

# MAMMOTH TRUMPET



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## MOCHANOV SHOWS, TELLS, ON U.S. TOUR

### Siberian Says Diring Site 3.1-1.8 Million Years Old

Russian archaeologist Yuri A. Mochanov has returned to the chill of Siberia after attempting to warm American scientists to evidence that humans lived—and perhaps originated—in the frigid far north more than two million years ago.

During a tour of the United States in January and February, Mochanov, director of the Lena River Basin Archaeological Expedition and Academician of the Russian Academy of Science, spoke to American scholars, students and the public. His appearances, which received considerable news coverage, caused audiences to ponder questions of human origin and dispersal. His tour began in the Northwest with public appearances in Seattle, Portland, and Corvallis. Then he spoke in San Francisco and met scientists at the Institute of Human Origins in Berkeley. From there, he visited the Calico pebble-tool site in the southern California desert. Traveling inland, he addressed academic audiences and met with scholars at Texas A&M University and the University of Arkansas before visiting the Smithsonian Institution in Washington, D.C., and Rutgers University. His final U.S. appearance was at the Denver Museum of Natural History. The tour was sponsored by the Center for the Study of the First Americans.

Mochanov has strongly defended his scientific



Mochanov confers with interpreter during lecture at Oregon State University.

team's series of paleomagnetic dates that indicates a stratum containing pebble tools and associated debitage is from 3.1 to 1.8 million years old. (See *Mammoth Trumpet* 7:3 "Siberian Site Defies Theories on Peopling.") Speaking to an Oregon State University seminar, Mochanov insisted that to suggest the site might be younger would be intellectually dishonest for him because it would deny evidence secured by his scientific team. Mochanov insisted that research has done nothing but confirm original findings of the site's antiquity, and he repeatedly invited U.S. scientists to visit Diring and investigate for themselves.

The concept of tool-making hominids 3 million years ago at one of Earth's coldest places confounds anthropological theory. Yet if Diring's evidence is troubling for American anthropologists and archaeologists, it was stunning to Mochanov and Svetlana Fedoseeva, his wife and the archaeologist who initially found the pebble tools while excavating a late-

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## STRATIGRAPHY SHOWS UNITY IN DRAW SITES

### Study Puts Folsom Date On Controversial Skull

New understanding of stratigraphy at sites in the southern High Plains promises to unify and improve knowledge of well-known Paleoindian sites such as Blackwater Draw, Plainview and Lubbock Lake. The stratigraphic analysis by Quaternary scientist Vance T. Holliday already has brought a new estimate of the age of the Midland Woman, the long-controversial human remains discovered in 1953 near Midland in west-central Texas.

Dr. Holliday, Associate Professor of Geography at the University of Wisconsin-Madison, says geological evidence suggests that the stratum of the Midland site in Monahans Draw is no more than 10,000 years old and possibly younger. "To put it another way, it would be Folsom age at the oldest and possibly younger than Folsom as opposed to some of the other interpretations that place it as Folsom age or older," Dr. Holliday said in a recent telephone interview from his office at the University of Alaska Museum, where he is a visiting professor in the Alaskan Quaternary Center for a semester. Holliday's interpretation is based on his field work in 10 draws—shallow, normally dry valleys—on the High Plains of Texas and New Mexico.

Holliday's focus on the Midland site stems from an interest in the Paleoindian geochronology of the region. The study evolved from a broader interest in late Quaternary stratigraphy and paleoenvironments. "It allowed me to try and answer some of the lingering questions about the age of the human remains." Because existing data from sites such as Blackwater Draw, location of the original Clovis discovery, and Lubbock Lake, suggested similar stratigraphy, his goal was to establish regionwide understanding. Previous evidence had suggested that the environmental histories of the sites were similar through time. "In other words, it suggested that all the areas experienced similar environments as the climate changed through time."

His study extended from the Plainview site in Running Water Draw on the north all the way to Monahans Draw near Midland on the south. The work involved analyzing 400 sediment cores and sections in about 100 locations along the 10 draws.

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Archaeologist Yuri A. Mochanov engages in an animated conversation with a Russian-speaking visitor at a reception following his lecture in Corvallis, Ore. With him is his wife, archaeologist Svetlana Fedoseeva.

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# You Can Join the First Americans Expedition

If you would like to discover a stone tool that someone lost more than 11,000 years ago, consider joining a First Americans Expedition in southwestern Montana this summer. You'll be guaranteed an away-from-it-all, two-week vacation in a beautiful, secluded place, and you'll meet interesting, intelligent people who share your interests.

More important, you'll be a crucial part of a tangible scientific quest at the Mammoth Meadow archaeological site. Volunteer support is crucial to the opening of this unique window on America's earliest human heritage, because field archaeology is a time-consuming and labor-intensive undertaking. The Mammoth Meadow site, under scientific study since 1985, has revealed an extensive series of habitation floors dating as far back as 14,000 years.

Nearly 20,000 flaked stones, worked bones and other artifacts have been recovered by volunteer and professional archaeologists from the site, which is located near sources of high-quality chaledony that was used for tools by people over a vast area. More unusual is the extensive record of hair recovered by Mammoth Meadow workers. Hair found there is helping change the course of archaeological investigations because it has proven the presence of many animals, some of which, like mammoth, American horse, and American camel, are long extinct. Still more fascinating is the record of human hair that clearly links the early inhabitants with Asia. Using new technology, scientists can use the hair recovered from the site to provide hitherto unobtainable information on prehistoric animals and peoples who have been there.

The Center for the Study of the First Americans is already accepting applications for volunteers for the 1994 field season at the site on the slopes of the Beaverhead Mountains. Volunteers are expected to provide their own transportation to Dillon, Mont., and furnish their own camping gear, but they are served meals at Mammoth Meadow's "Far Away Cafe," a well-equipped mobile kitchen and sheltered



First Americans Expedition participants watch a flintknapping demonstration by Rob Bonnicksen, principal investigator, at the Mammoth Meadow site in southwest Montana.

meeting area. Volunteers learn from and work with a congenial team of professional archaeologists, geologists, soil scientists and anthropologists. They join in hands-on projects including mapping, excavating, screen-washing, flotation of organic sediments, and cataloguing.

Three expeditions are scheduled: June 18-July 2, July 6-July 20 and July 23-Aug. 6. A few scholarships may still be available. For an information packet on

the 1994 Mammoth Meadow expedition and a registration form, phone 503-737-4595, or write: First Americans Expedition, CSFA, Weniger 355, Oregon State University, Corvallis, OR 97331. ☐

## Video Previews Expedition

An excellent way to preview what it is like to be a part of a First Americans Expedition is by purchasing the new video, "An Archaeological Quest for the First Americans." This professionally produced presentation illustrates work at the Mammoth Meadow site and beautifully depicts the ambiance of a First Americans Expedition. It also places developments at Mammoth Meadow into a broader scientific context. To order your copy of this video by Anne Stanaway of Sunlight Productions, send \$13.95 to the Center for the Study of the First Americans, Weniger 355, Oregon State University, Corvallis, OR 97331, or fax your order with your Visa or MasterCard number to 503-737-3651. ☐

## SUGGESTED READINGS

### ON Mochanov Shows, Tells

Mochanov, Yuri A. 1993 *The Most Ancient Paleolithic of the Diring and the Problem of a Nontropical Origin for Humanity*. Translated by Richard L. Bland. *Arctic Anthropology* 30:1:22-53.

Morell, Virginia 1994 Did Early Humans Reach Siberia 500,000 Years Ago? *Science* 263:611-612.

### ON Stratigraphy Shows Unity in Draw Sites

Hester, James J. 1972 *Blackwater Locality No. 1: A Stratified Early Man Site in Eastern New Mexico*. Vol. 8. Publications of the Ft. Burgwin Research Center, Taos.

Johnson, Eileen (editor) 1987 *Lubbock Lake: late Quaternary Studies on the Southern High Plains*. Texas A&M University Press, College Station.

Wendorf, Fred, and Alex D. Krieger 1959 New Light on the Midland Discovery. *American Antiquity* 25:66-78.

Wendorf, Fred, Alex D. Krieger, Claude C. Albritton and T. Dale Stewart 1955 *The Midland Discovery*. University of Texas Press, Austin.

### ON New Wave in Archaeology

Bonnicksen, R. M. T. Beatty, M. D. Turner, and M. Stoneking 1994 (in press) What Can Be Learned from Hair? A Hair Record from the Mammoth Meadow Locust, Southwestern Montana, in *Prehistoric Mongoloid Dispersals*, edited by Takeru Akazawa and Emöke J. E. Szathmari. Oxford University Press, New York.

Fischman, J. 1993 Going for the Old: Ancient DNA Draws a Crowd, *Science* 262:655.

Stone, Anne, and Mark Stoneking 1993 Ancient DNA from a Pre-Columbian Amerindian Population, *American Journal of Physical Anthropology* 92:463-471. ☐

## New Genetic Study Backs Early Arrival

Research in genetics published recently by a team headed by Antonio Torroni of Emory University indicates that people reached Central America 29,000 to 22,000 years ago. The report in *The Proceedings of the National Academy of Sciences* details the study of seven groups of Central American Indians who speak the Chibcha language.

Archaeological and linguistic evidence indicates the separation of the seven groups at 10,000 to 8,000 years ago. The genetics team studied mitochondrial DNA from these people and determined the amount of genetic diversity apparent from a separation of that length of time. Having thus developed a presumed rate of genetic mutation and differentiation, team members then compared genetic differences between the Chibcha people and 18 other Indian groups. They concluded the amount of diversity they found would have taken at least 22,000 years to develop.

Though the team's paper notes there are inferential leaps in their evolutionary time clock, Dr. Torroni told *The New York Times* that he believes in the data. "I feel that they strongly push for an early arrival of people in the Americas," *The Times* reported. ☐

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A NEW WORLD of materials is opening up for archaeological study. Inside bone and teeth, as well as inside softer parts of living bodies, are minute amounts of DNA, the genetic material. This comes about because every part of a human being is built up from cells. And virtually all cells contain DNA, long molecules that direct each cell's function: whether it will grow and divide, whether it will produce bone materials or head hair, whether it will send out nerve signals, and so on.

Molecular biologists have become proficient at isolating and analyzing DNA from the cells of living bodies. Recently some molecular biologists have turned to the challenge of studying DNA isolated from dead bodies, whether Egyptian mummies or Paleo-Indian burial remains (see **Suggested Readings**). Since our human individuality depends in large part on our DNA, these molecular studies of present and past humans are informative about human variation and human evolution.

So far, studies on ancient human DNA have relied on extracting it from hard materials such as bone and teeth. But bones and teeth are not as numerous as human hairs, which also contain DNA but which are often overlooked in archaeological excavations. So a team at Oregon State University is now embarking on the comparative study of hair DNA from both modern and ancient humans.

The team, composed of Katharine Field, Walter Ream, and Robson Bonnicksen, has recently received funding from the OSU Research Council for a pilot project aimed at the analysis of human hair from the extensively studied Mammoth Meadow site in Montana. Dr. Field is in the departments of Microbiology and Zoology, Dr. Ream is in the Agricultural Chemistry department, and Dr. Bonnicksen is Director of the Center for the Study of the First Americans, Professor of Anthropology, and principal investigator at Mammoth Meadow, where he and his co-workers have developed field methods for recovering hairs from the clay deposits. The site has produced a record of human and animal

# New Wave in Archaeology:



## Oregon State University Team Launches Pilot Genetic Study

hair spanning the period from about 14,000 to 8,000 years ago.


In a recent interview, Dr. Field explained that human hair can be readily differentiated from the hair of other species. Furthermore, it is "tough," resisting decomposition even under rather extreme conditions.

*Analysis of hairs from archaeological sites might reveal genetic characteristics of the local group and how the population changed through time.*

It can be radiocarbon dated quite accurately by the method of accelerator mass spectrometry. And it contains minute but measurable amounts of DNA. "Another

important consideration," Dr. Field noted, "is that human hair is lost continuously throughout the life span—unlike bones or teeth, so that an archaeological site encompassing a camp or a settlement may contain hairs from the entire local population." It follows that analysis of the hairs at such a site might reveal in unusual detail genetic characteristics of the local group and how the population changed through time, given the good hair-dating techniques now available. Ancient groups from several areas could also be compared genetically, via hair-DNA studies.

Dr. Field cautions that a number of technical problems need to be addressed before the ancient hair samples can be analyzed. First of all, when studying today's populations, copious DNA can be extracted from blood samples. A hair, in contrast, contains a very small amount of DNA, and it is likely to be imperfectly preserved. The technique of gene amplification called

polymerase chain reaction, or PCR for short, can be used to get around this problem. Using PCR, millions of copies of a DNA sequence can be made in a test tube, as long as researchers have some DNA sequence information to start off the reaction. The necessary sequence information to prime the reaction comes from what is known about modern humans, because all people living or long dead share a great many of their genes. The initial step in this study will be for team members Field and Ream to analyze DNA from the hair of living people. Then they will turn their attention to old-but-not-ancient hair samples obtainable from museums, such as the Smithsonian Institution; this phase of the work will permit them to develop lab techniques especially applicable to old, fragile, and imperfectly preserved hair. The DNA extractable from such hair is expected to be degraded into short segments, far from a "pristine" condition. Obtaining enough DNA for genetic analysis from these old hairs is often problematical. Only when these "test runs" have been satisfactorily concluded will the team members turn their attention to the less numerous, and far older, human hairs rescued from Mammoth Meadow. Then the heart of the study will really begin.  —Dee Baer



Katharine Field examines an individual DNA record in her lab at Oregon State University's Department of Microbiology. Dr. Field, who is also in the OSU Zoology Department, and her colleagues hope to develop techniques to analyze DNA found in old hair from archaeological sites.





With the help of interpreter Mila Bonnichen, Mochanov replies to questions from members of an audience in Corvallis, Ore.

## Mochanov

*continued from page 1*

Neolithic site at Diring. Nothing of the kind had ever been found in Siberia. "We were at a loss," Mochanov told the Oregon State seminar. "These materials were comparable only to the most ancient tools in Africa." They seemed, he said, Oldowan in typology, that is, comparable to the 1.6- to 2.5-million-year-old tools of broken pebbles and flakes found at Olduvai Gorge. Such tools are quite individual in character, though some may seem sophisticated and practical.

Showing slides depicting snow blanketing their site, Mochanov and Fedoseeva explained that on Oct. 9, 1982, they had to temporarily abandon their quest because the Lena River, the only means of transportation to and from the site, was starting to freeze. However, back at their laboratory in Yakutsk, 140 km downstream, winter gave Mochanov time to plan the 1983 field season.

The mysterious pebble tools were made of hard, fine-grained quartzite, and because they were found near the surface it was imperative to ascertain the local stratigraphy. Were the tools in one spot or were they scattered? Were they part of some complex they hadn't yet discovered?

Diring Yurekh (Deep Creek) was not an isolated site in the Siberian wilds. Mochanov and a team from the Siberian Academy of Sciences had worked for years carrying out an archaeological survey of 5 million square kilometers. By 1982 they had identified more than 1,000 sites dating to the age of mammoth-hunting peoples.

Mochanov's primary interest had been to answer questions about the peopling of the Americas, and he knew that people expanding out of Asia into Beringia would have had to cross the natural boundary formed by the Lena River and its major tributary, the Aldan. This river system, one of the world's mightiest, stretches from the Arctic Ocean at the mouth of the Lena all the way to mountains near the Pacific coast. Mochanov reasoned that this geographical boundary would be the place to look for clues to the people who moved into the Americas, and by 1982 the Lena Basin Archaeological Expedition had documented a series of five ancient cultures extending from Dyuktai (35,000–10,000 B.P.) to Ymyakhtakh (4,200–3,100 B.P.).

"We obtained a clear picture of population and change of cultures for the last 35,000 years," said Mochanov, speaking through an interpreter. "Wherever we worked, we always were able to find some-

thing that confirmed something that was found in previous years. We were starting to get bored," he said with a smile. "When you find the same material you automatically get bored." He thought it was time to sit down and write thick monographs in Russian and to translate them into English, Chinese and other languages.

"As it often happens, some accident changes all the plans." That accident was the chance placement of a ceremonial Ymyakhtakh burial, which contained an assemblage of jewelry-quality lithic points, beside a scattering of mysterious artifacts made from quartzite pebbles. Mochanov and Fedoseeva believe that the pebble-tool makers were farther removed from the Ymyakhtakh culture than those late-Neolithic people are distant from our own age of space travel, genetic manipulation and telecommunications.

Beginning with the 1983 field season and con-

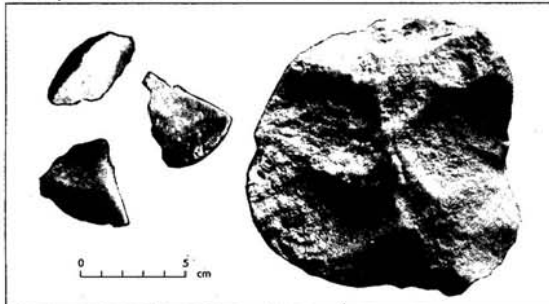
expensive archaeological excavation in the world, and undoubtedly it is the largest Stone Age excavation.

The mysterious artifacts were grouped in clusters, frequently around an anvil stone. The obvious conclusion from the configurations is that a person put a rounded pebble, perhaps the size of two hands clasping each other, on the anvil stone and struck it with another rock. Pieces of broken pebbles scattered from impact, and most, presumably not being the shape the makers had wanted, were left where they fell. About 12 percent have been classified as tools, perhaps lost among the litter of camp life or food preparation; about 7 percent are anvils and hammerstones, while the remaining 81 percent is debitage.

Mochanov brought a collection of Diring's cobbles on his American tour, giving scholars and anyone who attended his public lectures the opportunity to examine them. The quartzite, Mochanov observes, preserves the impressions of each hit made to break it. "You can trace the whole process of thinking in making the tool," he told an audience of more than 400 in Corvallis, Ore. "You can see how the final result was obtained." Studying the alteration of the pebbles gives Mochanov a sense of personal communication with the makers, and he is confident the makers thought as we think. "Tools come alive."

Mochanov's team has discovered in the single Diring stratum more than 3,000 artifacts, nearly 400 of which were identified as tools. Many broken pebbles were found complete in situ; archaeologists can piece them together and study how they had been broken apart. Others were scattered as desired tools were removed and used. Most common tools from Diring are various forms of choppers. Mochanov notes that choppers have been associated with various cultures from Pliocene time on. Pebble tools are the only known tool type from Pliocene time (generally considered to have ended 1.6 million years ago with the beginning of the Pleistocene epoch).

Diring's artifact level is a deflated zone about 3–5 cm in thickness typified by wind-abraded pebbles. Ice wedges, caused by permafrost conditions, extend 5 m below it. Mochanov has evidence that the surface was formed under permafrost conditions; subsequently the surface seems to have been exposed to Siberia's bitter elements for a long time. The pebble artifacts as well as unaltered rocks have been abraded and polished, perhaps by blowing sand and great temperature extremes. The deflated surface on which they were found was deposited by the Lena River; Mochanov says geomorphologists work-



Diring cobble and three pieces broken from it.

tinuing each year, Mochanov has moved vast amounts of earth to understand the startling discovery. On the bluff that rises more than 150 m from the left bank of the Lena River, a great tract of boreal forest has been ripped away and more than 60,000 cubic meters of the sandy permafrost soil have been pushed aside as Mochanov and his team followed the very primitive cultural layer into the hill. At times the archaeologist commanded operators of bulldozers and legions of Soviet soldiers as the project continued vigorously in search of answers. Back from the bluff the cultural layer is as much as 40 m below the surface in permanently frozen deposits. As more was uncovered, more pebble tools were discovered scattered about the newly leveled surface. Ultimately more than 26,000 square meters of the subject surface was laid bare—an area large enough for several sports fields. It has become, Mochanov believes, the most

# Mochanov Feels Americans Have Neglected Russian Research

**Yuri Mochanov** is more than a little disturbed by the neglect of the world's scientific community, but he takes some comfort from having observed that good science sometimes is rejected in favor of political expediency.

Director of the Lena River Basin Archaeological Expedition and faculty member at the Academy of Science in Yakutsk, Russia, Mochanov holds the title of Academician of the Russian Academy of Science, his country's highest scholastic honor. He commands large river boats and heavy excavation machinery, and he has had squads of Soviet soldiers put at his disposal to probe for clues to humans' ancient past in northeastern Siberia. If red dots that mark his teams' archaeological discoveries on a map of Siberia were cities, the wild region might be one of the world's most populous.

Yet Mochanov points to recent American archaeological publications that suggest Siberia is poorly studied or not well understood. While visiting Oregon State University earlier this year, he expressed concern that the world's scientific community has given a cold shoulder to Russian archaeological discoveries in Siberia, particularly the Diring Yurekh site. He has become accustomed to having professional adversaries in Russia—he refers to them as his “former friends”—but Mochanov can't rationalize having his work ignored.

Disregard of published accounts of discoveries at Diring remind Mochanov of the way some of his colleagues reacted to political pressure during the Soviet regime. In an interview with an American journalist, Mochanov tells a story of one of Russia's most prominent archaeologists whose work was highly regarded by all his colleagues. Then Josef Stalin, the long-time Soviet dictator, published an article criticizing this famous archaeologist, and soon other archaeologists began recanting their support for him. Mochanov says he witnessed “a whole chain of intrigues” that you would not be able to understand unless you were there as he was. Significant science was ignored.

Mochanov also recalls similar “intrigues” in Russian archaeology when China came to be seen as an enemy rather than an ally of the Soviet Union. Some archaeologists immediately changed their perspective on scientific matters regarding China, and scholarly conflicts ensued. After such conflicts, Mochanov notes, scientists form groups. They try to cover their intrigues by calling them “different approaches,” he says, suggesting that it can happen in any country. The effect, he adds, is that the dominant side condones the publication of its own views and rejects publishing the other viewpoint.

He says he sees the same process in the United

States in respect to Russian research, which he believes is discounted or ignored by American scholars. Western scientific literature, he says, is likely to contain phrases such as “some Russian scientists say . . .” rather than containing citations to actual Russian publications.

“The scientists use the excuse they don't read Russian,” he says. “Then papers are published in English, and 10 years later they're still using the same references.” Mochanov suggests that Russian research findings are often referred to in the West as old wives' tales. Because of his interest in questions about the peopling of the Americas, he believes that research by Russians in Siberia should be considered along with work of North American and South American researchers. It is, he says, a very international issue.

What is Mochanov's advice to American colleagues? “Make close acquaintance with the Diring site,” he replies without hesitation; he believes his book on Diring should be published in English so North American archaeologists could read it “and draw their own conclusions.” He suggests that American scholars should visit the site, either as part of a conference or symposium or as individuals. He insists that he wants Americans to understand the site and its artifacts. “I do not oppose inviting all the other scientists to work with me,” he told a seminar at Oregon State University. (The Center for the Study of the First Americans is seeking funding for a three-year project that would assemble a conference of Western authorities at the Diring site the first year, reconvene these scientists in Oregon the second year to present papers on their findings, and publish their results the following year.)

Mochanov advises American archaeologists to look further into the seemingly ancient but questionable sites in the Americas that may contain pebble-tool complexes. “Pay attention to these sites,” he tells an interviewer, and he specifically mentions the Las Toldas site in Argentina and pebble-tool sites in the southwestern United States where finds have largely been from the surface. “It is important to get stratigraphical context even if you pick up surface material,” he says, and he advises archaeologists to look for, and map, any clusters of pebble tools.

“Invite Russian scientists to study these sites. Every archaeologist has his own particular insights,” Mochanov goes on to suggest that archaeologists work together to determine definitions.

As he looked forward to his meetings with American authorities on early prehistory, Mochanov said it was extremely important that Diring artifacts be shown to those who have worked in Africa, “and for us to look at African material.” He believes the only known analogs to Diring artifacts have been found in Africa. Before returning to Yakutsk, Mochanov visited Donald

Johanson at the Institute of Human Origins at Berkeley, Calif., and John W. K. Harris, professor of African prehistory at Rutgers University, New Brunswick, N.J.

Diring Yurekh, Mochanov says, “provides the potential for placing humans in North America a very long time ago—hundreds of thousands of years.” Diring, of course, does not determine an early presence of humans in the Americas. “Only American studies can show that.” But he feels sure American archaeological theory will be altered by Diring discoveries.

“These findings just confirm the viewpoint of those who think the Americas were peopled long before Clovis culture,” says Mochanov. He is aware that many scientists believe the first humans did not reach the Americas before about 11,000 years ago, and he also understands that some scientists insist that the Arctic was peopled quite late. He says he appreciates their doubts because it is obviously difficult to survive in the Arctic even now. He observes that everyone knows the bitterness of cold, yet peoples known as Eskimos have adapted well to the Arctic. “For them cold is routine condition.”

Because discoveries at Diring Yurekh conflict with all theories of paleoanthropology, Mochanov is forced to think revolutionary thoughts. Either he has wholly misinterpreted material from the site high above the Lena River or else the theories are wrong, and since he is supremely confident that Diring's only analogues are African sites 1.6 to 2.5 million years old, he rejects the theories. Diring demands revised precepts; it calls for an Albert Einstein of anthropology to come forth with a theory of human origin and dispersal that will account for the great range of discoveries in Africa, explain Diring, and also predict when the earliest settlements occurred in the Americas. Lacking a grand, unified theory of anthropology—perhaps an impossible concept in a field that deals with complex biological and cultural variables—Mochanov attempts his own explanations, embracing an Arctic origin of mankind.

Western culture, he argues, is rooted in ancient Greece and Rome—warm Mediterranean places where people wore light clothing and sandals, and ate olives and other fruits. That culture rejects Arctic origins of humanity. If, he suggests, our history was acquired from Eskimo people, our cultural traditions would likely focus on snow and ice, walrus and seals.

“We comprehend completely the problems the Diring site has raised,” Mochanov told an Oregon State University seminar. “We understand what it means to make the statement that humans lived within the Arctic Circle 3 million years ago.”

—Don Alan Hall

ing at Diring say that the area was an island in the river, and it remains the most ancient river terrace but is overlain in places with up to 40 m of subsequent deposits.

According to one of Mochanov's recent publications, paleomagnetic dating done by A. V. Pen'kov on strata below and above the culture-bearing layer yielded probable dates of 4.2–3.9 million years B.P. below and 3.15–3 million years B.P. above. Mochanov concedes that “a variation is possible as well: 3.4–2.9 or 2.5 million years.” And, he continues, “at present a ‘minimum’ variation cannot be excluded: 1.9–1.7 million years. The younger variations are not as probable nor do the paleomagnetic determinations of Z. N. Gnibidenko contradict these dates.” Mochanov is acutely aware that his North American colleagues are reluctant to accept or acknowledge the Russian dating, and he says he welcomes dating by Western experts. While lecturing in Oregon, Mochanov showed a slide depicting the site of one of several soil samples taken by geologist Michael Waters of Texas A&M University for testing. Subsequently Waters told *Science News* that preliminary thermoluminescence analysis of those Diring samples yielded a date of approximately 500,000 years. The magazine reports that analysis of the soil is continuing at Ohio State University, where Steven Foreman is directing the research.

Mochanov's team found that when the artifacts were created the annual mean temperature was minus 12 or minus 14 degrees C (about 10–7 degrees F), actually colder than the present. In Yakutsk, the mean annual temperature now is minus 10.2° C (about 14° F).

Experts who have examined Diring's broken cobbles and pebbles agree that they are artifacts. No natural processes can explain them. Those who examined the sample of lithic materials Mochanov brought to the U.S. included Smithsonian archaeologists Richard B. Potts and Dennis Stanford. “I suspect the artifacts are younger than Mochanov's estimates,” Potts told *Science News*. “But even if Diring is only 50,000 years old, it's significantly older than any other human site in Siberia.” Potts expressed hope that more investigation will be undertaken near Diring. Stanford told *Science News* that the 500,000-year date supports theories that people came to the Americas more than 30,000 years ago.

Mochanov agrees: “These findings just confirm the viewpoint of those who think the Americas were peopled long before Clovis culture.” But he cautions that Diring discoveries cannot ascertain the very early appearance of humans in the Americas. “Only American studies can show that.”

—DAH



Lecture visitors examine Diring artifacts.



Fábio Parenti, left, whose eight years of research at Pedra Furada produced a four-volume dissertation, talks with Dena F. Dincauze of the University of Massachusetts at a cross section of the site. Other visitors look on.



## PEDRA FURADA CONFERENCE REACHES FOR COMMON GROUND

The recent visit to Brazil's illustrious Toca do Boqueirão Pedra Furada archaeological site did not convince American scholars who are skeptical that people lived there as long as 50,000 years ago. But the meeting at the site may yet produce more common ground among researchers.

A number of the world's leading authorities attended the International Meeting on the Peopling Process in the Americas Dec. 17-21 at São Raimundo Nonato, about 535 miles due west of the coastal city of Recife in a remote and semi-arid region of Brazil's state of Piauí. As guests of the Museum of American Peoples (Fundação Museu do Homem Americano, or FUMDHAM) the scientists visited Pedra Furada and nearby archaeological sites. In five days of tours, presentations and discussions, participants examined the problems confronting studies of the initial peopling of the Americas, but they did not reach the hoped-for, but elusive, resolution of how scientists can agree on when humans first reached northeastern Brazil or any other part of the Western Hemisphere. They did concur, however, on the need of a consensus for evaluating early evidence of humans in the Americas. Proceedings of the meeting, conducted in English and Portu-

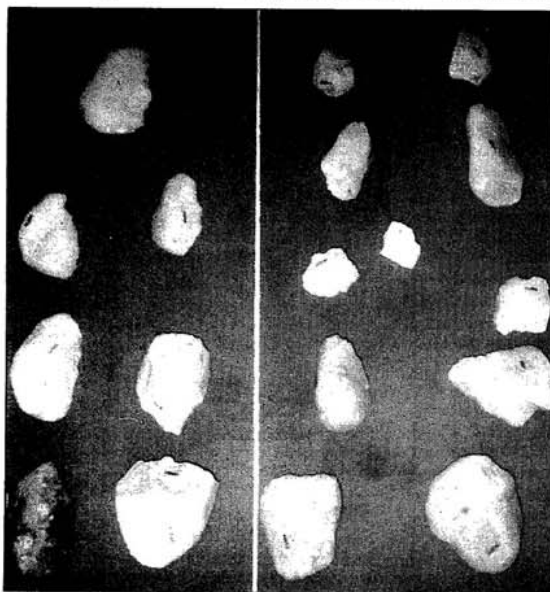
guese, are scheduled to be published early next year.

Participants who actively took part in discussions included J. M. Adovasio, Mercyhurst Archaeological Institute; Robson Bonnichsen, Center for the Study of the First Americans; Claude Chauchat, Université Bordeaux; Tom D. Dillehay, University of Kentucky; Dena F. Dincauze, University of Massachusetts at Amherst; Claude Guérin, Université Claude Bernard-Lyon; Richard MacNeish, Andover Foundation for Archaeological Research; David J. Meltzer, Southern Methodist University; Fábio Parenti, Universidade de Roma; Jacques Pelegrin, Université Bordeaux; John Alszostai Petheo, Central Washington University; and Gustavo G. Politis, of Argentina's CONICET-Faculty of Natural Sciences and Museum de la Plata.

Parenti's eight years of research on Pedra Furada produced a four-volume doctoral dissertation, which he defended earlier in 1993 before an academic committee in Paris. While conclusions of that research were presented at the December meeting, participants did not feel that it was possible to directly evaluate details of the enormous amount of work described in the dissertation. For



example, participants had difficulty interpreting alignments of rocks that have been found in the site. Much clearer, however, is the chronological, stratigraphic framework established at Pedra Furada by principal investigator Niède Guidon and her team. The hosts presented a list of 55 dates



Left: Pedra Furada artifacts are displayed on red velvet for the conference.

Below: Jaques Pelegrin, a lithic authority at France's Université Bordeaux, examines a collection of artifacts exhibited for conference participants.



*They did not reach the hoped-for, but elusive, resolution  
of how scientists can agree on when humans  
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or any other part of the Western Hemisphere.*

from excavations from 1978 to 1988 dating to more than 48,000 years B.P.

They also displayed some of the site's diverse and extensive assemblage of artifacts. Though many obviously are attributable to human manufacture, it is the artifactual evidence that most troubles those scientists who do not wish to concede that there could have been humans in the Americas more than 12,000 years ago.

Pedra Furada is a rockshelter at the base of a bulging cliff of colorful sandstone. Rockfall is a natural feature there, and falling rocks can break or cause other rocks to break in ways that make them resemble artifacts. Guidon and Parenti have examined the lithic materials and determined which were geofacts (caused accidentally by rock falls) and which were artifacts. Doubting archaeologists contend that reasonable scholars can disagree about what are geofacts and what are artifacts, and they suggest that since there can be ambiguity about artifacts from the site's old levels, all specimens must be considered geofacts. Thus, they insist, there is no credible evidence of human presence.

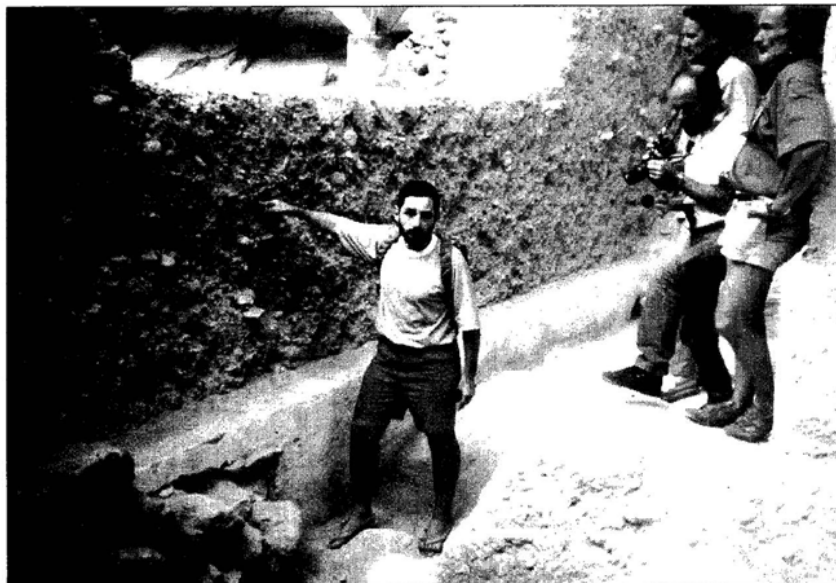
During the discussions at the conference, a variety of approaches to solving questions about the veracity of early sites in the Americas was suggested. Several of the participants noted the need to reduce ambiguity. The scientists discussed specific methods that can be used to analyze the natural deposition and rockfall at rockshelter sites. Though Pedra Furada has been extensively and painstakingly studied, there has been no off-site study to specifically analyze natural sloughing from the cliff above.

Though there was some suggestion that in scientific disagreements the burden of proof must lie with the investigator, participants of the meeting agreed on the need for dialog and exchange of ideas between archaeologists and scientists in other fields at broad levels. Perhaps such dialog can generate impartial models that can be applied to archaeological controversies.

In the wilting December heat, visiting scientists got a good look at what is expected to become a big tourist attraction—not only a new, still-vacant museum building, but an extensive open-air archaeological museum in a natural reserve of more than 300,000 acres that harbors unusual plants and animals. In a picturesque, semi-arid area in a basin of sedimentary rock with mountainous ridges, valleys and plains, Serra da Capivara National Park contains 360 archaeological sites, most of which feature rock art. Largely because of the rock art, the United Nations Educational, Scientific and Cultural Organization has designated the area an international cultural preserve.

FUMDHAM integrates research at several Brazilian and French universities. Support for it comes from the government of Brazil, the state of Piauí's departments of education, culture, and tourism, the government of France and businesses and banks. ☐

—DAH



Parenti describes Pedra Furada deposits for participants of the International Meeting on the Peopling Process in the Americas in December. Those watching include Tom Dillehay, left, David Meltzer, with camera, and Claude Chauchat.

## New Video

**Mammoth Meadow:**  
An Archaeological Quest for the First Americans documents our research at the Mammoth Meadow site in the Big Sky country of southwestern Montana. Produced by Sunlight Productions, Inc., this 15-minute video is an excellent introduction to CSFA's First Americans expedition and our years of research at this important location. Just \$13.95. Order now from:

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## After Pendejo Cave

Archaeologist Richard S. MacNeish and a team from the Andover Foundation for Archaeological Research are exploring sites in the Animas region of southwestern New Mexico this winter and spring. The area is in New Mexico's "boot heel" about 150 miles west of the controversial Pendejo Cave site, where MacNeish and workers found what appear to be human hand prints cast in clay dating to 28,000 B.P. and apparently butchered animal bones dating to 40,000 B.P. ☐

## UPCOMING CONFERENCES

March 17-20—Annual Meeting, Central States Anthropological Society, Kansas City.

Contact: Martin Ottenheimer, Dept. of Sociology, Anth. and Social Work, Kansas State University, Manhattan, KS 66506-4003. 913-485-2703 Fax: 913-532-6978 E-mail: omar@ksuvm.ksu.edu.

April 6-9—Annual Meeting, Northeast Anthropological Association, Geneseo, NY.

Contact: Sue Roark-Calneke and Russell Judkins, Anth. Dept. SUNY, Geneseo, NY 14454. 716-243-0856.

April 7-9—Second International Conference on Paleo-Archaeology, Columbia, S.C.

Contact: Albert C. Goodyear, S.C. Institute of Archaeology and Anthropology, 1321 Pendleton St., Columbia, SC, 29208. 803-777-8170 Fax: 803-254-1338.

April 7-9—Annual Meeting, Southwestern Anthropological Association, Las Vegas, NV.

Contact: William Jankowiak, Department of Anth., UNLV, Las Vegas, NV, 89154. 702-739-3610.

April 8-9—Integrating Archaeological Demography: Multidisciplinary Approaches to Prehistoric Population, Sponsored by Center for Archaeological Investigations, Carbondale, IL.

Contact: Richard R. Paine, CAI, Southern Illinois U., Carbondale, IL 62901. 618-549-4009 Fax: 618-453-5037 E-mail: rpaine@siucvmb.

April 20-24—59th Annual Meeting of the Society for American Archaeology, Anaheim, CA.

Contact: SAA, 900 Second St. NE, Suite 12; Washington, DC 20002

May 4-8—27th Annual Meeting, Canadian Archaeological Association, Edmonton, Alberta.

Contact: Jack Ives, Conference Chair, Provincial Museum of Alberta, 12845-102 Ave., Edmonton, Alberta T5N 0M6. 403-453-9149 Fax: 403-454-6629.

May 17-21—International Conference on Tree Rings, Environment and Humanity: Relationships and Processes, Tucson, AZ.

Contact: International Conference, Laboratory of Tree-Ring Research, University of Arizona, Tucson, AZ 85721. 602-621-2191 Fax: 602-621-8229.

May 23-29, 1994—Symposium on Paleoindians and the First Americans, Museum of Natural History of San Rafael, Mendoza, Argentina.

Contact: Committee on the Symposium on Paleoindians and the First Americans, Archaeology Division, Faculty of Natural Sciences and Museum-UNLP, Paseo del Bosque s/no, 1900 La Plata, Argentina. Fax: 54 21-257527 or C.C. 275, 7630-Necochea, Argentina, Fax: 54 0262-21209.

May 30-June 4—American Rock Art Research Association's International Rock Art Conference, Flagstaff, AZ.

Contact: ARARA, P.O. Box 65, San Miguel, CA 93451-0065. 805-467-3704 Fax: 805-467-2532.

June 19-22—13th American Quaternary Association 13th Biennial Meeting, University of Minnesota, Minneapolis.

Field trip June 17-19 to Archaeological Sites in Minnesota dating from Paleoindian to European contact. Contact: Linda C.K. Shane, Limnological Research Center, 310 Pillsbury Drive S.E., Minneapolis, MN 55455-0219. 612-626-7889 Fax: 612-625-3819.

Aug. 25-Sept. 2—45th Arctic Science Conference, Anchorage, Alaska, and Vladivostok, Russia. Themes include Natural Resources and Environmental Changes, Recent Discoveries about Beringia, Development and Adaptation of People and Culture, and Communication and Information Exchange.

Contact: Dr. Gunter Weller, Geophysical Institute, University of Alaska, Fairbanks, AK 99775-0800, E-mail: gunter@dino.gi.alaska.edu; Fax: 907-474-7290.

Oct. 18-22—Rewriting the Pacific: Culture, Frontiers and the Migration of Metaphors, Davis, CA. Deadline for abstracts: April 30.

Contact: Kay Flavell, Critical Theory, University of California, Davis, CA 95616. Fax: 916-752-8630.

November, 1994—International Symposium on Pleistocene/Holocene Boundary, Mendoza, Argentina.

Contact: Marcelo Zárate, Centro de Geología de Costas y del Cuaternario-UNMP, Castilla de Correo, 722 Correo Central, 7600 Mar del Plata, Argentina. ☐

## Draw Sites

continued from page 1

and securing many radiocarbon dates. Results have been gathered into a detailed monograph that currently is under review, but of more interest to **Mammoth Trumpet** readers is a second monograph Holliday is writing. It will be about Paleoindian geoarchaeology of the southern High Plains.

"This monograph is expressly focused on Paleoindians and Paleoindian sites," he said, explaining that it covers the stratigraphy, environmental reconstruction, and chronology. Holliday became involved with investigation of the area's Paleoindian materials at Lubbock Lake in the mid-1970s while working with Dr. Eileen Johnson of Texas Tech University. This multicomponent site in Yellow House Draw at the northwest edge of Lubbock, Texas, has yielded archaeological material dating from Clovis up to historic times. An excavation attempting to reactivate springs there in 1936 unearthed Folsom points and bones of Pleistocene animals. Archaeological work has revealed extensive records of Clovis, Folsom, Plainview and Firstview cultural periods and a great deal of faunal material including the first records of short-faced bear and giant armadillo found in association with humans. From Lubbock Lake, Holliday's work, financed by the National Science Foundation, continued in other draws in the region.

"My project was to look at the regional stratigraphic picture," he says. At Monahans Draw Dr. Holliday was joined by Dr. David J. Meltzer, Southern Methodist University anthropologist who has done a re-examination of archaeological work at the Midland site. Ultimately, the two scientists presented their conclusions on the age of the human remains at Midland in a paper in **Current Research in the Pleistocene 10**, published late in 1993, and they are preparing a full-length article detailing their work and the conclusions they draw from it.

Their suggestion that the Midland Woman is of Folsom age differs from new dating of the bone announced in 1992 by Dr. Curtis R. McKinney. McKinney, while a doctoral student at Southern Methodist University's Institute for the Study of Earth and Man, analyzed samples of the bone using a uranium-thorium analysis and postulated that it was of Clovis age. His data placed the age of the material at  $11,600 \pm 800$  years (**Mammoth Trumpet 8:1** "Clovis Age Confirmed for Midland Woman"). Holliday and Meltzer, writing in **CRP 10**, said, "We find no compelling evidence that the human remains from the Midland site are older than Folsom age." Further, they suggested that stratigraphic correlations with other Paleoindian sites in the region indicate "that the bone may be contemporary with or younger than Folsom age."

Investigation of the Midland site began after an

amateur archaeologist discovered human bone fragments in 1953 in what was termed a blowout between dunes. Midland was one of the first applications of uranium-series dating conducted by the late John Rosholt of the U.S. Geological Survey, who was a pioneer of the method. The initial Midland excavation also made use of radiocarbon dating when it was still relatively experimental. Initial results caused scientists to think that the site might be as much as 19,000 years old, but the dating specialists had made assumptions that later were found to be in error. Then some scientists questioned whether the human bones actually might have been displaced from more-recent strata that had eroded. Perhaps the skeleton didn't even date to the Paleoindian period. Because of controversy about the antiquity of the Midland remains, physical anthropologists D. Gentry Steele and Joseph Powell chose to omit the specimen from the sample of Paleoindian measurements they analyzed in 1991 (**Mammoth Trumpet 7:2** "Paleoindian Skeletal Data Re-Examined").

In an interview, Holliday said the age of the human bone is still far from settled. "Meltzer and I are pretty confident that the bone was eroding from the gray sand, as originally reported," he said, adding that it may never be known if the death of the Midland Woman was contemporaneous with the deposition of the gray sand, as Wendorf and his coworkers called the layer that yielded the bone. Holliday said the equivalent stratum in some sites dates to as young as 6,000 years B.P. "and therefore the bone could be Early Archaic." But he added that generally the layer is 7,000 years or older. "Our best estimate for the age of the human remains is between 10,000 and 7,000 years B.P."

Holliday noted that McKinney's date was achieved by an averaging of three dates that vary over several thousand years. McKinney did two new uranium-thorium dates himself and recalculated one of Rosholt's dates. "I don't know what it means to do a mathematical average of three dates on three different bones that have different weathering history," Holliday said. "It might be OK, but we don't know that it's OK." Because the dates are difficult to evaluate, Holliday prefers to rely on what he calls the "good old basic principles of geological stratigraphy" to evaluate the age of the skeleton. "In some ways it's cruder, but it's not experimental."

Holliday said that people think of Midland as a sand-dune setting and don't consider that it is in a draw. "It is in dunes, but it is where dunes overlap the draw. Based on what we have seen, the skull and the other archaeology that came out were in valley fill, not in the main belt of dunes." That's significant, because it allows the Midland site to be analyzed from Holliday's data on the stratigraphy of the region's other draws.

"It's very clear, based on our work, that the stratigraphy in the draw at the Midland area is essen-

tially identical to what we see over and over in other draws," he told the **Mammoth Trumpet**. "Right where the skull was it's a little bit different because it's along that margin of the valley, but as you trace the stratigraphy out, you can follow it right into the typical draw stratigraphy we see throughout the whole southern High Plains."

Though Holliday concedes that the difference between Clovis and Folsom age is not a major difference of opinion, he says it is important to know where the skull fits into the Paleoindian chronology. And though he disputes McKinney's interpretation that the Midland skeleton is of Clovis age, he emphasizes that he is not critical of the early work at Midland. The site was originally excavated by Dr. Fred Wendorf in collaboration with the late Dr. Alex D. Krieger, the late Dr. Claude C. Albritton, and the late Dr. T. D. Stewart. "They were doing very good work for the 1950s," Holliday said. "For its time it was state-of-the-art. In a lot of ways that project was a pioneering study in the region." He noted that it was an expressly interdisciplinary project with geologists, chemists and paleontologists joining the archaeologists.

"We've gone in and looked at it again from a different perspective, so we have picked up on some complexities that they didn't originally identify or pick up on," said Holliday, who noted that any scientist re-examining a site after some decades is likely to have a different viewpoint than was originally prevalent. He is not optimistic that any known dating technique can positively date the Midland skull, and he notes that the many attempts to place an age on the material consumed more bone.

When studying stratigraphy, Holliday typically uses radiocarbon for dating. "We hope for something we can date with radiocarbon. If not that, then it's just a matter of what is there." Other methods, he notes, can be subject to variability due to local conditions. "That's one of the reasons radiocarbon is so applicable. Local conditions don't affect radiocarbon quite as much as they do other methods." The fundamental test of a laboratory dating method is reproducibility, and for Holliday's work radiocarbon provides the best reproducibility. Of course, he utilizes more old-fashioned methods, too. "Archaeology sometimes is as reliable as anything. If you find Folsom points, for example, you can be pretty sure how old those are."

Holliday has worked with colleagues who are using new, high-tech dating methods, and while he is somewhat reserved in his enthusiasm for them, he insists that he is hopeful. "We're eagerly awaiting the development of other methods," he says. Meanwhile, there is the problem of calibrating new dating methods and getting them to converge with tried and accepted methods. Further, he cautions, two corresponding dates aren't any better for their agreement if they're both in error. ☐

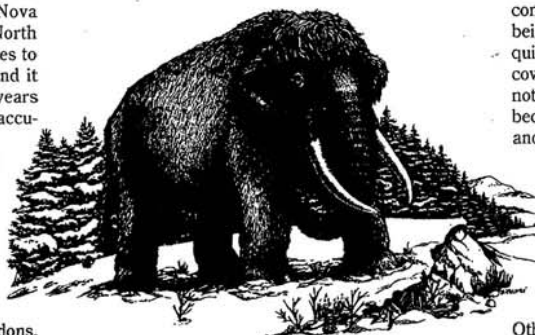
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## Two Nova Scotia Mastodons May Be 70,000 Years Old

Remains of two mastodons recently recovered from a gypsum quarry at East Milford, Nova Scotia, are to be studied by a number of North American Quaternary scientists. The site dates to the late Sangamonian interglacial interval, and it has been estimated to date to about 70,000 years B.P. Findings are expected to provide more accurate dating.

About 60-70 percent of the bones of an adult mastodon were recovered. The other mastodon was a juvenile animal that lived to be about seven years old. Less than 10 percent of it was recovered, according to Dr. Derek S. Davis, manager of collections at the Nova Scotia Museum of Natural History in Halifax. Bone, tusk and tooth material was obtained from both animals. In addition to the mastodons, many samples of sediment and organic materials were recovered.

"Particularly good collections of mollusks, insects, amphibians and reptiles were made," Davis says, adding that the project also recovered other mammal and possibly bird remains. "The museum recognizes the extreme scientific value of these materials, which will provide a unique documentation of climate and life."



NOVA SCOTIA MUSEUM/IONNIE ROSS

The project to excavate the mastodons and other interglacial materials from sink holes in a gypsum quarry continued from October 1991 until August 1993 under the direction of Robert Grantham, curator of geology at the Nova Scotia Museum. The site, owned by the National Gypsum Company, has been known since the 1950s for its glacial and interglacial materials.

While the field-collecting phase of the project was completed last summer, a large quantity of material is being conserved and that process is expected to require up to three years. Dr. Davis suspects new discoveries will be made as the work progresses. He noted that conserving the material is no small task because much of the bone was wet and unmineralized and required impregnation with preservatives. It must be dried slowly. Meanwhile the museum has been working with a number of scientists on the analysis of the materials. "We did not want to put sensitive materials through a conservation process before studies are out," Davis said.

Dr. Daniel Fisher of the University of Michigan is examining the mastodon remains. Other authorities are engaged in thermoluminescence dating, analyzing the stratigraphy, interpreting climatic changes, doing palynology, analyzing mycology, and studying remains of mammals, reptiles and amphibians, and arthropods. Davis is analyzing the mollusks.

The Province of Nova Scotia provided additional funding to the museum for the project, and several outside scientists are cooperating with the museum on research. ☐