LUBBOCK LAKE LANDMARK: STATE HISTORIC SITE

The groundbreaking ceremony of the Lubbock Lake National Historic and State Archaeological Landmark was held October 23, 1987. The dedication of the newly established state park marks the culmination of years of effort aimed at preserving and developing this unique site.

Lubbock Lake is a stratified, multicomponent site containing an archaeological, geological, paleontological, ecological, and climatic record of events exceeding 12,000 years. Scientific investigations reveal a continuous sequence of cultural occupations ranging in time from the Paleolithic period to the Historic. The site, according to researchers, is among the most important archaeological finds in the world, and the only one of its kind now known in North America.

Like all archaeological sites, Lubbock Lake is a fragile non-renewable resource. The unique stratigraphic and associated cultural record contained at Lubbock make it imperative that this site be preserved for future generations.

Friends and supporters of Lubbock Lake Landmark observed the establishment of the park by an all-day dedication ceremony. Following a morning public hearing held in the Lubbock city council chambers, celebrants adjourned to the site for the dedication. Speakers at the ceremony included Dr. Eileen Johnson, Director of the Lubbock Lake site, Texas Tech University, Robert Nash, Master of Ceremonies, Senator John T. Montford, D-Lubbock, Dr. Laura Cavazos, President of Texas Tech University, B.C. McNinn, Mayor of Lubbock, and Alton Brazell, County Commissione. Dr. Robon Bonnichsen, Director of the Center for the Study of Early Man, Maine, gave the keynote address, entitled "The Significance of the Lubbock Lake (Continued on page 8)"

ROCKING AROUND THE GEOMORPHICAL CLOCK:
Dating by the Rock-Varnish Method

Let the stones speak
With tongues that talk all tongues.
—Dylan Thomas

Rock varnish: it sounds like something invented in California for preserving pet rocks; or perhaps like the name of a heavy-metal band. Actually, says Ron Dorn, geomorphologist from Texas Tech University's Department of Geography at Lubbock, "It's a paper-thin coating, also known as desert varnish, that accretes on rocks in virtually every terrestrial climate and environment." Rock varnish that has accumulated on artifacts from surface archaeological sites can now be dated, thanks to techniques newly developed by Dorn and his colleagues. Recently, in the Mojave River Basin in eastern California, this method produced a series of dates going back almost 22,000 years ago—the oldest dates on surface artifacts in North America. In a 1983 Quaternary Research article, Dorn demonstrated that rock varnish on surface sites in a semi-arid and arid environments is dateable by means of what is known as cation-ratio analysis. The problem with this method, however, is that it produces only relative dates. It can tell how much older one rock varnish surface is than another, but it cannot give an absolute age for either.

Therefore, Dorn began working with the Accelerator Research Group at the University of Arizona. Together, they worked out a new way of dating rock varnish—the C-14 dating technique. Although this method does give numerical dates, it has a disadvantage in that large surface areas of varnish are required in order to isolate a sufficient quantity of carbon for analysis. Reporting in the February, 1986 issue of Science, however, Dorn and his collaborators announced a method for combining cation-ratio analysis and radiocarbon analysis of rock varnish. If a series of radiocarbon dates can be obtained for an environment, an indeterminable number of cation ratio can be calibrated against it. Small artifacts, themselves undatable by radiocarbon, can then be dated through cation-ratio analysis from the varnish that forms on them by using the established calibration. Although cation-ratio analysis must still be considered an experimental technique, startling results have, thus far, been obtained by combining the two methods: the dates from the Mojave region which, as mentioned above, suggest human occupation of the Southwest during the late Pleistocene.

"Rock varnish ranges in thickness from less than a micron to over 500 microns—that's half a millimeter," Dorn observes. "Its variable chemistry comprises clay minerals, manganese, and iron oxide, with a variable sweep of well over thirty trace elements, including carbon. It's the trace elements that make desert varnish—or rock varnish, as I like to call it—suitable for dating. The reason I call it rock varnish is that although this manganese—iron clay coating is ubiquitous and most noticeable in arid environments, it also occurs in many others"—even in Iceland.

"Cation-ratio dating is based upon changes in the chemistry of trace elements over time. Some of the elements are fairly mobile, particularly potassium and calcium; some are fairly immobile, such as titanium." The varnish is removed from the rock with a tungsten-carbide needle under magnification, and purified by a filter system. Then the cation ratio of potassium plus calcium divided by titanium (K + Ca/Ti) is ascertained by particle induced X-ray excitation (or PIXE for short), a process conducted by Tom Cahill's Air Quality Group at Cracker Nuclear Laboratory, University of California at Davis. As the potassium and calcium are removed more rapidly than the titanium through cation exchange, the cation ratio declines regularly over time, thereby becoming a potential measuring standard.

Despite the promising tools he is holding out to archaeology, Dorn is not an archaeologist himself, and emphasizes that he would never attempt to date sites or artifacts without the assistance of one. Dorn, who (Continued on page 3)
RENEWALS

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SUGGESTED READINGS

On Dating by the Rock-Varnish Method


On Lubbock Lake Landmark: State Historic Site


CORRECTIONS AND COMMENTS

From our story, 'Stranded in the Past': Prior to the Udrora discovery, only one Paleolendid site in the entire Great Lakes region, the Honig site in Michigan, had produced identifiable animal bone. Additionally, the inadvertently failed to mention that Udrora was initially discovered and defined by Lawrence Jackson, Gordon Diibb, Pat Boyer, and Jane Edward. Our apologies to these researchers, and our thanks to Dr. Heather McNeill (Trent University, Peterborough, Ontario) for bringing this to our attention.

From "Paleolendid Research in Canada", New Brunswick, the Principal Investigators were Christopher Turnbull and Patricia Allen.

Addendum: "Paleolendid Research in Canada": Due to a mix-up in the mail, Quebec's response to our survey arrived too late to be included in our last MT edition. Therefore, we are pleased to note that both amateur and professional paleoarchaeological societies are located in Quebec. The arrival of this information completes a 100% rate of response from the Canadian provinces and territories to our questionnaire. Thank you Canada!

STILL SEARCHING

In 1987, Earthwatch teams working with Center Director Rob Bonschensun uncovered numerous stone tools and tool fragments as they excavated ancient stone quarries and workshop sites in the Beaverhead Mountains of southwestern Montana. This summer Earthwatch teams will continue investigating this area, seeking to uncover clues to the role stone tool technology played in early North American society.

The results of the research will help us understand, for example, how and when this continent was first populated by humans.

The expedition teams camp along Everson Creek. Both geological and archaeological skills will be used to search and test for new sites and to excavate the Mammoth Meadow site, where last year's teams found so many artifacts.

For more information about 'The First Americans' expedition, contact Earthwatch, P.O. Box 403, Watertown, MA 02272-9990.

JUST DESSERTS?

No, we have a full menu of bite-sized articles on a wide range of topics related to the earliest peopling of the Americas. Archaeology, Lithic Studies, Methods, Physical Anthropology, and Paleoenvironments (including Plants, Invertebrates, Vertebrates, and Geosciences), all articles have been taste-tested by our editors. And it all comes in one convenient package for easy take-out. Volumes 1 (1984) through 4 (1987) are currently available; Volume 5 (1988) is in the works.

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ROCKING AROUND THE GEOMORPHICAL CLOCK:

(Continued from page 1) hold: a Doctorate in Geography with a specialty in georraphy, and was working with calculating the analysis about ten years ago, in conjunction with Tad Onderfender of the Geography Department, University of California at Berkeley. At that time, the problem was to find a means of calibration. Onderfender had the idea of going to the Coso Range in eastern California, where there were potassium-argon-dated volcanics, to see whether a calibration could be established between the varnish ratio and potassium-argon-dated material. The project later became Dorn's master's thesis under Onderfender.

Dorn discovered that "When a calibration is charted on a semi-logarithmic plot, with the ratio on the vertical axis and the age in logarithm (base 10) on the horizontal axis, it comes out to be pretty much of a straight-line relationship, or close to it."

"At the same time," Dorn continues, "I was messing around trying to extract carbon from varnish," hoping to learn how to concentrate it in sufficient quantities for radiocarbon dating. During the several years it took him to succeed at this endeavor, he madecontacts with Austin Long, Tim Jull, and Doug Donahue of the Accelerator Research Group at the University of Arizona. "They agreed on an exploratory attempt to see if the Coso Range varnish contained sufficient accelerator mass spectrometry" (TAMS). The eventual result was the 1986 Science article, which, in Dorn's words, "really opened up the archeological time scale in the southwest." The report described the start of Dorn's continuing collaborations with several groups of archaeologists.

"But," Dorn explains, "although you can't date varnish on artifacts by radiocarbon dating, you can do it by cation-ratio analysis. There isn't enough carbon in the varnish on artifacts for even an accelerator radiocarbon date; the amount of varnish that I need is probably an order of magnitude or two greater in surface area than even a petroglyph, let alone a small artifact. It's beyond the technology today.

But the radiocarbon dating permits you to set up a calibration for cation-ratio dating virtually anywhere. So if you have a site in an arid enough area, where the varnish is biogenochemically stable and doesn't erode, you can radiocarbon-date the varnish on landforms, set up a calibration between the accelerator dating and the cation ratio, and you're off and running."

How wide an area will such a calibration cover? "I'm experimenting on that in the eastern California area," Dorn replies. "I start out in the Coso Range, then the Cima Volcanic Field, and I'm looking at calibration points extending that. There's no good rule of thumb. It could extend as limited as a few square miles: it could extend to tens of square miles, perhaps even to almost a hundred square miles, I don't know. One of the assumptions that you make is that the environmental conditions affecting the varnish cation exchange have been similar in an area over time. If you get a calibration and the conditions have been similar, you may be able to use the calibration over that area.

In addition to its confinement to contexts in which the continuous cation-ratio varnish is not eroded, eroded by acidic environment or by dust- and sand-blasting, Dorn's method has two other shortcomings, both of them connected with calibration. First, he says, "It's a highly specific material less than a thousand years old, it's better for older materials." Second, "A serious problem is the cost: and there's very little I can do about it. If a calibration doesn't exist for an area or a subclass of material less than a thousand years old, it's better for older materials." Second, "A serious problem is the cost: and there's very little I can do about it. If a calibration doesn't exist for an area or a subclass of material less than a thousand years old, it's better for older materials."

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"It is an experimental technique. And yet, when you're careful in using it, it looks pretty good." Range petroglyphs, mostly with Dave Whitley, a Research Associate of the Institute of Archaeology at UCLA. We've found that these petroglyphs are much older than previously thought.

The petroglyphs in question appear on basalt cany

walls; the Coso Range has over 30,000 of them. Previously estimated to be of the same age as the late Holocene, the petroglyphs have been dated to the Early Holocene. Dorn has also conducted a series of petroglyph dating projects, focusing on the early and middle Holocene.

Scanning electron microscope photograph of varnish on a petroglyph from the Coso Range in the Mojave Desert. Radiocarbon analysis has dated the abstract image rock art to about 3700 yr B.P. The flaky lamellate surface indicates that this varnish is not carbon that has been mixed with later materials.

Dorn says that the project is aimed at understanding the relationship between the petroglyphs and the ancient climate. The project involves analyzing the petroglyphs and the surrounding environment to determine if there is a connection between the two. The project is funded by the National Science Foundation and is expected to take several years to complete.
The Mammoth Trumpet asked Dr. Ruth Grunh to review The Great Journey because of her in-depth knowledge of North and South American early occupation literature. The opinions expressed in this review are those of Dr. Grunh, and not the Trumpet. We do, however, think a critical analysis of material presented via the popular press is useful in order to give a balanced view of the current status of the search for the first Americans.

—The Editor


In this well-constructed book, written for the popular market by a successful author of general textbooks in archaeology, Brian Fagan attempts to present the current picture of New World Early Man studies. The book opens with a discussion of early European ideas about the origins of American Indians. Fagan then provides a background summary of human biological and cultural evolution in the Old World from the beginning to the end of the Pleistocene. By that time he has brought the reader to the Bering Strait area, with a description of the environment and cultural evidence in Beringia and the ice-free corridor. Fagan critically reviews evidence for human occupation of the Americas before 11,500 years ago, before going on to a presentation of the conventional Clines model of initial entry, which he accepts. The book closes with a brief review of the later prehistoric developments in North America.

Upon first skimming through the book, I noticed a marked geographic imbalance. A surprising total of seven pages was devoted to the European/Southwest Asian pre-Neandertal and Neandertal population, and another 10 pages to a detailed description of the European Upper Paleolithic complex. In contrast, the Upper Paleolithic archaeology and human paleontology of northern China was given hardly half a page. Almost 40 pages were devoted to Beringia and the ice-free corridor while Fladmark's alternative North Pacific coastal route of initial entry was given only ½ of a page. South America received a total of nine pages in the entire book.

When I delved into reading the book, the explanation for the imbalance emerged. Fagan is operating with fundamental postulates that are bound to constrain severely his presentation and interpretation of the data. These postulates include (1) the rapid and complete replacement of a primitive "Neandertal" population in all areas of the Old World by migrations of advanced anatomically modern man only 40,000-35,000 years ago; and (2) the imperative need for a sophisticated and specialized Upper Paleolithic technology in order for human populations to cross the arctic zone of the Bering Strait and enter the New World. The scenario which is set up on these fundament postulates allows no possibility of entry into the New World before 35,000 years ago as the very maximum—and indeed, the time of first arrival at the Bering Straits is placed at likely no more than 15,000 years ago (with 25,000 years considered the very oldest possible). The presumed route of the ice-free corridor is considered to have been effectively closed between 25,000 and 15,000 years ago. Thus people could not have been in the Americas and North America before 15,000 years ago. As well, a sophisticated and specialized Upper Paleolithic technology is made imperative for all of the initial colonists, presumed to have been terrestrial hunters. Following these postulates, it is clear that New World archaeological sites with unspcialized lithic technologies dated earlier than 15,000 years ago as a rule have to be something wrong with all the reports of such sites, and Fagan follows other recent writers (Stanford, Dinaou, Owen, Waters) in his efforts to discount each one of them that he reviews.

And like the others before him, Fagan, in his haste, makes significant errors and omissions in his description of pre-Clovis-age sites. To cite one example ranging between 14,000 and 12,000 yrs B.P., for Unit I. Although the original fine horizontal beds in Unit I have been largely disturbed and convoluted by the upwelling water (which also sorted out the clay fraction), evidently the hydrostatic pressures were not sufficient to move bones enclosed in Unit I by any significant amount. At the top of Unit I is a remnant paleosol, and an erosional disconformity; and no evidence was found of penetration of this extensive old land surface by upwelling water. Bone fragments in this disconformity included remains of horse, glyptodont, Macrauchenia, and land tortoise—extinct taxa all, supporting the early radiocarbon dates from the underlying Unit I. No mastodon remains and no artifacts were found on this disconformity or in the units above it. At the top of the 30 cm thick sterile colluvial sand deposit of Unit II overlying the midden was another remnant paleosol. Unit III, overlying this second paleosol horizon, was a black organic clay which had previously yielded radiocarbon dates ranging between about 10,300 and 9,700 yrs B.P. Up to three meters of sterile colluvial yellowish-brown sand (Unit IV) overlies the black clay.

Fagan apparently took his interpretation of the geology of this site from previous writers who have never visited the site. Discordia (1964), using outdated comments by Lynch and Haynes (written before the 1976 excavations) as well as a student term paper, also ignored the 1976 stratigraphic profile. Fagan's map of his part (but perhaps describing Standard 1982) stressed point (as an argument that the El Jojo point at Taima-Taima was not as old as indicated by the radiocarbon dating that the type was "commonly used somewhat later." To my knowledge Taima-Taima is one of only two radiocarbon-dated sites with an El Jojo point, which is a quite distinctive point type in terms of its morphology and technique of manufacture. The point which Fagan illustrates, that appears to have been drawn from a photograph in a 1956 article by Crusten, is not a typical form, as most El Jojo points feature a pointed or sometimes a straight base. The other radiocarbon-dated site with an El Jojo point is Museo (a few kilomters south of Taima-Taima) which yielded 16,300 and 14,300 yrs B.P. bone dates.

In an effort to avoid another perpetuation of error, I must correct Fagan's account of the Toca do Boqueirão do lad Fura, as he is compelled by his basic postulates to view as "a Brazilian enigma," a site with a consistent series of more than a dozen radiocarbon dates on hearths in well-stratified occupation levels ranging back to 32,000 yrs B.P. Fagan is mistaken in his statement that the early occupants of the large rock overhang camped alongside a stream, which flowed through the site. The "stream" is a narrow channel which has, on occasion, taken torrential seasonal overflow from a specific fissure on the cliff face lateral to the rockshelter. The channel is at least six meters from the shelter's rear wall, and never entered the occupation area. The deposits within the occupation area are comprised of sand and angular sandstone fragments weathered from the walls of the overhang, which are consolidated sandstone. There is no possibility that the early artifacts of quartz and quartzite have spilled off the walls of the shelter. I have visited this site and examined the artifacts (no quotation marks needed) in Dr. Guidon's laboratory. While Fagan does the same, he will be embarrassed by his remarks about the site, especially the implication of a lack of rigorous scientific description and analysis.

Other more minor errors in the book need to be pointed out lest they be perpetuated as well. The second radiocarbon date from Wilson Butte Cave is 15,000, not 13,000, 800 yrs B.P. Monte Verde has mastodon remains, not mammoth (mammoth have ever been found south of Nicaragua); and it is an Ice... (Continued on next page)
An Appreciation of Bill Irving

What is success? Prestige, honours, fortune, fame, or satisfaction—we all have our own answers. It was a young Quaker Fire. Bill Irving chose to seek for truth and a solution to a problem that has puzzled anthropologists and archaeologists for over a century—Where did human beings enter the New World? Bill did not live to an age of 60, dying at age 50, and so did not gain the recognition that comes to the senior and retired savant. His contributions to North American archaeology were, however, significant, lasting, and appreciated during his lifetime.

William N. Irving was born on Armistice Day, November 11th, 1927, in Toronto, Canada. He was educated in that city on November 25th, 1987, having devoted his talents to North American prehistory. He attended the University of Alberta at Fairbanks to gain a B.A. in Anthropology with minors in Geology and Biology. He returned to Harvard University from 1953-57, doing graduate work in Anthropology, and entered the University of Toronto to gain a Ph.D. in Anthropology with a minor in Geology in 1964. Bill's academic mix of Anthropology with a strong natural history component of Geology and Biology, prepared him for his primary interest in northern archaeology. His book, The Anishnawbek in the 1870s: A Native Indian in Hokkaido, Japan, gave him an early experience in organization and leadership which proved valuable during his fieldwork in northern Canada.

William Irving's first chance to investigate northern Canadian sites came when he joined the National Museum of Man in Ottawa, Canada, in 1964. He was instrumental in delineating the Arctic Small Tool Tradition while at the Museum.

Bill's publications generally reflect an abiding interest in northern archaeology. In 1968, he joined the Department of Anthropology at the University of Toronto, the first paper on the Old Crow region of the Yukon Territory appeared. This was followed by a steady flow of reports on the Old Crow Flats, the relations of Beringia to Asia and central North America, and the peopling of the New World by humans.

Bill Irving heard of this find and, with his long interest in Arctic archaeology and environment, he saw it as an opportunity to perhaps locate an early man site in Beringia. When Peter Lord showed a caribou bone to Dick Wrightson at a picnic bar on the Old Crow River in 1966, a new window opened on Northern American history.

Bill created the Northern Yukon Research Programme at the University of Toronto; a broadly multidisciplinary project designed to investigate the Old Crow Basin, nearby areas of the Porcupine River, and sites such as Bluefish Cave in the surrounding mountains. The research team has published many papers in many areas, all with Bill's encouragement and interdisciplinary understanding. Further papers are in press or in preparation by his co-investigators.

Bill also advocated the recognition of some peculiarly broken bones and ivory as human tools. Although his identification of an “osteodontokeratic” culture in the Yukon resulted in much criticism and skepticism, it was also forced many to think in new ways outside of the accepted orthodoxies under which we had been educated. Not all of us appreciated being made to reconsider what had become accepted assumptions. Some have fought strenuously to defend the status quo. However, the “earth tremors in the crust” started by Bill have acted to alter and adapt the “anthropological plate” to the new evidence. Bill's enthusiasm and energy seldom flagged. His ideas inspired his students and colleagues. His position as an eminent senior Professor was tribute to his activities in the classroom, laboratory, field, administration, and in guiding research. Bill deserves a special place in all our memories for his level-headed generation of the standards of his colleagues' views. He believed that ad hominem arguments or personal biases are out of place in science. Bill's understanding of the kinds of people being studied by Beringia in allowing immigrant organisms from Asia to enter North America has assured his place in New World natural history. I once joked with Bill that he was the modern "Pilgrim" of Beringia and that "Alquipp semper novum ex Beringia" ("there is always something new out of Beringia") should be his motto. Bill should be the type of person who looked for a future of knowledge about North America in the record of the past preserved in Beringia.

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C. S. Chancer
Department of Zoology
University of Toronto

THE GREAT JOURNEY

(Continued from page 4)

Age settlements, not the Age. There are not “dozens” of Clovis site with remains of extinct fauna in direct association; rather approximately one dozen (only two of which have monographic reports). It's Archilochus, not Andrew, and Wesley Hurt, not Hurt. With all the errors and omissions in their own presentations, critics of early sites still gratuitously lecture one another; but anyone who needs to be reasonably scientific, Fagan in his turn attempts to deny the legalistic aspect of Early Man studies, but he himself applies the usual double standard. The excavator of an early site is required to produce a multi-volume court case; while defenders of the conventional Clovis model need only a few general statements. Fagan's treatment of Lewisville is an example. A detailed report of extended excavations in the late 1950s at this deeply stratified site near Dallas produced evidence of simple stone artifacts in association with a variety of extinct taxa. Associated hearths yielded radiocarbon dates over 37,000 yrs B.P. More recent excavations of the upper levels at this locality led by Dennis Stanford are said to demonstrate that it is “almost certainly” actually a Clovis campsite by no means that old. To the best of my knowledge, Stanford has to date publish only five general papers on this his 1978/1980 work. Lewisville site (two summary paragraphs in one general survey article in 1982, and three general paragraphs in another in 1987) — with no documentation at all. Fagan affirms the now-dead conclusion. If there were no double standard, Stanford's presentation would be deemed unacceptable. Had Stanford proposed that the site is older than Clovis, Fagan would have demanded a detailed monograph. Why the difference? According to Fagan's scenario, an American site over 37,000 years old is simply impossible. It cannot be fitted into the model he is locked into by his basic postulates.

When I see sites like Monte Verde, Taima-Taima, and Toca do Boqueiro do Peda Furada, which fulfill all of the archaeological and geological conditions for acceptance listed by Fagan (p. 143), still discounted on the most frail of criticisms, it becomes apparent to me that not only site data but the very concept of site is best considered satisfactory, given Fagan's basic postulates. As Peter White and James O'Connell once observed about the situation in America Early Man studies, “...the acceptance and strength of data are conditioned by our ideas of what they ought to be.”

The real core of the problem with Fagan's scenario of initial settlement of the New World, then, is the suite of fundamental postulates mentioned earlier in this review: the notion of a single origin and rapid worldwide spread of an advanced population of anatomically modern man no earlier than 40,000-35,000 years ago; and the idea that only people equipped with a complex and sophisticated Upper Paleolithic technology could have entered the New World from Asia. Although these notions are long-standing among American archaeologists, they are now becoming outmoded as Euro-centric in origin. The archaeological and paleoanthropological record in China, virtually ignored by Fagan despite the citation of a significant paper by Jean Aigner, now indicates that there was a transition from late Asian Homo erectus through archaic Asian Homo sapiens to anatomically modern Asian populations, a local evolution which took place gradually over the course of the past 200,000 years; with no material evidence of intrusion let alone replacement, by other populations or exotic Paleolithic traditions in the late Pleistocene. We do not need a new population of anatomically modern man arriving from western Eurasia with a new Upper Paleolithic technology late in the Pleistocene in order to start the clock on the settlement of the New World; capable indigenous populations were present in eastern Asia long before 40,000 years ago. We do not even need the Upper Paleolithic technology; if the earliest settlers spread down the Pacific coast, as Knut Fladmark has suggested, a simple un specialized lithic technology would have sufficed for a literal adaptation (consider the ethnographic Yaghan of coastal Tierra del Fuego). Such a population, expanding linearly down the late Pleistocene coastline, could have reached South America before settlement of the interior areas of North America, accounting for the earlier dated occupation sites on the peripheries of the southern continent.

In other words, the great journey could have been earlier and shorter than Fagan would have it. With abandonment of outdated postulates, an alternative model of the settlement of the New World becomes feasible—a model proposing indigenous Asian origins and a coastal route of initial entry by an early lithic-adapted population with an unadulterated cultural heritage. This model would require not only the final discarding of the conventional Clovis model of initial entry, but also a fresh view of indigenous cultural evolution within the Americas. Fagan and others obviously aren't ready for such a truly revolutionary model as yet. Sooner or later, however, they must face up to the more realistic view of human biological and cultural evolution in east Asia, and to the evidence of the early South American archaeological sites. In the meantime, readers of Fagan's book should be aware that there is a fresher, alternative theory of early human settlement of the New World, with a different route ontology, an earlier time frame, different crops, and more complex action.

—Ruth Gruba
Department of Anthropology
University of Alberta
Dating by the Rock-Varnish Method

(Continued from page 3)

elements — whole elements or parts of elements — found next to charcoal that dates to the late Pleistocene. A major on petrology dating in the eastern Mojave has just appeared in the October 1987 issue of World Archaeology.

But,” Dorn continues, “if you turn to all the rock art panels in the western United States, you find that, although people have done a lot of work trying to make interpretations, there’s been no really effective way of dating them up to now. Once on rock art, “the surface is pecked out and the varnish reforms,” Dorn says. “The cation ratio date is a minimum age for the petroglyph because it assesses

the time for the onset of varnishing. The lag time, between the time of exposure and the onset of varning, is about a hundred years. I’ve looked at historic surfaces in the western United States and in Australia, and it appears to take about a hundred years before varnishing is visible with a scanning electron microscope. So there’s not much lag time.”

A third use for the new method is in dating geology. “There are forms you can see only from the air, or on see best from the air,” explains Dorn, artificial land formation or “disturbed desert pavement” that some people have construed to be landing strips or flying saucers, la Chariots of the Gods. “We’ve done geophony work in Julian Hayden’s Sierra Pincate — looked at a spiral form and a human image several meters long, and found them to be early Holocene. This is the type of material that would have been undatable.

Dorn continues, “A perfect use of varnish radio-carbon dating is to look at the ages of the Nazca geoglphys in Peru. There, you have a cobbled pavement coated with desert varnish; the disturbed surfaces have varnishes that have re-formed on them. . . . Years and years of study, yet these have never been dated. Persis Clarkson of the University of Alberta did a dissertation on a Nazca geoglyph; she tried varnish dating but had no calibration. And yet, you don’t even have to mess around with carbon-ratlon dating: there’s enough surface area to gather material from so that you can get a reliable radiocarbon dating. She’s interested in working with it, but for some reason nobody wants to fund it, and I haven’t had the time to make a serious

attempt at fundraising for it. Now, I wouldn’t mind collaborating with Peruvians . . . he trails off thoughtfully.

Fundling, indeed, has been a recurrent problem — when isn’t it in archaeology? — particularly due to the cost of setting up initial calibrations. Most of the original research has been supported by the National Science Foundation, but various archaeological groups such as ACT have chipped in to aid in further adapting the technique for archaeology.

Dorn reiterated, “I’m not an archaeologist, and don’t pretend to be one. At all times I work with archaeologists: I don’t try to do this by myself because I don’t know what I’m doing! He is even reluctant to try to push his technique with any hard sell tactic for adaptation outside his own field: “I’m a geomorphologist, who just got sidetracked into this desert varnish stuff: a strong interest of mine is apply these techniques to geomorphology. How far they’re useful to you, he tells archaeologists, “would be best evaluated by yourselves.”

That does not mean he is not convinced that his method has its archaeological advantages. Beyond its primary advantage of being able to date otherwise undatable artifacts and objects, Dorn says “It’s important to stress that this is a very useful method, which I use is not destructive. You simply remove the varnish mechanically; the artifact is not harmed. Furthermore, PIXE is a non-destructive method, in that even the varnish itself does not get destroyed; it’s still there for subsequent analysis.

Speaking of destruction, archaeologists attracted to Dorn’s method are urged to go easy on the cleaning of their specimens. I don’t like to work with an artifact that has been modified in any way. Archaeologists sometimes do funny things to clean their artifacts in peculiar ways. I haven’t run all the tests possible to find out what type of treatment would affect a cation ratio. In general, I would strongly advise that, if people want their samples analyzed, they do not bother taking anything to them or a toothbrush and some distilled water. They might want to mark which side was bottom and which side was top — but you can usually tell those things anyway.”

Someone who develops a technique with many new possibilities is likely to catch up for a time in an initial whirlwind of activity, and Dorn has been enjjoyably but rather exhaustively busy with projects and publications for several years now. Nevertheless, he is strongly aware of the need to communicate the existence and the details of his technique to the archaeological community. “I would like to publish an introduction for archaeologists in a major journal some time,” he says hopefully. “I do wish to do first, to publish a complete introduction to radiocarbon-dating varnish, then present an archaeological article.”

For rock-varnish dating is, as he hopefully declares, “a technique that is here to stay for archaeology.”

—Michael Doltani

NEW REFERENCES AND RESOURCES

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JOURNALS AND JOURNAL ARTICLES


Martin, Paul S. 1987 Coviens the Beautiful. Natural History 96(10):10-12.*


Section No. 12 of the Central Texas Archaeologist is an entire issue devoted to the Howe Shelter. The Shelter itself is a Pleistocene geology and grave goods dated at 10,000 years ago. This section may be ordered from the Baylor University Bookstore, Waco, TX 76798.

OTHER


Pielet Geology Library Preparation for Geology 134 at Harvard University.

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OTHER


Pielet Geology Library Preparation for Geology 134 at Harvard University.
**MAMMOTH TRUMPET**

**ENCES**

June 6-8, 1988 AMERICAN QUaternary ASSOCIA-
TION 11TH BIENNIAL MEETING, University of Massachu-
setts-Amherst.

Contact: Dan Bornes, Prog Chair, 104A Boardman Hall, U of
Maine, Orono, ME 04469.

July 24-31, 1988 12TH INTERNATIONAL CONGRESS OF ANTHROPOLOGICAL AND ENTHNOLOGICAL SCI-
ENCES, Zagreb, Yugoslavia.

Contact: Miljenko Markulic, Arheo Prog Coord, Dept of Anth, Mem-
phis State U, Memphis, TN 38112.

July 26-30, 1988 SYMPOSIUM ON ASIAN PACIFIC
MAMMALOGY, sponsored by AMERICAN SOCIETY OF
MAMMALOGY, and the MAMMALOGICAL SOCIETY OF
CHINA, Kunming, Yunnan Province, People's Republic of China.

Contact: Dr. Andrew T. Smith, Dept of Zoo, Arizona State U,
Tempe, AZ 85287.

August 2-5, 1988 5TH INTERNATIONAL CONFERENCE ON FERMOANtroPE, Tromsø, Norway.

Contact: Science VP, Norwegian Research Laboratories, PO Box 5900 Etterstad, N-9006 Oslo 6, Norway.

August 29-September 2, 1988 FIRST CONGRESS OF THE ANTHROPOLOGY ROCK ART RESEARCH ASSOCIATION
Durham Performing Arts Centre, Beauport Hotel Convention Center, Newcastle, Australia.

Contact: Australian Rock Art Res Assn, PO Box 216, Caulfield South, 3162, Australia, Victoria.

September 1-3, 1988 ARCHAEOLOGICAL WOOD SYM-
POSIUM, Los Angeles, CA.

Contact: Dr. Robert M. Bowd, USDA, Forest Products Labora-
tory 1 Gifford Pinchot Dr, Madison, WI 53705.

September 5-9, 1988 FISSON TRACK DATING, 6th Inter-
national Workshop, Beaune, France.

Contact: J-L. Janneau-Dubry, Laboratoire de Microsystèges Nuci-laires, UFR des Sciences et Technologie, 16 Rue de Gray, 25000 Beaune Cedex, France.

September 19-21, 1988 INTERNATIONAL SYMPOSIUM ON ENGI-NEERING GEOLOGY AS RELATED TO THE
STUDY, PRESERVATION, AND PROTECTION OF AN-
CIENT WORKS, MONUMENTS, AND HISTORIC SITE,
organized by the INTERNATIONAL ASSOCIATION OF
ENGINEERING GEOLOGY, Athens, Greece.

Contact: Paul G. Mianos, Greek Committee of Engineering
Geology, PO Box 19410, GR-117 10 Athens, Greece; Fax: 45-412 POLX (exe Marinos).

September 23-25, 1988 19TH ANNUAL BINGHAMTON
GEOGRAPHY SYMPOSIUM, Brock University, Canada.

Contact: K.J. Tinkler, Brook U, St Catharines, Ontario, Canada
L2S 3A1; 416/858-5559; Ext 4346.

September 23-25, 1988 UNSPECIALIZED BONE IN-
DUSTRIES, 6th Meeting of Working Group No. 1, Sedna, Italy.

Contact: Dr. Marylene Poliou, Institut de Paléontologie Hu-
maine, 1 rue René Paushard, 75013 Paris, France.

**AAPA Conference to Convene**

The 57th Annual Meeting of the American Association of Physical Anthropologists will be held March 24-26 in Kansas City, Missouri. Hosted by the University of Kansas, Lawrence, the conference will feature 3 sessions focusing on topics in paleoanthropology, paleopathology, forensic anthropology, primate behavior, genetics, and evolution.

A symposium, organized by Dr. Wakefield Dott Jr. and Larry D. Martin, both of the University of Kansas, Lawrence, promises to be of partic-
ular interest to archaeologists. This session will concentrate on Pleistocene human and animal osteological remains recovered from surface sites along the Kansas River.

In addition to the AAPA functions, there will also be meetings of the Palaeoanthropology Association (March 22-23), the Dental Anthropology Association, and the Human Biology Council (March 23), and the Dermatoglyphics Association and the Denal Anthropology Association (during AAPA sessions).

Those readers wishing to attend the meetings may register on site or in advance by contacting Paul Forio, Conferences and Programs, Division of Continuing Education, University of Kansas, Lawrence, KS 66045.

October 22-25, November 1, 1988 GEOLOGICAL SOCIETY OF AMERICA, Annual Meeting, Denver, CO.

Contact: Jean Kinney, GSA Headquarters, Box 9140, 3300 Vermont Place, Boulder, CO 80301-3447 (203-872-2400).

November 10-13, 1988 HOUSEHOLD COMMUNITIES:
THE 21ST ANNUAL CHACMOL CONFERENCE, Calgary,
Alberta, Canada.

Contact: 1988 Prog Chair, Dept of Anth, U of Calgary, Calgary,
Alberta, Canada T2N 1N4. Appraisals and conference visa due
April 1, 1988.

**Ice-Age Hunters of the Rockies**

A symposium focusing on the earliest human inhabitants of the Rocky Mountain region will be held in Denver, Colorado, April 8-10, 1988. Co-sponsored by the Denver Museum of Natural History and the Smithsonian Institution of Washington, D.C., "Ice-Age Hunters of the Rockies" will feature 16 papers dealing with this area of Paleol

**Mammots, Mastadons, and Human Interaction**

In Waco, Texas, October 30-November 1, 1987, symposia convened to address the intertwined issues of the People of the New World and mammoth/mastodon behaviors. Held in conjunction with the 58th annual meeting of the Texas Archaeological Society, the conference had as its workshop the 28,000-year-old Waco Mammoth site. Approximately 500 people attended the symposium "Mammoths, Mastadons, and Human Interaction," which was hosted by John W. Fox and Calvin B. Smith (Baylor University), co-principal investigators of the Waco Mammoth site. Fox and Smith are presently editing the conference proceedings for publication.

S. David Webb (University of Florida) discussed North and South American proboscidean distributions. Ernest Landelius (University of Texas, Austin) delineated changing Southwestern late Pleistocene faunal zones and climatic regimes. Karl Buzer (University of Texas, Austin) presented a model to account for the hiatus in the American Plains record of sites predating Clovis, even though 20,000-30,000-year-old sites seemingly exist in South America. This model draws comparisons from information on the grasslands of South

L. Mammamoths recovered from Hot Springs, South Dakota, and presented new data on mammoth coprolite deposits discovered on the Colorado plateau. Jeffrey Saunders (Illinois State Museum) discussed possible mastodon and mammoth behavior suggested by his work on Boney Springs, Arkansas. Gary Haynes (University of Nebraska), who gave both a symposium paper and the keynote address at the convention's banquet, described day-to-day African elephant routines, and what can be inferred from skeletal remains in reference to his fieldwork in the game parks of East Africa. John Fox and Calvin Smith (Baylor University) argued seasonal migration and defensive herd bunching of *Mammuthus columbi*, the Columbian mammoth, based on characteristics of the Waco mammoth herd. Gentry Steeet and David Carlson (Texas A&M University) proposed a model for identifying human activities at "low profile" proboscidean sites lacking lithics. Pat Shipman (Johns Hopkins) presented quantitatively generated models for recognizing bone expediency tools. Site reports were given on the South Dakota Clovis-kill site, Lange-Ferguson, By Adrien Hannus (Augustana College) and on a megafaunal deposit at Ft. Hood, Texas, by Frederick Brier. Tom Dillehay (University of Kentucky) spoke on human scavenging of mastodon remains based on his work in Monte Verde, Chile. Discussant Robson Bonnichsen (University of Maine) summarized the presentations.

A total of 19 papers were presented at the symposium, affording conference participants a memorable experience.

—John W. Fox
Department of Anthropology and Sociology
Baylor University, Waco, Texas
"The new facility presents an opportunity to break with the academic tradition of scientists preparing papers for scientists."

out of it," says Nash. "It was," he adds, "kind of like a family picnic."

As public awareness of the importance of Lubbock Lake increased, so did a realization of the necessity to preserve the site. By the beginning of 1987, despite close cooperation between the City of Lubbock, the county, and Texas Tech University, the move to make Lubbock Lake a Landmark a state park seemed at a standstill. Although plans for the park had been drawn up in 1983, funding for the project had met a series of dead ends. "We knew," Nash comments, "Lubbock Lake contained a gold mine of information, but no one wanted to open the door." Now, in addition to the ever-present danger of vandalism, the site was threatened by rising water tables.

In desperation, the supporters of Lubbock Lake enlisted the aid of Senator John T. Montford. Senator Montford, convinced of the urgent need to protect Lubbock, moved quickly to spearhead legislation geared towards preserving and developing the site. With a matter of months, the red tape entangling Lubbock Lake had given way to the dedication of a new state park. "Lubbock Lake," emphasizes Senator Montford, "is a worthy heritage to pass on to future generations."

As the result of a cooperative agreement between the City of Lubbock, Texas Tech University, the Texas Tech Museum, and the Texas Department of Parks and Wildlife, plans are now underway for the construction of a three to five million dollar educational facility. The proposed land use pattern for the Lubbock Lake Landmark State Park calls for an archaeological preserve open to the public, with an on-going research program.

Lubbock Lake is a 307 acre archaeological site located on an old meander of Yellowhouse Draw, a tributary of the Brazos River. Situated on the northern outskirts of the City of Lubbock, the site is in an area of formerly active springs. A 1936 attempt to reactivate springs in the draw led to the discovery of the site, when Folsom occupation and the bones of extinct Pleistocene animals were dredged from the deposits. Subsequent investigations resulted in the recovery of 12,000-year-old Clovis material, found in conjunction with the butchered remains of several extinct mammals, including horse, camel, mammoth, short-faced bear, and giant musk ox. "The bear and armadillo," notes Dr. Eileen Johnson, Director of the current Lubbock Lake Project, "are particularly important since these remains are the most recent known for these extinct animals and the first found in direct association with humans."

At another area of the site, excavators unearthed evidence of a Folsom bison kill/butchering locale. Here, explains Johnson, "Small herds were stalked, and bones from individual bison were stacked in small piles reflecting the butchering operations."

Moving up the stratigraphic column, researchers discovered a third Paleoindian occupation. "Plainview," says Johnson, "is the earliest post-Folsom occupation of the Southern Plains representing a continuation of bison economy and change in point technology." Three bison kill/butchering locales from the Plainview period have been identified at Lubbock Lake.

"These remains are the most recent known for these extinct animals and the first found in direct association with humans."

Plainview was succeeded by yet another Paleoindian occupation—Firstview. This period is represented at Lubbock Lake by two bison kill/butchering locales and a camping area, the latter containing evidence of plant gathering and processing.

In addition to these subdivisions of the Southern High Plains Paleoindian period, other archaeological excursions at Lubbock Lake Landmark have resulted in the discovery of Protohistoric, Ceramic, Protohistoric, and Historic material.

In conjunction with archaeological research, the ongoing Lubbock Lake Project has integrated research focusing on the geology, paleoclimatology, and paleontology of the site. This multidisciplinary approach has contributed greatly to an understanding of past environmental and climatic conditions on the Southern High Plains. Additionally, the 12,000-year-long paleoenvironmental record provides an ideal framework for reconstructing specific human adaptation patterns.

When the new facility is complete (target date October, 1989), an Interpretive Center, a laboratory for research conducted by the Museum, and trails, over looks, and picnic areas will exist at the site. Dr. Robert Bonnichsen, speaking at the dedication ceremony, noted, "The outstanding record of Lubbock Lake is well suited for the investigation of unanswerd research questions, graduate education, and public exhibits. The new Lubbock Quaternary Research and Archaeology Education Facility presents an opportunity to break with the academic tradition of scientists preparing papers for scientists."

The Interpretive Center is currently envisioned as a single floor structure of approximately 7,973 square feet. Three main units reflect the public programs: the exhibit area for long term and changing displays; a children's learning center for exploration and enhancement; and an auditorium to accommodate a variety of programs and audiences.

The Research Building, a single floor structure of approximately 3,535 square feet, will accommodate both Lubbock Lake Landmark and visiting scholars' research space needs. This, along with two other structures, a dining hall and an accommodations facility, will function as the proposed Research Center. The combination Research Facility/Interpretative Center will be the first state park to include a Paleoindian site. "Lubbock Lake," Senator Montford observes, "has the potential to become a world-class park of international interest." The Lubbock Lake National Historic Site and State Archaeological Landmark promises to provide a valuable model for other states engaged in similar endeavors.