to Oregon State University early this summer to show staff members of the Center for the Study of the First Americans.

Dr. Donald Christman, an osteologist, displayed the broken leg bone of an extinct species of bison that was taken from the cave site. The bone, a humerus broken in mid-shaft, was from a layer the MacNeish team has dated to 40,000 years ago. Christman said the two pieces were found within a hearth approximately six inches apart, with a rock between them.

The nature of the break, apparently caused by a sharp blow to one of the strongest parts of the bone, has led Pendejo investigators to suggest that it had been purposefully broken, apparently by a human seeking to extract marrow. The bone is charred black, presumably from the low-oxygen heat of a hearth where it could have been placed to keep it from predators. Center staff members agreed that the bone, that of a Bison antiquus, did not seem to have been broken by natural event, such as a rock falling from the cave roof. Evidence points to a careful and deliberate break.

Ancient bison bone rests on tissue paper with transparent tape across the break that appears deliberately made to extract marrow.

Close-up of print from 28,000 B.P. level at Pendejo.

Dr. Christman also displayed samples and photographs of Pendejo's now-famous clay casts of apparent human finger- or hand-prints, dated at 28,000 years ago. MacNeish and his team discovered the prints in the cave several months ago (see Mammoth Trumpet 7:1 Pre-Clovis Human Prints Found in Clay). The prints, Christman noted, display the distinctive ridges and also sweat glands of the people who left them. While at OSU, Christman also discussed the human hair, dated at 19,000 years B.P., which has been discovered at Pendejo Cave.

More recently Dr. MacNeish was the subject of a profile in the July 31 issue of Science spotlighting his strong disagreement with the theory that peopling of the Americas began no more than 12,000 years ago.

-DAH
huge amounts of data from many fields. In minutes, computers can generate charts and maps using data it would take a human lifetime to analyze and plot. As a result, computers are revealing large patterns of data that archaeologists have been unable to discern until now.

The result has been a fundamental shift in archaeologists' outlook, from the recent emphasis on technical specializations to a larger, more comprehensive view of entire cultural systems. This bigger view is, paradoxically, very close to the view of the archaeologists who lived and worked a century ago. Limp explains: "When you read the way archaeologists wrote about archaeology in the late 1890s through the early 1900s, they were excited about what the people looked like, and there was a sense of almost creating a past landscape and a past life.

"Then, as archaeologists faced up to the legitimate reality of the complexity of the problem, everybody became a lithic specialist," concentrating on specific areas of technical expertise. But in viewing sites and artifacts so technically, Limp says, "we forgot that there were people. . . . While we need to focus on that very detailed analysis, maybe with the computers we have, we now have some tools to move that from an analysis to a real understanding of the real complexities of people who lived in the past. . . . That's pretty exciting."

---1992 by Nancy Allison

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The Center for the Study of the First Americans needs to reduce its stock of books and journals to make room for new titles. For a short time only, the Center is offering discounted prices on all its books shown below. The discounts, up to 20 percent and more in some cases, are on new titles such as Clovis and Taima-Taima as well as popular books such as Bone Modification, the bible of archaeological and paleontological investigations of bone. All available issues of Current Research in the Pleistocene also are discounted.

Orders must be received by Oct. 15 to obtain the discount.

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I. CENTER PUBLICATIONS

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10. Mammoth Trumpet

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*If ordering 5 or more CENTER publications, take 20% discount.

II. NEVADA STATE MUSEUM PUBLICATIONS

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III. SMITHSONIAN PUBLICATIONS

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IV. OTHER

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Site data, artifact data, report data, and spatial information are all together on the same system. . . . The result has been a fundamental shift in archaeologists' outlook.

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The University of the U.S. Bureau of Land Management, the agency responsible for the area, which is extensively grazed by the cattle of a neighboring ranch. An electric fence protects the open excavation units from these modern megafauna. Other interesting finds from the lowest levels are unusual rounded rocks that appear to be bolas fashioned from dark, granular rock. While recovery of the hair and lithic materials proceeds, mapping of the area's geology and study of the soils continue. Mammoth Meadow's chaledony, formed as the result of volcanic alteration of the local geology early in the Tertiary Period. For thousands of years—probably until after American explorers Meriwether Lewis and William Clark passed near here in 1805—the haurous crystalline-like rock was quarried from these sagebrush-cloaked hills where it occurs in bands a few miles wide at near the surface. Early miners left the slopes dotted with shallow pits, and the area's surface remains scattered with flakes of handsome tool-grade material that compel archaeologists to stoop to admire them.

The area had been known for decades to amateur collectors of lithic tools. Bonnichsen and his colleagues, including Richard Reinhart, archaeological field foreman, chose the site for their investigations in 1886 and have returned every year but one since then. The Turners have made extensive field surveys in the area. While they found that Mammoth Meadow was not glaciated in Wisconsin time, they discovered evidence of glaciation early in the Pleistocene, more than a million years ago.

This site was termed Mammoth Meadow when a piece of mammoth bone was found on the surface in 1985. Although mammoth hair has been discovered during the excavations, the site has produced no further mammoth bone or tusk. Archaeological teams here include a number of volunteers from all across the United States. Persons interested in being part of a Mammoth Meadow expedition may write to the Center for the Study of the First Americans at Oregon State University for information about the 1993 field season.

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I do try to make it myself. But," he adds, laughing, "sometimes I might design a better handle—something like that.

But computers' benefits to archaeologists far out

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Federal Policy

continued from page 1

using wisely those that must be destroyed or damaged and preserving as many as possible so that future generations of Americans also will have access to the unique archaeological information that they contain. These materials are a record of changing environments over the millennia, and of the human community’s adaptations to those changes.”

Secretaries make a point of calling for more public education and participation in archaeological activities. “We need more and better public education and opportunities for the public to participate legitimately in archaeological projects,” he says.

“The increasing popularity of State Archaeology Week celebrations, archaeological open houses and tours, available archaeological volunteer programs, even the Indiana Jones films, all demonstrate that archaeology is a topic of interest to millions of Americans.” Lujan says federal and other public agencies that conduct archaeological investigations or manage archaeological sites should do more to present the results of their investigations and interpret their sites for the public. He encourages public land managers to involve the public in archaeology.

“Opportunities for public participation in federal archaeological projects should be included in the project design,” says Lujan.

The Interior Secretary outlines three benefits of public involvement with archaeology projects:

1. To provide a constructive outlet for persons with a strong interest in archaeological information that they engage in archaeological looting;
2. To teach people to appreciate the careful recording and detailed attention necessary in scientific archaeological field and laboratory work by having them excavate at a site or clean, sort, and catalog finds from an excavation;
3. To provide volunteer labor that can further the interpretive or management needs of public archaeologists and protect. He emphasizes that volunteers must be properly supervised.

The National Park Service booklet Archaeology and Education: the Classroom and Beyond is available free of charge to help in educating the public. It includes six essays by different educators and professionals who discuss programs that successfully impart the awareness, the teaching of, participation in, and evaluation and training of teaching in archaeology. The booklet is written for a general audience and is part of a series that the Park Service is publishing.

In the federal policy statement Lujan also emphasizes that archaeological sites include a record of thousands of years of human adaptation to changing American environments.

“This record is a public trust to be understood and evaluated to help shape our present responses to changing environments,” Lujan says, adding that the ancient plant and animal remains in archaeological sites identify the conditions in which people have lived, and the changes that have occurred in society, diet, and technology in response to changing climate and natural resources.

The federal policy also outlines efforts to fight looting and preserve the archaeological record in place. “We have had recent successes in this area; several federal bureaus have focused new attention on archaeological site protection. Interior bureaus and other federal agencies joined in the national effort led by the Society for American Archaeology to protect archaeological sites.” The Park Service publication Legal Background of Archaeological Life-Sources Protection provides an examination of legal protection to archaeological resources. It examines laws from the Antiquities Act of 1906 to the 1968 amendments to the Archaeological Resources Protection act, which were designed to help prosecute looters. Other legislation that indirectly benefits the protection of archaeological resources also is examined.

A related Park Service publication, Site Stabilization Information Sources, also focuses on site protection. It highlights the process of a stabilization project, which is a multi-discipline effort including archaeologists, cultural resources managers and stabilization specialists. Maximum protection to the site, with sensitivity to the archaeological record is the ultimate goal. Preservation in situ is the approach of choice, and site stabilization, rather than systematic excavation, is one of the most important means to protect sites when they are threatened by adverse effects. Both publications, Technical Briefs 11 and 12, are available free of charge (adjuncting box).

Lujan’s policy statement stresses cooperation in the exchange of information. Noting that federal and other public agencies conduct tens of thousands of archaeological investigations each year, gathering information about the presence of sites and the significance of sites plus interpretations of history and prehistory, Lujan declared that the data must be available to those who need it. “Such information is of intense interest to the agency that conducts the study, but exchange of information often is hampered by bureaucratic constraints. Public agencies must work to improve archaeological information exchange at the national, state or regional, and local levels.

“One specific means of improving this exchange is the participation of public agencies in the National Archaeological Database network being established through the National Park Service,” says Lujan. The new federal policy also encourages interagency meetings to discuss common archaeological challenges and opportunities.

“On average, Federal agencies that manage land have conducted investigations to inventory the archaeological sites on less than 10 percent of their public land,” says Lujan. “The lack of information about where archaeological sites are located has been identified by many as one of the problems confronting agencies in the preservation of sites. We need to find the means to undertake these inventory investigations.”

The Interior Secretary’s new policy also focuses on the curation of collections and records including protecting the vast numbers of artifacts and other remains excavated from sites on public lands or from sites that government activities have disturbed.

“What these remains must be curated properly,” Lujan emphasizes. “For sites that have been destroyed, these remains and records are the only remnants left to future generations from which they can learn about the archaeological record. These remains and records must be cared for to ensure their preservation for future use. We must be more systematic programs to meet this preservation challenge.”

In conclusion, Lujan’s statement says that federal strategy will improve the preservation of America’s archaeological heritage when public agencies adopt and implement appropriate activities. “The loss of any of this heritage diminishes all of us and future generations. There is no quick fix to our challenges. Public agencies must provide for archaeological preservation as an important part of their ongoing programs.”