Tusks Tell Tales of Ice Age Life and Environment

Cara and Noah Fisher are well aware that tusks of mastodons and mammoths contain fascinating stories about life at the end of the Ice Age. Their father, Daniel C. Fisher of the University of Michigan Museum of Paleontology and Department of Geological Sciences, has been deciphering those stories for many years. When this picture was taken at the Buesching mastodon site near Fort Wayne, Ind., two years ago, Cara was 11 and Noah 7. What do America's elephants have to say about the initial peopling of the Americas? Our report begins on page 4.
JALISCO PROJECT SEARCHES FOR MEXICO’S FIRST HUMANS

Editor’s Note: Desert playas in west-central Mexico have been yielding fragmentary remains of Ice Age animals and humans that appear very old. From the Chapola, Zacualco, and Sayula playas of Jalisco state, mineralized bones have been making their way into museum collections for well over a century, and some of this evidence suggested a very early human presence in Mexico’s interior plateau region. The Jalisco Early Man Project has been investigating this intriguing evidence for several years. Generally project scientists have found the bones too mineralized to permit radiocarbon dating. The late John E. Lobdell of the University of New Mexico gave a preliminary report on the work during the Society for American Archaeology meetings in 1998, including evidence of human modification on several animal bones petrified with silica. Dr. Lobdell also reported that the tooth of a swamp deer yielded enough protein for dating, providing a radiocarbon date of 18,200 years. The project team hoped to similarly date a human tooth, but they have had no success. Joel Irish of the University of Alaska-Fairbanks reported to an American Association of Physical Anthropologists session in 1998 that human bones from the region represented three or more individuals. One of these had an extremely rugged cranium with massive supraorbital ridges and other attributes Dr. Irish and his colleagues said were unusual in the Americas. In the following article, leaders of the project describe the latest phase of the investigation and plans for continuing research.

by Stanley D. Davis, Dept. of Anthropology, Texas A&M University, and Joel D. Irish, Dept. of Anthropology, University of Alaska-Fairbanks

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2 Spirit Cave Man ruled ‘unaffiliated’
3 Brazilian tooth may be hemispheric’s oldest human remains
4 Tooby testimony: Dan Fisher documents proboscideans’ tale
Tools aren’t the only evidence of the earliest Americans.
10 Amateurs help rescue New Hampshire sites
15 Mammoths and mastodons in American literature
English professor considers the appeal of extinct beasts generations before Jean Aud.
14 Hyperbole update
20 New Books
Spirit Cave Man 'Unaffiliated Native American'

Federal Agency Makes Preliminary Ruling Under NAGPRA

The U.S. Bureau of Land Management (BLM) has made a preliminary determinative that ancient human remains from Spirit Cave are Native American but cannot be culturally affiliated with the Fallon Paiute-Shoshone Tribe or with any other contemporary group. The remains, including Spirit Cave Man, a remarkably well-preserved mummy discovered in 1940 and later determined to be more than 9,000 years old, will remain in federal ownership. (Remarkable Discovery’ Mammoth Trumpet 12/2)

"After more than four years of consultation with the tribe, analyzing the information and reviewing policy, I feel it's time to make this determination," said Bob Abbey, Nevada State Director for the BLM, in a mid-August news release. "Although this determination is disappointing to the tribes, I am committed to a continuing dialogue with them on this and any other issue that comes up as we continue to determine the affiliation of human remains from BLM-managed lands."

The Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) requires federal agencies to inventory Native American human remains removed from public lands and housed in museums to determine if they are culturally affiliated with a contemporary Indian tribe.

Cultural affiliation means there is a relationship of shared group identity which can reasonably be traced historically or prehistorically between members of a present-day Indian tribe and an identifiable earlier group. Cultural affiliation is established when the preponderance of the evidence indicates a relationship. The kinds of evidence reviewed can be geographical, biological, archaeological, linguistic, or based on folklore, oral tradition, historical, other information and expert opinion.

Spirit Cave Man has been housed at the Nevada State Museum for nearly 60 years. The mummy is of particular interest to scientists studying the initial colonization of the Americas, because radiometric dating on artifacts found with the mummy indicates he lived more than 9,000 years ago. A request by the Museum to conduct DNA analysis and radiocarbon dating on Spirit Cave Man and other sets of human remains from the Lahontan Basin was withdrawn earlier this year.

"The Secretary of the Interior is considering recommendations from the NAGPRA Review Committee on the disposition of remains like those from Spirit Cave that cannot be affiliated," said Abbey. "I am keenly aware of the cultural sensitivity of the materials from Spirit Cave."

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Tooth from Cave Near Pedra Furada Yields 14C Date

A human tooth from one of the many archaeological sites in Brazil's Serra da Capivara National Park may be the oldest human remains yet recovered in the Americas. The tooth is more than 12,000 radiocarbon years old, according to the results of an AMS (accelerator mass spectrometer) assay recently announced by a team that includes Néide Guidon, long-time principal investigator of the area's archaeological sites, including the nearby Toca do Boqueirão Pedra Furada. Dr. Guidon is archaeologist at the Museum of American Peoples (or FUMHAM, Fundação Museu do Homem Americano). FUMHAM integrates research in several Brazilian and French universities with support from Brazil and the Brazilian state of Piauí.

Two teeth from a cave site known as Toca do Gordo do Garrincho were studied in Paris by Evelyne Peyre, from the Musée de l'Homme, and one was subsequently dated by Beta Analytic. The lab reported a conventional radiocarbon age of 12,170 ± 40 years, and calibrated the results with a 95-percent probability that the sample is between 15,245 and 14,600 calendar years old (Beta 136204). Such a date is likely to renew interest in the antiquity of the scores of archaeological sites in the area.

Guidon and colleagues, including Fabio Parenti, who completed a four-volume doctoral dissertation on the Pedra Furada site in 1993, have reported that human occupation of the area dates to nearly 60,000 years ago, but North American archaeologists have been reluctant to accept the oldest dates as unequivocal evidence that people lived there that long ago. Guidon and her FUMHAM team compiled a lengthy series of radiocarbon dates from deposits at Pedra Furada, which they excavated from 1978 to 1988.

The recently dated tooth came from Toca do Gordo do Garrincho, a site that was initially excavated between 1990 and 1993. Work resumed there last March. The cave has yielded considerable faunal material, but human remains recovered there consist only of a fragment of cranial and two teeth, which Peyre and others described in a 1998 publication (see Suggested Readings). An article on the dating is being published in the journal Clio by Guidon, Evelyne Peyre, Claude Guérin, and Yves Coppens. Toca do Gordo do Garrincho and Pedra Furada are among more than 500 archaeological sites, most of which are known for their rock art, that have been found in the national park and a preservation area that extends in a 10-kilometer circle around the park. UNESCO, the United Nations Educational Scientific and Cultural Organization, has designated the area an international cultural preserve.

SUGGESTED READINGS
ON Pedra Furada

Dolameri, Michael 1989 La Recherche du Temps Perdu. Mammoth Trumpet 52(1):


DAH 1994 Pedra Furada Conference Reaches for Common Ground, Mammoth Trumpet 92(6-7).


Mastodons and Mammoths

Yielding Clues to Early Americans

If you think the only real evidence of the earliest Americans is the tools they left behind, Daniel C. Fisher would like to talk with you about mastodons and mammoths.

Dr. Fisher of the University of Michigan Museum of Paleontology and Department of Geological Sciences has long been considered a foremost expert on the elephants of the North American mid-continent, and he has had direct involvement in the analysis of many mastodon and mammoth sites and the tusks, teeth and bones of many more of the extinct animals. Over the years he has compiled a mammoth amount of data and developed an astounding degree of understanding about the lives and times of species that no American has seen for at least 10,000 years.

His research makes him confident there was an important relationship between America’s Pleistocene people and the largest animals in their environment, and he argues that anyone interested in the peopling of the Americas needs to listen to the detailed story the animals have to tell. “The way these long-dead mammoths and mastodons speak most clearly,” says Fisher, “is through their tusks.” He studies tusks the way a jeweler might study a precious gem, the way a glaciologist might study a core of ancient ice, the way a dendrochronologist looks at tree rings, or the way a paleontologist analyzes lake sediments.

“I don’t want to overstate things, but the tusk record provides much more data than we have for most extinct species.” Ultimately, these data indicate to Fisher that Americans hunted mammoths and mastodons throughout an extensive period of time, and that they probably did, indeed, bring about the extinction of these elephant relatives. But there are a
great many tiers of evidence to consider before one can reach that conclusion. Furthermore, besides tusks, there are the other taphonomic data to consider—evidence left by bones.

"Many of us probably agree that mammoths and mastodons were somehow involved in human subsistence," says Fisher, but a great amount of meticulous scientific detective work is involved in determining how. Such detective work has been in progress for decades at many mammoth and mastodon sites, several of which have been reported on in the Mammoth Trumpet ("Clues to Paleoindian Survival," and additional articles, MT 6:4; "Worked Flint Found with Mastodon Bones," MT 8:4; "Mammoth Bones Recovered from Underwater Site," and "Associated Stones Suggest Meat Anchors," MT 7:1 and 8:4; and "Mammoth Was Butchered in Wisconsin," MT 8:3). Fisher cites two mastodon sites, the Heider site ("Butchering and Seasonal Mortality of Mastodons," MT 1:3) in southern Michigan and the Burning Tree site ("Evidence of Mastodont's Last Meal," MT 6:4) in central Ohio, as typical of many that provide clues to the interactions between these animals and humans. Besides paleontology, the information is coming from archaeozoology, taphonomy, geochemistry and other disciplines, and many similarities have been found from site to site.

At the Heider site, a young male mastodon, about 17 years old, died in autumn after a summer marked by the first healthy growth of its tusks since he was evicted from his family unit ("Tale of the Tusk," page 6). His bones were preserved in an organic-rich marl that had been the bottom of small pond. They were found in five different clusters, some concentrated and others more diffuse. Each of the clusters had bones that would have gone together in life, but also bones from quite different anatomical regions. The skull, which Fisher notes was not excavated with shovels or trowels but literally "by hand," bore a distinctive pattern of transverse gouges that were unlike gnaw marks or naturally occurring scrape marks.

There was, in short, something decidedly unnatural about the site. "Parallel patterns of damage among the clusters were notable," says Fisher.

Having brought the tusk of the Buesching mastodon into his lab in Ann Arbor, Fisher, above, carefully bisects it longitudinally to reveal its internal structure. Every few centimeters he must readjust the suspension so that the cut follows the gradual spiral of the tusk. Right, the tusk of a Michigan mammoth is suspended on Fisher's rolling scaffold during a cut that took almost two weeks to complete (the freshly excavated Buesching mastodon tusk took less than three days to complete). The dryness of the mammoth tusk required consolidation with epoxy, but in both cases, Fisher was left with two complete halves of tusk, split down the center.

"Both scapae were present, though in different clusters"; further, both shoulder-blade bones were missing the muscle attachment points known as metacromion processes. The two muscle-attach-
Tale of the Tusk

America’s proboscideans, the mammoths and mastodons, have long been associated with the existence of early American peoples, but both made the crossing from Asia long before humans. The woolly mammoth depicted in the Mammoth Trumpet logo had a long history in Eurasia’s high-latitude regions. "It dispersed into North America during the last glacial cycle and spread across the northern portions of this continent," says Daniel C. Fisher of the University of Michigan. "Mammoths found in most Clovis contexts," he says, "are Columbian Mammoths, the late-Pleistocene representative of the lineage of mammoths that crossed into North America almost two million years ago." Dr. Fisher reminds us that American mastodons were a more distant relative of modern elephants than any of the mammoths. Mastodons descended from an Old World ancestor that came into the Americas 15 million years ago. Their remains have been found across North and Central America, but mastodons are best known from discoveries in the Great Lakes region. Their teeth, as well as digestive tract remains from a few well-preserved sites, make it clear that mammoths grazed on grasses while mastodons browsed on leaves, buds, twigs and other leafy vegetation. "Mammoths differed from mastodons in various ways," Fisher says, "but most aspects of their anatomy and behavior were very similar." Discovery of mastodon and mammoth sites have always excited laymen and scientists alike, and through taphonomic analysis of the bones, teeth and tusks, as well as the sites themselves, scientists know a great deal about America’s proboscideans. Because of careful collecting and cataloging over many years, museums such as Fisher’s have excellent comparative collections of mammoths and mastodons. And because today’s living elephants are good analogs for America’s extinct ones, many inferences can be drawn from evidence discovered in paleontological and archaeological sites.

“In elephants today," says Fisher, "as young males reach maturity they are kicked out of the matrarchal family unit in which they’ve been nurtured since birth. Some don’t survive this period and most decline severely in nutritional condition, failing several years to recover fully." Life histories of Ice Age elephants were similar, and because tusks reveal the ages and sexes of animals found in sites, Fisher and his colleagues have accumulated many details of the life histories, and deaths, of mammoths and mastodons. "Tusks form through a lifelong history of growth in response to complex interactions involving climate, food resources, individual behavior and reproductive history," Fisher likes to show a diagram of a tusk cross section as he explains the wealth of information they can reveal.

The proximal end of the bicuspid tusk of the Powers mastodon excavated near Decatur, Mich., by Betsy Gerlach of Western Michigan University.

About seven annual growth increments are visible in this tusk fragment broken when a backhoe encountered the Van Sickle mastodon. The final increment indicates the animal, found near Leeper, Mich., died in autumn.

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could be compared to tree rings, he says, except that the cycles are not only yearly ones. Instead, they reveal details on two additional, shorter time scales of the complex interaction between environmental and physiological conditions that occurred during task formation. The largest scale days represent the annual cycle of seasons. These annual layers in tusks are subdivided on two finer scales, the smallest of which measures months, following the circadian day-night physiological cycle. There is an intermediate scale of task lamination that reflects periods comparable to weeks or simple multiples of weeks.

The layers can be examined microscopically and also chemically. For the most complete access to the internal structure of tusks, Fisher has developed a rolling scaffold to secure the tusks as he blocks them longitudinally with a band saw. Because of the curves and great size, it is not an easy task. "With a large, spirally curved tusk," he says, "the cut can take hours to days." The tusk, suspended from the scaffold, must be readjusted after every few centimeters of cut. But the results are rewarding—often spectacular, for after polishing, the cut inner surfaces can be breathtakingly beautiful. Annual increments are often easily traceable as dark-light couples. For more detail, he prepares transverse thin sections for microscopic examination. In the dentin of mastodon tusk these typically are about 26 intermediate layers within each annual layer, thinner increments, typical of winters, usually occupy the dark portion of the annual couplet.

By measuring these task-development layers, Fisher obtains data that allow him to plot increment thickness against increment number or cumulative thickness, and the resulting data provide a profile of variation in the inferred growth rate that correlates with the dark-light couples. Thicker increments in the lighter portions of the couples indicate summers, and

and then there are about 14 of the finest increments within each of the intermediate-scale features. Mammoth tusks are similar, although they display about twice as many intermediate-scale features, each containing fewer of the smaller increments.


to test this interpretation, he samples specific lines and analyzes their composition. Analyses of powdered tusk material from a series of increments provide information about compositional changes through time that can, for example, reveal aspects of diet, climate, or soil chemistry. Such information, he says, can indicate seasonal diet changes and perhaps even an annual migration.

A polished longitudinal section through a fragment of tusk from the Parker mastodon, found near Sunfield, Mich., is grooved where material was removed for compositional analysis. The narrow grooves above the centimeter scale represent arbitrary fractions, wider than the tusk's natural "intermediate" growth increments.

"Strongly confirming that the largest-scale dark-light couples represent years comes from the oxygen isotope composition of tusk phosphate," says Fisher, explaining that at middle and high latitudes, well-documented atmospheric and earth-surface processes generate seasonal variation in oxygen isotopes. "This variation influences the water ingested by proboscideans and that in turn drives changes in body fluids and ultimately the oxygen isotope composition of mineralized tissues." Life histories of long-lived members of extinct species are thus not lost for all time.

Transverse sections of mastodon tusk show four dark lines of the circumpolar or intermediate-scale increments, which are about 0.3 mm apart. Between them are fine, approximately daily increments. These features are fine in mammoth tusks.
the intestines themselves were not preserved, their location was outlined by remnants of incompletely digested plant material complete with some of the original community of intestinal bacteria. Moreover, at Heisler there were two posts—small space trees with their topmost ends down—stuck into the pond sediment close to the bone clusters. Charcoal, The process end (at extreme right) of the Bueching mastodon's tusk shows where it fit into the animal's tusk socket. In this external view the “gumline” is visible near the left, and annual increments show up as dark ridges representing “outcrops” of the late-winter portion of the seasonal growth rings.

ordinarily not found in pond sediments, was found in association with some of the bones. Other sites, such as Burning Tree, also contained certain of these features. “Along with coauthors such as Brad Lepper, I've argued that sites such as Burning Tree and Heisler represent hunted, killed and butchered animals transported in the largest manageable pieces to a pond and submerged for storage and later recovery,” says Fisher. In addition to the pattern of the bones, Fisher has detailed information from his analysis of the tusks. He knows, for example, that many of these elephants died in autumn.

Frozen ponds would have preserved the meat and protected it from predators. Posts marked the location of the meat caches, and associated charcoal suggests a fire on the frozen pond surface, perhaps at the time of recovery and use of the stored meat. Carcasses that were recovered, stripped of their meat, and abandoned on the ice surface (where they were sometimes later gnawed by carnivores), evidently melted through the ice and today form diffuse clusters of bone in the pond sediments. Some concentrated bone clusters may never have been recovered.

“Yes, I considered the idea that these animals became mired in pond or bog sediments,” says Fisher. “But a wide range of evidence involving radiocarbon dates and associated stratigraphy, the clustered, non-anatomical patterns of bone distribution, and patterns such as the absence of tusk, seem completely inconsistent with entrapment.” He says he is open to other explanations for the for- posts seem to be an indication of human intention to return to the point of bone deposition in the pond. Buried wood in conjunction with the diffuse bone scatter suggests recovery at a time when ice was present, allowing a fire on the pond's surface. The sand-filled intes-
tion their mouths," Fisher said, explaining his evidence to a large audience at the Colvis and Beyond Conference in Santa Fe last year, "it turns out better than it sounds. A few years ago the death of a friend's draft horse provided an opportunity to experiment." He showed a slide depicting the placement of one of the legs of the butchered horse into a hole that had been chopped in the ice of a shallow pond. "In a similar fashion we stored all 1400 pounds of that particular animal." 

"Later that winter, we removed some of the meat from the pond and found it a bit discoloring on the outside but perfectly sound on the inside. I know," he says, "I ate it.

By spring the horse meat experiment might have appeared less successful, as bloated meat masses floated on the surface. However, Fisher found that the meat had been colonized by lactoba-
cilli, which produced carbon dioxide that caused the tithered meat masses to float to the surface. The lactobacilli maintained a strongly acidic environment within the meat mass, and that protected the meat from pathogenic bacteria. It remained safe for human consumption — "and palatable, despite its strong smell and flavor."

Most mastodon and mammoth sites in the Great Lakes region, then, may be explained as meat caches, but what can they tell us about the ultimate disappearance of proboscideans from North America? Plenty, thanks to data gathered by Fisher's research on these animals, data derived in no small part from tusks. He maturation should increase and growth rates should decrease."

However, he continues, the hunting-induced mortality of young and mature adults suggested by his meat-storage interpretations should produce a quite different effect — a decreased age of maturation and an increased growth rate. "That's what we might expect if over-hunting were the cause."

Fisher says that it seems that rates of tusk growth in mammoths were higher at the end of the Pleistocene than they had been for tens of thousands of years. Further, there is an indication that toward the time of their extinction, the animals matured earlier. This evidence supports over-hunting as a major force, he argues, achieved in earlier times, even before human immigration. This adaptive response may have helped, but it was not enough. The beginning of predation on calves and mother-calf pairs, for which we have very preliminary but tantalizing evidence, intensified matters."

Fisher's scenario does not resemble a "blitzkrieg" of bloodthirsty hunters invading a virginial continent. "The whole process didn't conclude in a decade or in a century or even two, but stretched out over millennia," he argues. "The environment was changing too, in ways the proboscideans were fully capable of accommodating, judging from their patterns of tusk growth."

-Don Alan Hall
SCRAP Spells 'RESCUE' For Science

D IGGING 100 METERS from the main excavation block at the Nevers site in Jefferson, N.H., Patricia Tucker uncovered a stone tool in situ. A new volunteer with the New Hampshire State Conservation and Rescue Archaeology Program, Tucker was excited about her first field excavation. She picked up the artifact and called to Paul Bock, her field supervisor who sat nearby on an overturned bucket documenting their finds, “What material is this flake made of?”

“Where did you find that?” asked Bock, a professional archaeologist and seasoned volunteer. He knew it was the base of a fluted projectile point.

“Right here,” she said, pointing to the ground.

“Put it back,” he said gently.

Tucker had found the first fluted point of the 1988 season. The Barnes-type point was dubbed the "Bacon Point." The dusky red Musunungu chert was lined with cream-colored bands as if it were a strip of bacon.

A small group of volunteers observed a moment of silence to appreciate the magnitude of the find, then one let out a loud whoop. The rest of the field school volunteers ran over along with Richard Boisvert, New Hampshire’s deputy state archaeologist who facilitates the volunteer program. Dr. Boisvert measured and recorded the artifact’s height, elevation, and its precise geographic coordinates. He works for the Department of Cultural Resources, part of the New Hampshire Division of Historical Resources. His duties include identifying, evaluating, and protecting cultural resources, assisting the public with preservation activities, and facilitating the State Conservation and Rescue Archaeology Program, known as SCRAP. The program, started nearly 20 years ago, encompasses archaeological research and an avocational archaeology certification. Boisvert, responsible for the program since 1987, trains and certifies volunteers in the technical skills of archaeology. “It's real archaeology,” he says, noting the volunteers become well-trained archaeological field and laboratory technicians.

Field school volunteers participate in site excavations as well as surveys, testing, scientific recording, lab analysis, research design, public presentations and publications. They chart collections found during field schools or donated to the state. Specific projects include dating sites based on pottery collec-
New Hampshire Teaches Volunteers How to Do Professional-quality Archaeology

Boisvert accomplishes the work through individualized training, workshops, regularly scheduled laboratory sessions, and annual summer field schools. The field schools are designed to instruct avocational archaeologists, community volunteers, and students seeking academic credit at Plymouth State College, which serves as the academic host for the program.

The volunteers are a diverse group ranging from college students to people from innumerable professions. Retirees and avocational archaeologists typically constitute two-thirds of the field crews. Most volunteers are captivated by archaeology and want to become personally involved. Some know only what they've absorbed by watching National Geographic and NOVA specials; others have extensive fieldwork experience.

Ardelta Paul, currently the oldest volunteer at age 74, recalls asking Boisvert at her field school in 1988, "How will I know if I found something?" He assured her that she would know. "Sure enough, I week field projects in May and October. Volunteers attending field schools are obliged to a two-week commitment, but once involved, many stay longer. Boisvert lets people follow their own inclinations. Some excavate, others work in the lab, and some do both. More than a third of the volunteers return year after year, and some move on to become professional archaeologists working for cultural resource management firms.

"It's clearly not our intent to train field technicians for contract firms," Boisvert says, "but quite a number of people have done that. And they tend to come back and help out when I need it."

Colleagues, students, and scrap volunteers agree Boisvert has enthused numerous talented people into the field of archaeology.

"Encountering Dick [Boisvert] totally changed my life," says Steven Bayly. "Dick took the time with me to de-mystify the whole archaeology thing. I never realized just ordinary people did archaeology."

Boisvert's emphasis on developing a learning community is显而易见，他相信在人们认为自己在叙述自己之前，他将影响他人的决定。他认为自己能影响他们至少在一定程度上。不过Boisvert似乎为避免某种意义上的同事关系，他的同事说，他已是一个有影响力的人在Jee的领域。Robert Goody, an assistant anthropology professor at Franklin Pierce College and co-principal investigator for Victoria Bunker Inc., a cultural resource management firm in Alton, N.H., credits Boisvert with bringing "a lot of energy into what he does and involving hundreds of people in archaeology from all walks of life—from students to senior citizens."

I taught a seminar on New England's prehistory and led my students into Dick's field school," Goody said. "They came back after a summer with Dick all fired up and ready to do archaeology. I think Dick is exquisitely the best thing to happen to archaeology in New Hampshire. He's brought a lot of talented people into the field."

Noting the hands-on training he received, Bock says, "The methodology and training are excellent." Doug Dickinson, owner/operator of Archmat, an archaeological supply firm he started with Boisvert's encouragement, and a program volunteer since 1989, credits Boisvert's leadership style. "In a typical excavation, Dick has an aura of knowledge and thoroughly trained people who give balance to the process." Dickinson says Boisvert lets people have experience and knowledge "help him run the show. He's open, flexible, and supportive."

According to Sarah Dunham, a volunteer who continued to work with Boisvert's lab manager before returning to college, Boisvert is "the backbone" of the State Conservation and Rescue Archaeology Program community. "Once Dick is completely convinced that an individual is willing to work and is dedicated to ar-
people into this field. They develop their skills and go off on their own.”

Boisvert makes light of such praise by joking that he “exploits people,” but he notes that the thousands of hours donated yearly by volunteers allow a substantial amount of archaeological work to be done. Volunteers, he says, do a large majority of the off-season lab work—washing the rocky debris they call kibble because it resembles dog food, searching for small stone flakes or other artifacts, and cataloging discoveries. On Wednesday evenings at the lab, thousands of two-quart bags of kibble from summer field schools are cleaned and catalogued. It is tedious work washing and drying the material and then searching for minute flakes chipped from stones during the toolmaking process. To break the tedium, to bring purpose to the work, Boisvert reminds the volunteers that the artifacts exist because people left them behind. He reminds them to take time to wonder: Why is this arrowhead here? Who might have made it and why? What might the knapper have been thinking at the time?

Some SCRAP volunteers put together museum exhibits, detailed displays with artifacts and photographs. Recalling an exhibit for the Libby Museum in Wolfeboro, N.H., Boisvert says, “They generated a nice exhibit. The artifacts were not tied up hostage to a board. It showed all different kinds of material culture through time in the region.”

Perhaps one of the most ambitious SCRAP projects was the immersion of an entire elementary school into a week of Paleo-Indian study. Iris Baird of Lancaster, N.H., a volunteer who was a retired teacher, worked with the staff of the Jefferson Elementary School culminating in an archaeology day during which students visited a Paleo-Indian excavation site, observed a flintknapper at work, and participated in a simulated dig. The children learned that archaeology is much more than digging. To document the experience, the school’s staff and students produced a Power Point presentation and four-page book, History in the Making—A Paleo-Indian Celebration, that they presented to the community. “The goodwill and appreciation for archaeology that were generated from this event are invaluable and could not have been obtained except through the involvement of the diverse membership of the SCRAP field school participants,” Dunham wrote in a recent paper for the New Hampshire Archaeological Society.

“Thank goodness for us,” Victoria Bunker says of SCRAP. The owner and principal investigator of a cultural resource management firm says, “It’s integral. It’s necessary.” Dr. Bunker worked as the SCRAP prehistoric-sites archaeologist from 1981 to 1987 in conjunction with Faith Harrington, the historic-sites ar-
MAMMOTH
TRUMPET

October ● 2000

This class photo taken during a 1998 field school session illustrates the diversity of SCRAP field school participants. Individuals mentioned in the article include Paul Bock, back row, second from left; Ed Bournas, front row, seated far left; Richard Boliver, front row, seated second from left; Steve Bayly, back row, fourth from left; Arletta Paul, standing on Bayly’s left and wearing wide-brimmed hat; Ann Pilkovsky, in sunglasses and hat, peering over Bayly’s shoulder; Sarah Dunham, back row, left of stadia rod; and Doug Dickinson, extreme right, back row.

Hampshire Preservation Office with the New Hampshire Historical Society, Busker recalls two women who “met the ideal.” After learning the basic skills such as site mapping and recording, they returned to their hometown and became advisors to the local Conservation Commission. They became the community watchdogs, says Busker.

Ed Bournas, who joined the SCRAP team as an avocational in 1992, says a sense of community is the fabric that holds the volunteers together. Bournas has participated in field schools, worked as a contract archaeologist, and now has turned his volunteerism toward the New Hampshire Archeological Society. Bouras applauds the awareness he has learned to help others become aware, and his work has extended beyond New Hampshire’s borders. Bouras was one of 15 volunteers who spent a week’s vacation time at their own expense working in Texas at the

The volunteers, says Michael B. Col- lins, of the Texas Archaeological Re- search Laboratory at the University of Texas and a principal investigator of the Gaul site, “were so good that I enthusiasm- ically invited them to come back to Texas anytime they want to.”

SCRAP has a core group of people like Ann Pilkovsky, who has volunteered since 1991. She is responsible for 30 sites around Ouachita Lake, N.D., and she’s so intimately involved with the area she says she often gets a feeling there’s an artifact ready to be found so she stirs whatever she’s doing and goes over to look. She always finds something. Pilkovsky, a re- tired teacher, knows her stuff. Her field book is filled with notes describing her finds: “14,879 horned flake tools, 210 ce- ramic sherds, 10 tools, 11 bifaces frag- menta, 795 bone, 93 quartz, 12 chert, 275 turtle.” The list is from a few one-meter- square units she and her field partner, Arletta Paul, excavated. Pilkovsky calls herself an avocationalist, yet she stakes off archaeological names for the various spear points she found at Ouachita Lake.

Sometimes Pilkovsky reminds Buse- ver of her skill at identifying artifacts. “He’ll kill me,” she says, laughing as she

continued on page 16
The Search for Hyperdisease

Mammalogist Ross D. E. MacFiee and his colleagues are progressing in their search for evidence that a lethal disease brought about the extinctions of large mammals at the close of the Pleistocene ("Explaining Pleistocene Extinctions," *Mammoth Trumpet* 14:1). Molecular biologist Alex Greenwood, who joined the American Museum of Natural History to work with samples of mammoth tissue that Dr. MacFiee collected, has been successful in extracting nuclear DNA from some of the material. More significantly, Dr. Greenwood reported to the 5th International Ancient DNA Conference in England in July that he also has been able to isolate from nuclear DNA of several mammoth samples partial sequences of endogenous retroviruses. These are formed when a retrovirus invades the germ line cells, which are cells that form eggs or sperm, and these retroviruses become part of the host's DNA. That scientific fact in itself may not directly bear on MacFiee's quest, but it's a significant milestone in their search for the hypothetical plaque they suspect was responsible for driving to extinction mammoths, mastodons, giant ground sloths and other Pleistocene megafauna.

Finding evidence of such a pathogen in mammoth tissue will be difficult, possibly much harder than extracting single-copy nuclear DNA. To exist for Greenwood to find, the pathogen surely would have had to heavily infect its host and invade the bone tissue the team is examining thousands of years later. As *Science* quoted Greenwood in its coverage of the conference: "It is mostly a matter of luck. You have to find an infected individual who had a high enough viral load that is detectable" (July 28 2020:530–531).

MacFiee and his team have recovered nuclear DNA from samples of mammoth from Alaska and Siberia that range in age from 30,000 years to 4,500 years old, thus bracketing the time they assume the first humans arrived. If they find evidence of pathogens in specimens dating to a time after the arrival of hu

COMING CONFERENCES

Oct, 5-7 27th Great Basin Anthropological Conference, Ogden, Utah. Contact: Steven Simms, GCAC Chair, Anthropology, Utah State University. Logan UT 84322-1370. 435-792-1277; simmsa@usu.edu (www.hass.usu.edu/gbac2000).
Nov. 8-12 33rd Annual Chacmool Conference, Calgary, Alberta. "Ancestral Archaeology's Sake: Material Culture and Style across the Disciplines." Contact: Marc Zender of Calla McNamara, Dept. of Archaeology, University of Calgary, Calgary, Alberta T2N 1N4.

Institute Develops Web Channel for Anthropological Education

The Archaeological Legacy Institute, a non-profit organization based in Eugene, Ore., has announced it now can offer free on-demand viewing of the first of a series of films on archaeology and indigenous peoples from its Web site (www.archaeologychannel.org). This first video, available Initially only at the 5K connection speed (low bandwidth for dial-up modems) in Real Player format, is called *Cemalce: Mysteries of the Moonwalk*. It concerns an important Mississippian mound site in Georgia. The institute expects to add more videos and greater bandwidth (100k and 300k) in both Real Player and Windows Media Player versions.

According to Rick Petigrew, President and Executive Director, Archaeological Legacy Institute was founded to address a range of problems facing archaeology today. He believes that although archaeology is popular and frequently in the news, a serious gap exists between the expectations of archaeology on the one hand and the realities of its performance and popular perception on the other. He expects that the institute's program will increase public understanding of the field and what it can contribute to solving contemporary problems. Interested persons are invited to contact him at the Web site above and learn more about how they might submit materials or in other ways use the institute's services.

Dec. 4-7 La Colonizaci6n del Sur de America durante la Transicion Pleistoceno/Holoceno, La Plata, Buenos Aires, Argentina. Contact: Laura Miotto, Museo de La Plata, Paseo del bosque s/n, (1900) La Plata Argentina, mitto@netver.com.ar; mitto@mcu.foyn.unlp.edu.ar.
March 28-31 2001, 70th Annual Meeting. American Association of Physical Anthropologists, Westin Crown Center, Kansas City, MO. Contact: David Frayer or Sandra Gray, Dept. of Anthropology, 622 Fraser Hall, University of Kansas, Lawrence, KS 66045-2110; frayer@ku.edu or sgray@ku.edu.
Stawskiowa 17, 31-016, Krakow, Poland, bocherowski@isek.pan.krakow.pl, http://www.isiek.pan.krakow.pl.

Send conference notices to Mammoth Trumpet, CPA, 155 Weniger Hall, Oregon State University, Corvallis, OR 97331.
INTERACTIONS BETWEEN HUMANS AND MAMMOTHES have fascinated not only scientists but creative writers and political leaders. Long before the novels of Jean Auel, mammoths found roles in literature. As a Mammoth Trumpet subscriber and a specialist in colonial American literature, I became interested in how Americans of the 1700s and 1800s interpreted the first findings of fossil mammoth bones. At a time when archaeology was just beginning and the true age of the earth was scarcely guessed at, these fossils inspired creative speculation. Paleontology first rose to prominence in American history when Thomas Jefferson wrote in Notes on the State of Virginia (1787) that ‘the mammoth, or big buffalo, as called by the Indians, must certainly have been the largest animal on the continent. The future President compiled a list of the quadrupeds of Europe and America, with sizes and weights, in an effort to refute the notorious theory of the French naturalist Buffon, which held that the American continents had emerged more recently than Eurasia from a primordial ooze or universal deluge, that America was immature and unable to support large animals. Jefferson put the mammoth at the head of his list of American fauna, and he believed that it still survived.

America west of the Appalachians was little known in the 1780s, and bones of giant creatures had been among the most notable findings of early explorers of the Ohio Valley. In 1739 the Baron de Longueville, later Governor of New France, found molar teeth, a femur, and a tusk near Big Bone Lick in modern Kentucky. He took them to Paris where they attracted the attention of Buffon's collaborator Daubenton, a co-defendant in Jefferson's suit on behalf of American nature. Because Buffon had also claimed that Native Americans 'taught art or for their female,' Jefferson felt compelled to defend America's collective fertility and virility, and the mammoth, like a big car, could only help a man's self-image. He concluded: 'To whatever animal we ascribe these remains, it is certain such a one has existed in America, and that it has been the largest of all terrestrial beings. It should have suffered to have rescued the earth it inhabited, and the atmosphere it breathed, from the impotence of im-

pactence in the conception and nourishment of animal life on a large scale.' Jefferson's political foes mocked his interest in fossils, however, particularly in 1808 when explorer William Clark brought over 300 of them from the Big Bone Lick and the President spread them out on the White House floor. Even though they noted its similarity to elephants, eighteenth-century naturalists believed that the mammoth was carnivorous. George Turner, in a paper read at the American Philosophical Society in 1797, offered support for this idea based on his 'personal acquaintance with the Great Bone Lick.' Of "the bones of the buffalos and smaller animals" found in one stratum of the site, "almost every bone of any length had received a fracture, occasioned, most likely, by the teeth of the mammoth, while in the act of feeding on his prey." Turner supposed that "Nature had allotted to the Mammoth the beasts of the forest for his food" and "as the immense volume of the creature would unfit him for coursing after his prey through thickets and woods," he imagined a stealthy mammoth approaching the lick, and, caltike, leaping upon its prey. In Turner's logic, size implied power implied domination, height=height-right. Such assumptions necessarily led to an image of a fearsome beast akin to the wolf. "With the agility and ferocity of the tiger; with a body of unequalled magnitude and strength, it is possible the mammoth may have been at once the terror of the forest and of man!—And may not the human race have made the extirpation of this terrible disturber a common cause?"

The most successful early American paleontologist was Charles Willson Peale, a Philadelphia portrait painter and founder of the nation’s first museum. In 1801 he traveled to Shawangunks, New York, following news that a farmer had found on his land the bones of a giant creature. Peale excavated enough bones to reconstruct two full skeletons of what he called a mastodon, distinct from European mammoths. These were the first extinct animals displayed in the manner that so many dinosaurs are in museums today. He sent one mastodon with his son Rembrandt on a tour to Europe. The Peale family's
excauation brought the mammoth fully into the American imagination and made it a scientific, even ethical, public, and by emphasizing its primeval side, it was displayed with taunts curving downward as weapons to show prey.

Much of the popular sensation over dinosaurs, as in the film "Jurassic Park," comes from portraying them as hostile monsters, even though most were slow-moving plant eaters. Portrayals of the mastodon followed a similar pattern, one that reached an extreme in a novel by Cornelius Matthews entitled "Bheemoth." Matthews took the theological step of combating current ideas about the mammoth with another popular myth of American prehistory, that of the Mound Builders. After all, during the years that the Big Bone Lick was revealing fossils of giant animals, mysterious earthworks were found nearby. Today we know that these had been built by the Adena and Hopewell cultures between roughly 900 B.C. and A.D. 1500. But Matthews and his contemporaries had no reason not to believe that mammoths had lived alongside the Mound Builders, whom they imagined as an advanced civilization quite different from the contemporary American Indians. Some had supposed that the earthen embankments of the Hopewell culture were fortifica-
tions built to repel an invasion by ancestors of the Yankees. Matthews proposed instead that the Invader was the mastodon.

Like Jefferson, Matthews cited as proof Algonquin Indian stories of giant animals that had lived in ancient times, what he termed "wild and traditionary descriptions of the mighty herd of brutes which had once tyrannized over the earth," monstrosities that were vanquished by a "majestic race of heroes." The epic

mammoth that Matthews named "Bheemoth" took on propor-
tions far larger even than fossils had suggested, and the Mound Builder hunt it not for pot, but in a desperate struggle to avoid being trampled to extinction. This conflict between man and mammoth was consistent with scientific accounts like Turner's, and endures today in the Overkill theory. At the end of the novel, the Mound Builders, led by the hero Bohooba, succeed at besieging Bheemoth inside a natural cornal yogurted by steep mountains, and the monster dies, wedged in a narrow canyon, a fate which seems designed to pre-
serve its bones for future discovery. But in spite of their victory, the Mound Builders are so pacified that their civilization declines toward its own demise. Matthews's novel of-
ered answers to the still-unsolved questions of why both the mammoth and its hunt hunters disappeared during America's prehistory.

**SUGGESTED READINGS**

**The mammoth in American history**


Lillard, John. 1945. "American Indians: How the Haplopians First Pre-


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SCRAP Spells 'Rescue' for Science

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Continued from page 13

agrees to tell a story about Boisvert. She was digging and found an artifact in the wall of her pit. According to site protocol, the artifact wasn't technically in her unit so she couldn't retrieve it. But she was sure it was something, and called to Boisvert who came to look. "Ah, it's nothing but a piece of rocky shatter," Filkovsya says, recalling Boisvert's response. She remained suspicious and continued digging.

"It was an accident," she explained, with a gleam in her eye. "I was using a trowel, I have big hands; I accidentally hit that and of course it fell out of the wall. I picked up a fluted point fragment and threw it to Boisvert and said, 'Do you want to see some rocky shatter?'"

Boisvert organized this past summer's six-week field school in Osippee, N.H., where the teams surveyed a rare environmental zone—a remnant scrub oak and pitch pine forest of 3,000 to 4,000 acres. Field school volunteers also worked in the Osippee Mountains looking for a source of hornbeams, a tool stone used

9,000 to 500 years ago. Boisvert calls hornbeams a "wild" stone because it is sedimentary, metamorphic, and igneous. The stone starts as volcanic ash (the igneous phase) that is lifted into the air and settles in layers in the caldera of a volcano, where it subsequently lithifies (the sedimentary phase), then undergoes a heating process by subsequent eruptions of the volcano that further alters its mineralogy (the metamorphic phase). Boisvert wanted to find where the raw material came from.

Generally the number of scrap volunteers fluctuates from 40 to 70 during the summer; this summer's 155 school had 45 participants. Sweating and working elbow to elbow in a pit in the hot sun with blackflies biting your neck, it's easy for volunteers' tempers to fray, but Boisvert manages the people component. He walks a thin line between being in charge of the crew and being part of the crew," Bayly says. He's known for his ability to listen, to mediate, and to make decisions. The SCRAP program—designed to provide the public, train in archaeological methods, provide rescue and salvage operations, and give hands-on experience in the field and lab—is clearly a success.

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Nancy Eichhorn
Jalisco Project

continued from page 1

spent the last seven years working (with very limited budgets) in the state of Jalisco, Mexico. This region has, over the past few decades, produced a significant number and variety of late-Pleistocene faunal and mineralized human remains, in addition to fluted points similar to those recognized in the United States as Clovis.

We have concentrated our efforts in the Chapala, Zacoalco, and Seyula Basins of Jalisco, employing a holistic approach in our pursuit of the questions concerning the first inhabitants of the Americas. Our investigations have, to this point, focused on reviewing all previous work, studying archaeological and paleontological collections, and conducting preliminary reconnaissance surveys to locate sites that may hold key archaeological and paleontological answers about the oldest inhabitants.

One of our primary objectives is to gain an understanding of the geomorphological features of the three basins—the landforms and the processes that formed them, and their development through time. Our ultimate goal is to find the earliest human occupations of the region and to show relationships between the processes of geomorphology, biophysical environment, human communities and their socioeconomic systems.

The core members of the Jalisco Early Man Project are Dr. Stanley D. Davis, Texas A&M University archaeologist and project director; Dr. Joel D. Irish, University of Alaska–Fairbanks bioarchaeologist; Dr. Lee Nordt, Baylor University geochronologist; Dr. Craig Gerlach, University of Alaska–Fairbanks archaeologist; Dr. Richard G. Holloway, Flagstaff, Ariz., palynologist; Prof. Federico A. Solorzano, University of Guadalajara and the Museo de Paleontología de Guadalajara, paleontologist; Ms. Debra E. Dandridge, Texas A&M University archaeologist; and Prof. Otto B. Schonhuber, State Archaeologist, Jalisco, Mexico, Museo Regional de Guadalajara.

Articulated remains of a mastodon are excavated from fluvial sediments exposed by receding Lake Chapala. Bones were only partially mineralized, indicating the animal may be late-Pleistocene in age. An intriguing bony growth on two adjoining vertebrae seems to indicate an injury such as an embedded projectile point. The excavation was under the direction of paleontologist Federico A. Solorzano of the University of Guadalajara and the Museo de Paleontología de Guadalajara, and Jalisco State Archaeologist Otto B. Schonhubude of the Museo Regional de Guadalajara. Here museum curator Javier Jaurez Woo (wearing white hat) talks with workers.
The team's investigations located a number of rockshelters for future investigation. The largest of the shelters, known locally as the Cave of the Sleeping Old Ones, is eroded into volcanic breccia approximately 50 meters above the playa floor. This shelter has an interior chamber measuring about 42 square meters with an entrance about half that big.

The premature death in August 1999 of Dr. John (Jack) E. Lobbell, an original member of our research team, was a shock to us and a major setback to the project. He is deeply missed.

Continuing investigations were conducted during May 2000 by Davis, Irish, Dondridge, Solorzano, Denver archaeologist Tony Baker, and Joshua Reuther and Joe Hickman, two students from the University of Alaska–Fairbanks. Our objectives were to: 1) relocate and record a possible Pleistocene rock glyph site depicting comelids, 2) conduct surveys within the Zacoaloa Playa region to relocate a possible Clovis-age site where two obsidian pale-points were previously found, 3) relocate and map rockshelter and cave sites within the Sayola Playa area, 4) select the most promising shelters and excavate test units to determine depth, type, and concentration of cultural and paleontological strata, and 5) investigate paleontological sites (Pleistocene-age bone beds) near the city of Ocotlán, north of Lake Chapala.

Upon our arrival in Jalisco this year, we consulted with Schendube and Solorzano concerning their efforts to excavate a mastodon, possibly of late-Pleistocene age. The articulated remains had been exposed recently in fluvial sediments of receding Lake Chapala. Our interest in the mastodon was piqued by the fact that the remains were only partially mineralized, and further titillated on discovering an unusually large bony growth on two adjoining vertebrae. At present, it hasn't been determined what caused this pathology, although some type of traumatic injury—possibly an embedded projectile point with subsequent infection and bony reaction—cannot be ruled out. We will know more when the remains are cleaned, conserved, and X-rayed. The mastodon's remains are curated at the new Museo de Paleontología de Guadalajara, which is the city of Guadalajara built for Prof. Solorzano in recognition of his lifetime of paleontological work in Jalisco.

Investigations are never as productive as one wishes, but despite some minor setbacks, a number of our objectives were met this year. We were unsuccessful in relocating the rock glyph panel, but were able to narrow the search area for later investigation. Two freshwater springs, located along the western slope of the San Marcos Mountains on the east side of Zacoaloa, hold promise for future surveys. We conducted a limited reconnaissance in the area of the fluted points and briefly studied a third fluted-point fragment previously collected by Schendube. This latter specimen, made from a non-local gray chert, was estimated to have been at least 6 mm thick; a 3.4 cm section of a remaining lateral edge shows...
pressure flaking and grinding. A 1.0cm-wide fragment of the slightly concave base was also blunted by grinding.

Much of our time was devoted to re-
connaissance of the Santa Basin. A num-
ber of rockshelters were located that have potential for further investigations. The largest of the shelters is eroded into volcanic breccias approximately 50
meters above the playa floor. This shel-
ter, known locally as the cave of the Sleep-
ing Old One, has an interior chamber measuring about 42 square meters with an entrance of 30 square meters. Unfortunately, we were unable to conduct sub-
surface testing in any of the shelters; that work will be undertaken next spring.

Lastly, we have been fortunate to have
help from a local land owner in locating
present surface. We recovered several fragmented horse bones. One of the
specimens exhibited three distinct cut
marks. On this trip we revisited the site to
evaluate its condition and to identify ex-
posed remains. We were unable, due to
time constraints, to excavate any test
units, but were able to view and identify
many exposed fossils. The team identi-
fied remains of deer, horse, antelope, and
catfish. An additional bone concentration
field near Ocotlan. It is situated on a Pleis-
tocene terrace associated with the Rio
Grande de Santiago, the outflow from
Lake Chapala, which runs through the
city. Again, horse and bison are repres-
sented along with camel. All three sites
contain remains of animals likely used as
food by early hunters and gatherers. At
present, it is theorized that the two bor-
row-pit bone beds are associated with
sediments along the shallow lake edge.

Members of the May 2000 team inspect a Pleistocene faunal deposit near Lake
Chapala. Although they did not have time to excavate any test units, they found
and identified many exposed fossils. On a previous trip, team members investigated a
borrow pit excavated into fluvial sediments associated with the lake levels of the
Pleistocene-Holocene transition. The excavation exposed a 50-by-100-meter concen-
tration of mineralized Pleistocene faunal remains from two to three meters below
the present surface. One horse bone exhibited three distinct cut marks.

Pleistocene-age bone beds. During a pre-
vious trip we investigated a borrow pit
that was excavated into fluvial sediments
associated with the Pleistocene/Holo-
cene lake level (Lake Chapala). The exca-
vation exposed a 50-by-100-meter concen-
tration of mineralized Pleistocene faunal
remains two to three meters below the
was located in a second pit south of the
first. This exposed bone level, measuring
100 by 100 meters, was also within Pleis-
tocene-Holocene lake sediments. These
mineralized remains, dark brown to
black in color, consist of bison, mam-
moth, and horse.

A third site was identified in a plowed
Continued research in the area ap-
pears promising. Our objectives for
spring 2001 are to test both the
rockshelters and bone bed sites. If time
permits we will continue surveys in
hopes of locating both the camellid petro-
glyphs and the Clovis-age sites near
Zacualco Flaya.
New Books

Bones, Boats & Bison: Archaeology and the First Coloniza-
tion of Western North America, by E. James Dixon. Univer-
sity of New Mexico Press, 1999, 322 pp. by 6-by-9 in.
forcement, $24.95 (softcover).

Dixon, Curator of Archaeology at the Denver Museum of Natural
History, presents a picture of hu-
man settlement of the Americas
that should be familiar to Mam-
moth Trumpet readers. In an
easy-to-read synthesis of re-
search, Dixon evaluates many of
the oldest archaeological sites in
the Americas and argues for a
relatively late settlement—about
13,000 radiocarbon years ago—
by way of the Northwest Coast.
After reviewing the early mile-
stones of Paleolithic archaeol-
yogy, the book describes the basic
theories of colonization. Though discussions of the sites are
necessarily brief and many old sites are not mentioned, the
book brings together much of the existing background informa-
tion relating to the peopling of the Americas. There are chapters
on sites south of the border, physical anthropology, archaeo-
logical theory and interpretation, and the archaeology of
the West’s regions.

The Amateur Archaeologist in the Great Basin by L. J.
Saddleback Rd., Reno, NV 89511 (Phone 775-847-0303),
2000, 116 6 by 9-inch pages. Softcover. $14.95 plus $2 ship-
ing and handling.

Geologist and lawyer Len Ettinger says he became seriously
interested in archaeology relatively recently and this book is the
result. He describes it as "a basic guide in eight chapters with a
glossary and a list of references. The central theme is that there
still are favorable geographic environments in which to find
surface artifacts left by the early occupants of the Great Basin."
It discusses how these favored environments have changed
over the past 12,000 years. Calling the record of human pres-
ence in the Great Basin a puzzle with many incomplete chap-
ters, he notes that some of the pieces have been found and
documented by professionals. "Other pieces have been vandal-
ized, picked up or dug up and removed by collectors without
documentation. These are lost forever and leave voids in the
puzzle." He urges collectors to donate or loan their collections
to state museums or else to photograph them and furnish
images to museums. The book includes a summary of state and
federal law that applies to archaeology in the Great Basin.

Folsom Lithic Technology, Daniel S. Amick, editor, Inter-
national Monographs in Prehistory Archaeological Series
12, P.O. Box 1266, Ann Arbor, MI 48102-1266, 1999, 220
pages with 77 illustrations and 36 tables. $65 (hardcover)
$35 (softcover) plus $5.50 postage and handling.

The papers included in this book use comparative methods
to identify patterns of lithic assemblage structure and variation
that may provide insights into Folsom Technology. Studies
consider several aspects of Folsom technology including tool
manufacture and reduction-system modeling, studies of varia-
tion in raw materials, use wear, technological variation in weap-
onry assemblages, and the organization of technology. They
contribute to a growing understanding of the patterns and
processes in Folsom technology and the causes of diversity
within Folsom lithic assemblages.

America’s Ancient Forests: From the Ice Age to the Age of
Discovery, by Thomas M. Bonnickson, John Wiley &

Here is a book for a forester that will be of interest to many
Mammoth Trumpet readers because it takes the big-picture view
of United States forests that ex-
tends into the Pleistocene. It con-
siders the Ice Age, Ice Age
forests, the origins of modern for-
est, and human interactions—
from Paleo-American time to the
time of European conquest and
settlement. The concluding chap-
ters examine regional forests of
the U.S. ranging from "the Span-
ish Explorer’s Forests," from
Southern pine westward to
Coast redwoods, "Forests of the
Colonies," and "the Trapper’s
Forests."

Geoarchaeology of the Great Plains, edited by Rolfe D.
Mandel, University of Oklahoma Press, 2000, 336 pages,
45 illustrations, 12 maps, 3 tables, $29.95 softcover. Add $4
shipping and Handling, OU Press, 4100 20th Ave. NW,
Norman, OK 73069.

Contributors to this book are John Albaneze, Joe Allen Arts,
Arthur Beets III, C. Reid Ferring, Vance T. Holliday, David W.
May, and Mandel. It traces the history of all major project
researchers, theoretical developments, and sites contributing
to the geoarchaeological knowledge of the Great Plains.