ARCHEOLOGICAL ANOMALIES: SMALL ARTIFACTS

Bone, Stone, Metal Artifacts, Footprints, High Technology

Compiled by:

William R. Corliss

A CATALOG OF ARCHEOLOGICAL ANOMALIES

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PREFACE

After more than thirty years of scouring the science and popular science literature for anomalies, my major observation is that the search has been most fruitful. In fact, I have wondered why the scientific community itself has not been systematically compiling such information. It is surprising that a Catalog of Anomalies does not already exist to guide scientific thinking and research. It is at least as important to recognize what is anomalous as it is to realize what is well-explained in terms of prevailing paradigms. With this outlook and philosophy, here is the twenty-first volume of such a Catalog. It is largely the product of one person's library research. The work has been carried forward entirely through the sale of these Catalog volumes and associated publications.

Under the aegis of the Sourcebook Project, I have already published 39 volumes, totalling roughly 16,000 pages of source material on scientific anomalies. (See page iv for a list of titles.) As of this date, these 39 volumes represent only about 50% of my data base. New material is being added at the rate of about 1,200 new items per year, about 700 of which come from the current scientific literature. This acquisition rate could easily be multiplied several-fold just by spending more time in libraries. Even after thirty years, only a handful of English-language journals have received my serious attention. The journals in other languages, government reports, conference papers, publications of research facilities, proceedings of state academies of science, and an immense reservoir of pertinent books remain almost untapped. Every library foray uncovers new anomalies; the world's libraries are bulging with them.

Given this rough assessment of the extent of the anomaly literature, one can understand why the Catalog of Anomalies will require at least 30 volumes, many of them larger than the one you now hold. I visualize a shelf of these 30 volumes, or an equivalent CD, accompanied by master indexes, to be the logical initial step in providing scientists with access to what, in my opinion, is not well-explained. The underlining of "my" is significant because anomalousness is often in the eye of the beholder. It depends upon how well one is satisfied with those explanations based on currently accepted paradigms. In the Catalog of Anomalies, the data rule; all theories and hypotheses are considered tentative. The history of science, from the luminiferous ether to the static continents, demonstrates that this is a wise policy.

Will the Catalog of Anomalies impact science significantly? Probably not---at least not right away. Quite often the initial reaction to the volumes already published has been disbelief and even disdain. The data must be in error; the data are too often anecdotal; the data are too old; the purported anomaly was really explained long ago. Germs of truth reside in such complaints. Some science and some observations reported in the Catalog are certainly bad; but this is minimized by a heavy reliance upon respected journals. In addition, the baseline of well-established theories---against which anomalousness in measured---is always shifting. And for every anomaly that can be explained away, a trip to a library will quickly replace it with ten more from impeccable sources. Nature is very anomalous or, equivalently, Nature is not yet well-understood. Much remains to be done in both anomaly research and in the resulting scientific research that will ultimately dispose of these anomalies.

William R. Corliss
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November 1, 2003

"ROUND ABOUT THE ACCREDITED AND ORDERLY FACTS OF EVERY SCIENCE THERE EVER FLOATS A SORT OF DUST-CLOUD OF EXCEPTIONAL OBSERVATIONS, OF OCCURRENCES MINUTE AND IRREGULAR AND SELDOM MET WITH, WHICH IT ALWAYS PROVES MORE EASY TO IGNORE THAN TO ATTEND TO .... ANYONE WILL RENOVATE HIS SCIENCE WHO WILL STEADILY LOOK AFTER THE IRREGULAR PHENOMENA. AND WHEN THE SCIENCE IS RENEWED, ITS NEW FORMULAS OFTEN HAVE MORE OF THE VOICE OF THE EXCEPTIONS IN THEM THAN OF WHAT WERE SUPPOSED TO BE THE RULES."

William James

Illustrations initialed JCH are the work of John C. Holden

HOW THE CATALOG IS ORGANIZED

PURPOSE OF THE CATALOG

The Catalog of Anomalies is designed to collect and categorize all phenomena that cannot be explained readily by appealing to prevailing scientific paradigms. Such phenomena are termed "anomalies." Following its definition, each anomaly is rated in terms of: (1) its substantiating data; and (2) the seriousness of the challenge it poses to mainstream paradigms. Next, important examples of the anomaly are recorded, some of the more interesting ones in greater detail. Finally, all the examined references are listed. Thus, the Catalog is a descriptive guide as well as a reservoir of examples of the phenomena along with their supporting references. Science researchers thus have a substantial foundation for beginning further investigations of these intriguing phenomena. In short, the basic purposes of the Catalog are: the collection and organization of the unknown and the poorly explained in order to facilitate future research and explanation.

GENERAL PLAN OF THE CATALOG

It was tempting to organize this Catalog alphabetically, making it an "encyclopedia of anomalies." But many of the phenomena have obscure names or, even worse, no names at all. Under these circumstances, alphabetical access to the data base would be difficult. Therefore, a system of classification was designed based upon readily recognized aspects of nature, such as lightning or mammal morphology. The universe of anomalies is first divided into nine general classes of scientific endeavor, as illustrated in the diagram on the following page. Few people would have difficulty classifying a phenomenon as biological, astronomical, geological, etc. The second, third, and fourth levels of classification are also based upon generally recognized aspects of nature. The similarity of this sort of classification to that employed in natural-history field guides is quite intentional. Like bird identification, phenomenon classification soon becomes second nature. In fact many of the phenomena described in this Catalog are accessible to anyone with normal senses and, particularly in ornithology, a little optical help.

Most catalogs employ numbering systems, and this one is no exception. Rather than use a purely numerical system, the first three levels of classification are designated by letters. The triplets of letters selected have some mnemonic value. Thus, an MMT anomaly is easily recognized as belonging to the archeology class (M); as involving small artifacts (M); and as concerning high technology (T). The number added to the triplet of letters marks the fourth classification level, so that MMT2 applies to "ancient metallurgy," as indicated in the diagram on the next page. Every class of anomaly has such a unique alphanumeric code. All cross references and indexes are based on this system. Catalog additions and revisions are made easier with this approach.

These codes may seem cumbersome at first, but their mnemonic value to the compiler has been considerable. The codes are simple, yet they are flexible enough to encompass the several thousand types of anomalies in the several diverse scientific disciplines that have so far been investigated.

A glance through this volume will reveal that each entry for an anomaly type bears an X-number, and each reference an R-number. MMT2-X1 therefore specifies the first entry for "ancient metallurgy." MMT2-R1 is the first reference in this section's bibliography.

First-order classification	Second-order classification	Third-order classification	Fourth-order classification
A Astronomy	A Anthropology	**B Bone Artifacts**	**1 Ancient Chemistry**
B Biology	G Graphic Artifacts	**C Cloth Artifacts**	**2 Ancient Metallurgy**
C Chemistry & Physics	**M Small Artifacts**	**E Geological Artifacts**	**3 Ancient Surgery and Dentistry**
E Earth Sciences	S Structures	**M Metal Artifacts**	**4 Micro-Work**
G Geophysics		**P Pottery Anomalies**	
L Logic & Math		**S Stone Artifacts**	
M Archeology		**T High Technology Artifacts**	
P Psychology		**W Wooden Artifacts**	
X Unclassified			

Other MMT Entries

Bold-face subjects are covered in this volume

CATALOG CODING SCHEME

HOW DATA AND ANOMALIES ARE EVALUATED

Each anomaly type is rated twice on four-level scales for data "validity" and "anomalousness," as defined below. These evaluations represent only the opinion of the compiler and must be considered only rough guides.

DATA EVALUATION SCALE

1 Many high-quality observations. Almost certainly a real phenomenon.

2 Several good observations or one or two high-quality observations. Probably real.

3 Only a few observations, some of doubtful quality, The phenomenon is questionable

4 Unacceptable, poor-quality data. Such entries are included only for purposes of comparison and amplification.

ANOMALY EVALUATION SCALE

1 Anomaly cannot be explained by modification of present laws. Major paradigms are challenged.

2 Can probably be explained through relatively minor modifications of present scientific laws.

3 Can probably be explained using currently accepted theories. Primarily of curiosity value.

4 Well-explained. Included only for purposes of comparison and amplification.

Referring to the evaluation scales above, it should be remarked that anomalies that rate "1" on both scales are very rare. Such anomalies, however, are the most important because they have the potential to force scientific revolutions.

ANOMALY EXAMPLES

Examples of anomaly types and entries discussing them are designated by the letter X in the body of the Catalog. Except in the cases of extremely common phenomena, such as ball lightning, all of the examples discovered so far are entered. If the example is of the "event" type, time and place are recorded if they are available. Such data are the basis of the Time-of-Event and Place-of-Event indexes provided in some volumes. These indexes may lead to obscure cause-and-effect relationships. When library research has unearthed a great many examples of a specific anomaly, only the more interesting and instructive are treated in detail. In the examples and entries, direct quotations from eye-witnesses and scientific experts are often employed to convey accurately the characteristics and significance of the phenomena.

THE REFERENCES AND SOURCES

Each anomaly type and the examples of it are buttressed by all the references that have been collected and examined. Since some of the references deal with several examples, each reference includes the X-numbers of the examples mentioned. When a reference covers more than one type of anomaly, it is repeated in each anomaly bibliography. Actually, there is little such repetition.

Perusal of the Source Index will demonstrate that the great majority of the references employed comes from the scientific literature. Heavily represented in this volume of the Catalog are such journals as: Nature, Science, and Antiquity. Some less technical publications are also used fairly frequently, such as Science News and the New Scientist. All of the serials just mentioned are generally very reliable, although one must always be wary when dealing with anomalous phenomena. In addition to these often-referenced publications, a wide spectrum of other journals dealing with archeology have been found useful here. In contrast to many of the preceding Catalog volumes, books, both scientific and popular, have played an important role here.

The sources consulted date from the beginning of organized science some 200 years ago. The great bulk of the references, however, comes from the past 80 years. In archeology, especially, the explosive growth of the data base is remarkable. Indeed, advances are being made so rapidly in archeology and anthropology that some things printed in this volume will be outdated before the books leave the bindery.

THE INDEXES

Most Catalog volumes conclude with five separate indexes. At first glance this may seem to be too much of a good thing, but in the context of a science-wide endeavor each index helps tie the whole together. It is quite apparent, though, that most archeological phenomena are not of the "event" type. Therefore, the Time-of-Event and Place-of-Event Indexes are not included in the Series-M volumes.

The Source Index shows immediately the dependence of this Catalog upon the scientific literature rather than newspapers and other popular publications. Its real purpose, though, is the rapid checking of newly acquired references to determine whether they have already been caught in the fishing net of the library-research aspect of the Catalog effort. The Source Index is doubly valuable because many footnotes and bibliographies in the scientific literature omit article titles and, sometimes, even authors! The researcher also comes across vague references to such-and-such an article by so-and-so back in 1950 in Nature. In such cases, the rather ponderous Source and First-Author Indexes can help pin down references lacking in specifics.

The three Indexes use the Catalog codes described above rather than page numbers. The codes are permanent whereas page numbers would change as volumes are revised. The mnemonic value of the Catalog codes is evident here, too, because the approximate nature of each Index entry is readily apparent, while page numbers provide only location.

SUPPORTING PUBLICATIONS OF THE SOURCEBOOK PROJECT

The Catalog volumes curently being published are actually distillations of huge masses of source material. The Sourcebook Project has already published 35 volumes of such material, as detailed on p. iv. Phase I of the Sourcebook Project resulted in ten loose-leaf notebooks called "Sourcebooks." To meet the demands of libraries, Phase II supplanted the Sourcebooks with a series of six "Handbooks," which are casebound, much larger, and more comprehensive than the Sourcebooks. Phase III, now in progress, is the cataloging phase. This consists of systematizing the data base, which now comprises some 50,000+ articles, and the publication of the "Catalogs."

CATALOG ADDENDA AND REVISIONS

Over 1200 new reports of anomalies are collected each year from current and older scientific journals. New anomaly types and additional examples of types already cataloged are accumulating rapidly. When sufficient new material has been assembled, Catalog volumes will be revised and expanded.

The Sourcebook Project welcomes reports of scientific anomalies not already registered in extant Catalog volumes. Reports from scientific journals are preferred, but everything is grist for the anomaly mill! Credit will be given to submitters in new and revised Catalog volumes. If the reports are from current literature, they may be mentioned in Science Frontiers, the Project's newsletter. Send data to: Sourcebook Project, P.O. Box 107, Glen Arm, MD 21057, USA.

The Project's web-site address is: www.science-frontiers.com.

MM INTRODUCTION

The title of this catalog volume necessitates beginning with three definitions:

artifact: An object that has been manufactured or modified by humans. In other words, it is artificial. Of course, an anomalist, being a generalist, must broaden this definition to include the possibility that nonhumans may have been involved in making the artifact. Examples: protohumans and other primates.

small: In this volume, "small" is usually equivalent to "portable"; that is, the object is small enough to lift. The Great Pyramid if obviously an artifact but hardly portable. Here, we catalog spearheads, pottery, etc.

anomalous: This words is usually defined as "irregular," "abnormal," "contradictory," or "out-of-place." We add "paradigm-challenging."

The artifacts left by ancient humans possess many objective properties, some of which may make the artifact anomalous. Some possibilities, with examples, are listed below.

Age, as defined by radiocarbon dating, stratigraphic position, physical association with objects of known antiquity, historical records, etc. Example: radiocarbon dating of the Monte Verde archeological site in Chile.

Location: as usually defined by geography, altitude, ocean depth, etc. Example: purported Roman amphorae off the coast of Brazil.

Purpose: use or application, a property often unknown, controversial, or sloughed off as being of "ritual" use. Example: African stone crescents.

Size: linear dimensions and/or weight. Example: microliths.

Scale: as measured by number, areal extent, etc. Example: a vast lithic workshop in Belize.

Composition: chemical and/or physical nature. Example: a purported ancient Chinese belt buckle made from aluminum.

Affiliation: similarity in style---a highly subjective factor. Example: ancient pottery in Ecuador resembling Japanese pottery thereby suggesting Precolumbian diffusion.

Association: colocation. Example: giant sloth domestication suggested by bones in an Argentine cave.

Sophistication: as subjectively determined by an artifact's complexity, its precocious use of materials, and/or the application of engineering and scientific principles generally assumed not to have been developed in a subject culture. Example; the Baghdad battery.

Curiosity value: as decided by the compiler. Example: large caches of stone discs with no known purpose.

Some small artifacts that are manifestly anomalous are relegated to the Catalog volume attending to "graphic" artifacts, such as maps, inscribed tablets, statuettes, coins, etc.

As in all volumes of the Catalog of Anomalies, the subject matter is first divided according to easily discerned properties. In the present volume, all chapters save one are determined by the artifacts' composition: metal, bone, stone, wood, etc. The exception, Chapter MMT, deals with technologically sophisticated artifacts, such as the Baghdad battery mentioned above.

MMB BONE ARTIFACTS

Key to Phenomena

MMB0 Introduction

Bone artifacts must be distinguished from archeological skeletal material that has not been modified by human hands. Such unworked bones are not "artifacts," but they may be anomalous in terms their of age and location. They are cataloged in MAE in another volume. Here, we examine human-modified bones, such as tools, weapons, deliberate skull surgery, and signs of routine cannibalism.

The challenges posed to mainstream thinking by bone artifacts are several:

- The Clovis-First paradigm is incorrect.
- Humans employed bone tools long before archeologists have allowed.
- Long before thought possible, humans were performing successful skull surgery.
- Human cannibalism was much more prevalent in the past than supposed.
- Caucasians diffused across the planet much earlier than permitted in accepted scenarios.

MMB1 Anomalously Early Bone Tools

Description. The appearance of bone tools, particularly weapons, that are technologically advanced for their age and location.

Data Evaluation. Our data sources are exclusively science journals and magazines. The physical and chemical techniques employed in dating the African harpoon points (X1 below) have large margins of error, which have led to some criticisms of the discovery. Rating: 2.

Anomaly Evaluation. An important paradigm at risk in this section states that the inhabitants of Africa were technologically far behind their contemporaries in Europe circa 35,000 years ago. Discoveries in Zaire (X1) belie this assertion. Rating: 2.

A second entry concerns the surprisingly sophisticated manufacturing seen in a 20,000-year-old ivory killing stick. Rating: 3.

Similar and Related Phenomena. The problems encountered in the stratigraphic dating of many artifacts mentioned in this volume, particularly at the supposed pre-Clovis sites in the New World (MMB3, MMS).

Entries

X1. Zaire. Early bone harpoon points. For years, anthropologists have confronted a curious paradox concerning the apparent disparate human technological development of humans in Europe and Africa. In Europe there seems to have been a surge of technological advance circa 35,000 years ago coincident with the sudden and still-mysterious appearance of the Cro-Magnons. All the while, Africa seems to have been a technological backwater, even though African skeletons of this period appear to be anatomically modern just like those in Europe. This discrepancy was termed a "paradox"; and this paradox was duly enshrined as a paradigm, specifically, that African culture lagged that in Europe by many millennia.

In 1988, J. Yellen and A. Brooks, burdened by this paradigm, were understandably taken aback when they discovered a neatly crafted bone harpoon at a site in Zaire believed to be much older than 35,000 years. At this site called Katanga, near Zaire's border with Uganda, they expected to find only crude tools. Instead, they collected bone harpoon points as sophisticated in design and workmanship as European artifacts manufactured 35,000 years ago. Their problem was that the Zaire bone points

A bone harpoon point from Zaire. Age: about 80,000 years. (R4)

seemed to be twice 35,000 years old. Could ancient Africans actually have preceded the Cro-Magnons technologically? (R4)

To destabilize the reigning Europe-first paradigm, Yellen and Brooks had to convince other anthropologists that the Zaire harpoon points were really more than 70,000 years old.

Radiocarbon dating was useless beyond 40,000 years, so they enlisted themoluminescent (TL) and electron-spin-resonance (ESR) dating, which were deemed effective in the 40,000-100,000-year range. TL dating revealed that the sand layer containing the harpoon points was indeed about 80,000 years old. A hippo tooth near the harpoon points turned out to be about the same age, as determined by the ESR method. (R8)

Supporting the TL and ESR ages were comparable dates from a technique called "optically stimulated luminescence" and other innovative dating methods. Faunal and stratigraphic data were also consistent with the 80,000+ age. It looked as if the Zaire harpoon points were at least twice as old as comparable Cro-Magnon artifacts. The Europe-first paradigm appeared to be severely challenged. (R6, R8)

It seemed incontrovertible that about 80,000-100,000 years ago, Africans were spearing the giant catfish that teemed in the nearby Semliki River with rather sophisticated bone-pointed harpoons. But critics were swift to list several objections to the claims emanating from Katanga.

(1) All of the dating methods used are subject to large uncertainties.

(2) The harpoon points look to be only 6,000-8,000 years old---a subjective observation to be sure.

(3) The harpoon points themselves were not directly dated, just the sand and hippo tooth. Geological disturbances could have shuffled the sand deposits containing the harpoon points and hippo tooth.

(4) If the harpoon points are really about 80,000 years old, a new enigma emerges: Why is the Katanga site so "advanced" compared to other African sites? Stanford anthropologist R. Klein asked, "Why does this site stand out like a sore thumb?

If the Katanga dates hold up, it appears that the Europe-first paradigm/anomaly will be replaced by a new anomaly: Katanga is markedly different from other African sites in terms of technological sophistication and, in all probability, aesthetics and economic status. (R5)

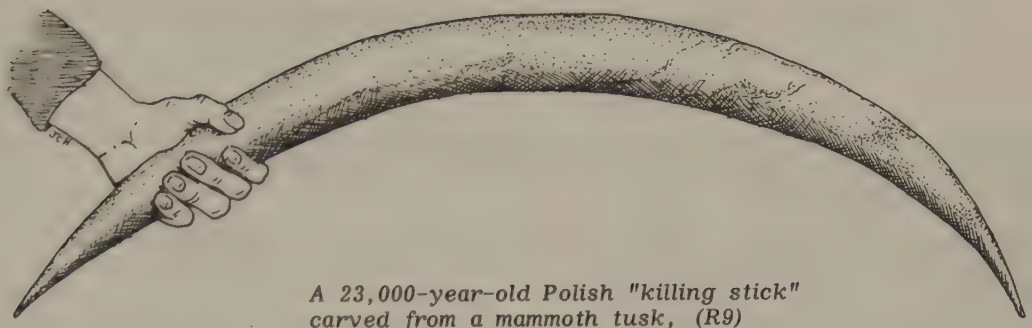
X2. Poland. An ivory boomerang-like object. Before the bow and arrow were invented, ancient hunters all over the world hurled killing sticks ("kylies") at prey beyond the range of spears. Properly manufactured killing sticks are surprisingly effective against small targets even 300 feet distant. Of course, the stick thrower had to retrieve his weapons, and that was always a bother. Killing sticks that returned to their thrower, boomerangs, that is, were a major advance in Stone Age hunting.

No one knows where the first boomerangs were developed. They have been employed for millennia on at least five continents, although the oldest seem to be some wooden examples retrieved from a swamp in South Australia dated as being 9,000-10,000 years old.

Some ancient hunters probably noticed that curved killing sticks had a tendency to describe an arc when airborne. With some trial-and-error shaping of the sticks and many flight tests, the boomerang secret could have been discovered. Even so, boomerangs are much more sophisticated technologically than killing sticks and spears.

So, when the excavation of a 23,000-year-old, boomerang-like section of mammoth tusk was reported in 1987, it attracted considerable attention in anthropological circles. The well-crafted bone implement was anomalously early in the technological sense. But was this ivory object really a boomerang; if thrown, would it return to the thrower?

From appearances, it looks as if it would. Its span is a rather large 27 inches. It is 2.3 inches wide at the broadest part. One side retains the curvature of the tusk, while the other is ground and polished until almost flat. The weight is almost 2 pounds (800 grams)---rather heavy for this type of weapon. One end is engraved with lines to afford the thrower a better grip. It is unquestionably a well-made,



A 23,000-year-old Polish "killing stick" carved from a mammoth tusk, (R9)

rather formidable-looking object. (R1-R3)

The question of its returnability had to be settled, but no one was going to flight test such a unique artifact. It wasn't until 8 years later (1995) that tests with a plexiglass replica were announced. Plexiglass has about the same density as mammoth bone, but try as they might, boomerang aficionados could not get the replica to return. It was a killing stick, not a boomerang. Still, the artifact was excellent aerodynamically and would have been a vicious weapon against prey beyond spear range. One of the discoverers, P. Valde-Nowak, surmised that, given its large size, it might have been launched against the reindeer that inhabited Poland 20,000 years ago. (Radiocarbon dating came up with an age of 20,300 years.) (R7, R9)

Although the carved mammoth tusk failed the return-to-thrower test, it remains a remarkable artifact for its time and place. P.G. Bahn evaluated it as follows:

> Subtle details in carving of the ivory, all apparently designed to improve the boomerang's [sic] stability and ballistic qualities, indicate that its maker knew precisely what to do. Its ingenious form points to a long tradition of making weapons of this kind; the carver was clearly drawing on long-accumulated knowledge in the working of this difficult material. (R7)

All of the above was done over 20,000 years ago!

References

R1. Bahn, Paul G.; "Return of the Euro-Boomerang," Nature, 329:388, 1987. (X2)

R2. Valde-Nowak, Pawel, et al; "Upper Palaeolithic Boomerang Made of a Mammoth Tusk in South Poland," Nature, 329:436, 1987. (X2)

R3. Bower, B.; Prehistoric Tusk: Early Boomerang?" Science News, 132:215, 1987. (X2)

R4. Shreeve, James; "The Dating Game," Discover, 13:76, September 1992. (X1)

R5. Gibbons, Ann; "Old Dates for Modern Behavior," Science, 268:495, 1995. (X1)

R6. Brooks, Alison S., et al; "Dating and Context of Three Middle Stone Age Sites with Bone Points in the Upper Semliki Valley, Zaire," Science, 268:548, 1995. (X1)

R7. Bahn, Paul G.; "Flight into Pre-History," Nature, 373:562, 1995. (X2)

R8. Menon, Shanti; "The Slow Crawl Forward," Discover, 16:34, August 1995. (X1)

R9. Anonymous; "The Killing Stick," Discover, 16:28, June 1995. (X2)

MMB2 Bone Artifacts of Uncertain Affiliation

Description. The presence at some old archeological sites of bone artifacts that cannot be confidently be attributed to recognized cultures existing in the specific space-time frame.

Data Evaluation. Although our sources are acceptable science magazines, the most important (R1, R2) are from 1940. It is almost inevitable that more recent information is available. Rating: 3.

Anomaly Evaluation. If the unusual bone artifacts found at Ipiutak turn out to be merely minor deviations from Eskimo culture, no anomaly can be claimed. If, though, the Ainu or some other Caucasoid culture was involved at Ipiutak, as speculated below, the accepted scenario of the peopling of the Arctic is at risk. Rating: 1.

Possible Explanation. Ipiutak may represent an early New World contact by the Ainu, Jomon, or another Old World culture.

Similar and Related Phenomena. Ipiutak as an unusual archeological complex from the standpoint of structures (MSS1-X1 in Ancient Structures); the Ainu culture and New World Caucasoid skeletons (MAK and MAE in future volumes in the M-series).

Entries

X1. Alaska. Ivory artifacts of Ipiutak. Built around 1,000 A.D., the settlement called Ipiutak is located about 150 miles north of the Arctic Circle on Point Hope. The environment is forbidding. It was not until 1940 that an expedition mounted by the American Museum of Natural History began serious excavations. The expedition's leader, F.G. Rainey, was astonished to find the remains of a culture that differed markedly from that of ordinarily associated with the Eskimos.

Rainey estimated that Ipiutak was once of town of perhaps 4,000 people, who lived in over 600 houses all neatly laid out in rows. For the Arctic of 1,000 years ago, this was a huge, unusually well-organized metropolis. Although the inhabitants of Ipiutak undoubtedly arrived from somewhere in Asia, their artifacts were distinct from those of the Eskimos. (R2)

Braving gales and cold rain, Rainey and his colleagues, plus a contingent of Eskimo helpers, excavated scores of Ipiutak graves. The Eskimos were as surprised as Rainey by what was uncovered.

> Gasps from Eskimos greeted the first revelation of a human skull with two large and staring artificial eyes with black pupils. Several more men with ivory eyes later came to light, one also fitted with ivory nose plugs shaped like birds' heads. This skeleton also had an ivory cup-like object over its teeth, while another had two long bands of ivory beside the hips, with complex and mysterious engravings unlike any Dr. Rainey had ever seen.
>
> Objects recovered from the tombs include tiny ivory needles, flint objects, arrowheads, ornate chain links, carvings resembling monsters, and curious twisted ivories which the Eskimos dubbed "biscuits." (R1)

Of especial interest was the recurrence of a unique and distinctive motif that was common in the Ainu culture now restricted to northern Japan. Could Ipiutak have been built by the Ainu? The conventional view of Ipiutak is that---despite its unusual nature---it was only an offshoot of the Eskimo culture that spread all across the Arctic at least a thousand years before Ipiutak was built. However, the Ainu were once a bold, seafaring race. Recently, their settlements have been uncovered in the Kurils north

of Japan, only a few hundred miles from the Aleutians and the Bering Strait. (R3) Some now speculate that the Ainu may have once reached the North American continent. The apparently anomalous ivory carvings and the singular motif hint at something like this, but we do not really know enough at this time to do anything but speculate.

The anomalousness of the possible Ainu connection deepens when one recalls that the Ainu possess some Caucasian physiological characteristics. If they really did reach North America in ancient times---actually thought to be long before the founding of Ipiutak---this contact might account for Kennewick Man and the several other deviant North American skeletons with Caucasian overtones. But, since Kennewick Man has been dated as being about 9,000 years old, an Ipiutak connection is tenuous to say the least.

X2. Ireland and Scotland. Possible Inuit artifacts. Unexpected human diffusion across the planet's far north may have extended all the way to Europe.

> Inuit harpoon heads have been dug up in Ulster (Northern Ireland) and Aberdeenshire (northeast Scotland) dating from the 1200s. (R4)

In essence the Eskimos may have reversed the earlier Viking voyages to Greenland.

There are also reports of Eskimos making landfalls on the Orkneys (Scotland) and the Netherlands in the 16th. century.

References

R1. Anonymous; "Unearth the Oldest Town in Arctic Circle Alaska," Science News Letter, 38:213, 1940. (X1)

R2. Rainey, Froelich G.; "Mystery People of the Arctic," Natural History, 46:148, 1941. (X1)

R3. Holden, Constance; "Possible Ainu Site Creates Buzz," Science, 284:583, 1999. (X1)

R4. Kleupfel, Brian; "Native Americans May Have Found Europe, Says Scholar," Berkeley Voice, January 28, 1993. Cr. P.F. Young. (X2)

MMB3 Pre-Clovis Bone Tools in the New World

Description. The existence in the New World of bones that are older than 12,000 years and, in addition, appear to have been worked by human hands for the purpose of manufacturing tools and weapons. Generally, these are the bones of mammoths and other large mammals, but other species, including humans, can be included in principle.

Data Evaluation. Much has been written in the science journals and magazines about the supposed pre-Clovis bone artifacts in the Yukon. The gist is that the bones may be pre-Clovis but that their modification by human hands is far from proven. Rating: 3.

Anomaly Evaluation. In the 1980s, evidence for a human presence in the New World before 12,000 years ago (i.e., pre-Clovis) would have been rejected almost out-of-hand by the scientific community. The so-called "Clovis Police" were very active! Under these conditions, such evidence would have been extremely anomalous. From the 1990s onward, however, the Clovis-first paradigm has been much weakened by many new claims of pre-Clovis artifacts, particularly in South America (Monte Verde). Therefore, the claims of pre-Clovis bone artifacts introduced below are not as anomalous as they would have been pre-1990. Rating: 2.

Possible Explanations. The purported bone artifacts in the Yukon are probably only the work of natural forces---the mainstream position.

Similar and Related Phenomena. Claims of pre-Clovis stone artifacts in the New World (MMS1-X1, MMS1-X3)

Entries

X0. Introduction. This section is one of several in this volume that adduces evidence that suggests that humans reached the New World before 12,000 years ago. This 12,000-year figure might well be called the "Clovis Limit," because it marks the earliest widely accepted date for human contact with the New World---this by the so-called Clovis people. Clovis is a famous California archeological site where the well-known and distinctive Clovis stone points were found in the early days of North American archeology. The Clovis Limit of 12,000 years has been vigorously---almost fanatically ---defended by mainstream archeologists and anthropologists for many years. All claims of pre-Clovis human artifacts in the New World are subjected to intense scrutiny, as they should be.

Here, we relate the discovery of bone fragments in North America that are dated well before the Clovis limit and, therefore, potentially highly anomalous. The most critical question asked about these putative artifacts is: Are they really artifacts and not objects created by mischievous Mother Nature? The same question will also be asked in MMS1 where the many claims of pre-Clovis stone artifacts in the New World are examined.

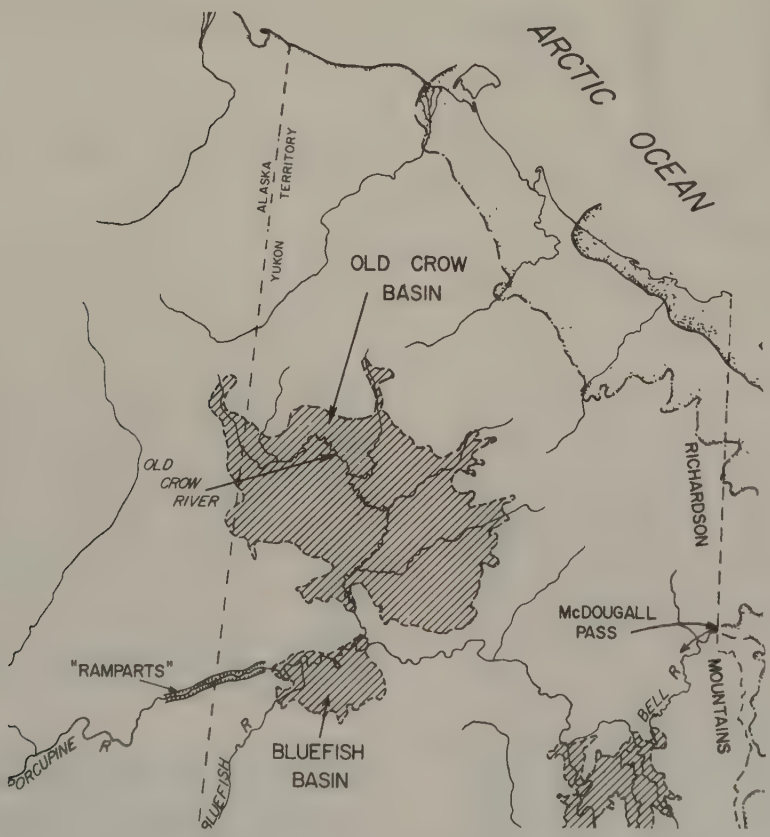
The Stone Age was not so-named capriciously. Stone was by far the most common material used in the manufacture of ancient tools and weapons prior to the Bronze Age. But bone, though softer than flint and almost unknappable, did have many uses, as in ivory needles, antler picks, harpoon points, and even as a material upon which to record lunar data. Even so, one wonders if all-bone cultures; that is, without any stone tools at all; could have been viable and competitive during the Stone Age. This is not a frivolous consideration in this section, because one of the most important, putative pre-Clovis sites in North America is notable for a complete absence of stone artifacts.

In 1981, in a rather bizarre response to such doubts about all-bone cultures,

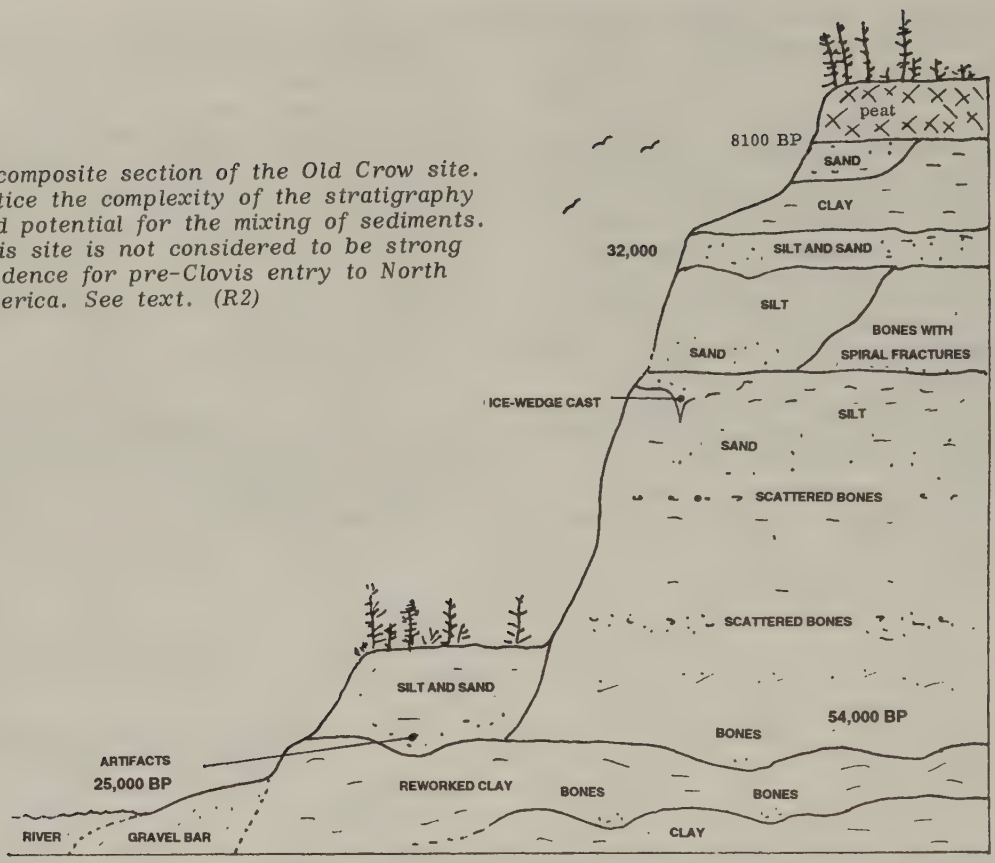
D. Stanford, of the Smithsonian Institution, and two colleagues took advantage of the death of an elephant named Ginsberg in a Boston zoo. They believed that they could indeed fashion crude tools from Ginsberg's skeleton by hammering the bones with crude cobblestones. They were successful. With the resulting crude but sharp fractured bones they proceeded to successfully butcher part of Ginsberg. (R6) Whether such was also done by pre-Clovis hunters in North America is another matter. But at least we know that an all-bone culture might be feasible, even though we have to wonder why abundant and easily accessible stone would not have been better suited for most applications.

X1. Old Crow Basin, Yukon Territory, Canada. The Old Crow archeological site is located just east of Alaska's border with the Yukon Territory. If humans from Asia did enter the New World via the Bering Land Bridge, it would not be surprising to find traces of them along the Old Crow River. (See map.) The bones of mammoths and other large quadrupeds are common in this region commonly called "Beringia." The hunting would have been good in Beringia as the last Ice Age waned.

The first mention in our files of ancient bone artifacts at Old Crow is in a 1966 issue of Science News. (R1) The story of the discovery has been told in more detail by R.E. Morlan, who, incidently, was one of the butchers of Ginsberg the elephant.



Map of northeastern Beringia, Yukon Territory, showing the locations of the Old Crow and Bluefish Cave sites. The cross-hatching indicates the extents of glacial lakes. (R2)



A composite section of the Old Crow site. Notice the complexity of the stratigraphy and potential for the mixing of sediments. This site is not considered to be strong evidence for pre-Clovis entry to North America. See text. (R2)

In 1966, the first of many fossilized bone artifacts was recognized by C.R. Harington during his paleontological research in Old Crow Flats. Harington brought this specimen to the attention of W.N. Irving who later examined other fossils from the same locality and selected several specimens which appeared to have been modified by man prior to mineralization. Among these specimens were two large fragments of mammoth long bones which appeared to have been flaked by blows delivered in several directions. Having cast them in plaster and epoxy, Harington and Irving sacrificed the two mammoth bone specimens and a sizeable portion of the tibia flesher for radiocarbon dating. The dates based on bone apatite, ranged between 25,000 and 29,000 years ago. (R2)

Morlan and others have collected many additional bones that seem to have been worked by pre-Clovis humans. Most have come from sediments along the Old Crow and nearby Porcupine Rivers. No associated stone tools, however, have been found. As pointed out by Morlan, the evidence for pre-Clovis occupation of the Old Crow Basin is thereby rather weak.

Some of the objections that have been leveled at Old Crow as a pre-Clovis site are as follows:

- The suspect bones could have been fractured by natural agencies.
- Recent Indians in the area could have made tools out of the fossilized bones.
- There are no associated stone tools

or other cultural artifacts, which would suggest by association that the old mammoth bones are true artifacts.

- There are no additional signs of an all-bone culture.
- The stratigraphy along the Old Crow River is complex. Mixing of the sediments has occurred.
- One of the Old Crow purported bone tools (a flesher) has been redated to only 500 A.D. by a more sensitive radiocarbon technique. (R17)

Such facts do militate again a pre-Clovis human presence in the Old Crow Basin. However, to the south of Old Crow lie some caves where additional suspect bone tools exist in a better archeological context. Most important is their physical association with genuine stone tools.

X2. Bluefish Caves, Yukon Territory, Canada.

Flying in a helicopter in 1975, Canadian archeologists William Irving and Jacques Cinq-Mars discovered three caves in the remote limestone hills of the Keele Range. Since then they have found thousands of animal bones there, including a mammoth scapula with cut marks and a collection of selected anatomical parts, implying a human presence and a variety of flaked stone tools at upper levels of the site. Radiocarbon dates on the butchered mammoth range from 15,500 to 20,000 years ago; the stone tools yield dates between 10,000 and 13,000 years B.P. The main problem is that there are no hearths or other cultural features, and no unmistakable tools have yet been found in the older levels. (R12)

The Bluefish Caves are less disturbed than the river gravels and cliffs at Old Crow. The physical association of worked mammoth bones and stone tools is encouraging, even though they are apparently well separated by time. The similarity of the mammoth bones---apparently worked by humans at both

A proboscidean limb-bone core from the Old Crow site in the Yukon Refugium. It appears to have been worked by humans. (R9)

the Bluefish Caves and Old Crow---does suggest that humans might have hunted in the region in pre-Clovis times. But, although the mammoth bones seem to be pre-Clovis, the stone tools in the Bluefish Caves are not. Therefore, most of the problems listed for the Old Crow site in X1 are also operational in the Bluefish Caves.

R.E. Morlan presented the case for pre-Clovis occupation of the Bluefish Caves at the 1992 annual meeting of the American Association for the Advancement of Science. At this time, he claimed an age of 24,000 years for the Cave's purported bone tools, but:

He conceded that the evidence is circumstantial.

> The pointed, chipped, and hollowed bones he finds at Blue Fish Caves as well as in the nearby Old Crow Basin appear to be tools, but it remains possible that they are naturally fractured bones. Their dates are firm from the dating of the isotope carbon 14 in their organic material. With them in the cave are stone tools of undeniably human manufacture, but the age of the stone tools cannot be determined directly, and they could have been left by later peoples. (R14)

And thus the matter seems to rest---for both the Bluefish Caves and the Old Crow site. The totality of the evidence at these two sites for pre-Clovis humans in Beringia is weak.

X3. Quaternary caves. California. This entry is very vague. We have no idea which caves the author refers to, nor exactly where they are in California. Nevertheless, the lead is worth recording because a Quaternary presence (more than 100,000 years ago) of humans in California would be much more anomalous than the claims of 24,000-year-old human traces in the Yukon.

Since research in these caves was carried out by the University of California, there are probably reports on file somewhere at Berkeley. We have seen nothing further in the literature we have examined. Our total knowledge in this matter is contained in this report by F.W. Putnam.

> In the investigations of the Quaternary caves of California which have been carried on by the Department of Anthropology of the University of California during the last few years, there have been discovered a considerable number of bone and several stone fragments apparently indicating the work of man. If these specimens are actually the evidence of man's work, it is of the utmost importance to have the facts brought out, as the objects in question have been associated with a fauna which represents an epoch considerably antedating the end of the Quaternary period, and would indicate human occupancy of this portion of the continent at a very remote period.
>
> The specimens that seem to exhibit evidence of human handiwork of the Quaternary include a number of polished and pointed bone fragments in most respects similar to the rougher instruments from the shell-mounds, and several other fragments with perforations of such a character that it seems impossible to explain their presence excepting by the agency of man. With these more definite evidences of man's presence there are found in the same strata large numbers of splintered bones, such as elsewhere form a considerable part of the deposits in caves or in shell-mounds that have served as places of human habitation in prehistoric time. (R16)

When the above was written (1906) radiometric dating was nonexistent. So, the supposed artifacts were probably dated by their association with the remains of extinct fauna in the caves, as intimated above by Putnam.

Pertinent here is the fact that some very old ages have also been claimed for other California sites where problematic stone artifacts have been found in abundance; e.g., La Jolla, Calico, and the famous auriferous gravels. See MSS.

X4. Toca da Esperanza, Brazil. Ancient bone tools are mixed with stone tools in at this cave site. These artifacts have been dated between 255,000-204,000 B.P. by the uranium-thorium method. These dates, however, are suspect. See MMS1-X3 for discussion of the stone tools. (R18)

X5. Nebraska. A 1927 item in Science News Letter reported as follows:

> Has Nebraska produced the most ancient evidence of the existence of man yet known to science?
>
> This question is raised by Dr. Henry Fairfield Osborn, president of the American Museum of Natural History, in a report to the American Philosophical Society in which he reveals that investigations conducted by him in collaboration with Albert Thompson, of the American Museum

staff, have unearthed fossil bone implements in geologic strata that are considered some 4,000,000 years old, an age known to geologists as Pliocene. (R19)

The fossils included extinct horses, camels, deer, elephants, and mastadons.

This "wild point" in North American human chronology has doubtless been revised, but we have not seen the retraction.

X6. American Falls, Idaho. Near Pocatello, bison bones worked by human hands were dated stratigraphically as 43,000 years old. (R20)

X7. Lewisville-Frieschenhahn cave, Texas. Both Stone and bone tools were dated at about 30,000 B.P. by A. MacNeish based upon the accompanying mid-Wisconsin fauna. (R20)

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R3. Bonnichsen, Robson; "Critical Arguments for Pleistocene Artifacts from the Old Crow Basin, Yukon: A Preliminary Statement," in Alan Lyle Bryan, ed., Early Man in America, Edmonton, 1978, p. 102. (X1)
R4. Dumond, Don E.; "The Archeology of Alaska and the Peopling of America," Science, 209:984, 1980. (X1)
R5. Patrusky, Ben; "Pre-Clovis Man: Sampling the Evidence," Mosaic, 11:2, September/October 1980. (X1)
R6. Anonymous; "Did Early Americans Make Tools from Elephant Bones?" New Scientist, 90:418, 1981. (X0)
R7. Nelson, D.E., et al; "New Dates on Northern Yukon Artifacts: Holocene Not Upper Pleistocene," Science, 232: 749, 1986. (X1)
R8. Anonymous; "New Dates for 'Early' Tools," Science News, 129:294, 1986.
R9. Morlan, Richard E.; "Pleistocene Archaeology in Old Crow Basin: A Critical Reappraisal, " in Alan Lyle Bryan, ed., New Evidence for the Pleistocene Peopling of the Americas, Orono, 1986, p. 27. (X1)
R10. Irving, W.N., et al; "Indications of Pre-Sangamon Humans near Old Crow, Yukon, Canada," in Alan Lyle Bryan, ed., New Evidence for the Pleistocene Peopling of the Americas, Orono, 1986, p. 49. (X1)
R11. Bower, Bruce; "Flakes, Breaks, and the First Americans," Science News, 131:172, 1987. (X1)
R12. Marshall, Eliot; "Clovis Counterrevolution," Science, 249:738, 1990. (X1)
R13. Wolkomir, Richard; "New Finds Could Rewrite the Start of American History," Smithsonian Magazine, 21: 130, March 1991. (X1, X2)
R14. Petit, Charles; "24,000-Year-Old Tools Found in Yukon," San Francisco Chronicle, February 10, 1992. Cr. D.H. Palmer. (X1, X2)
R15. Irving, William N.; "New Dates from Old Bones," Natural History, 96:8, February 1987. (X1)
R16. Putnam, F.W.; "Evidence of the Work of Man on Objects from Quaternary Caves in California," American Anthropologist, 8:229, 1906. (X3)
R17. James, Peter, and Thorpe, Nick; Ancient Mysteries, New York, 1999, p. 355. (X1)
R18. Dillehay, Thomas D.; The Settlement of the Americas, New York, 2000, p. 191. (X4)
R19. Anonymous; "Was First Man an American?" Science News Letter, 11:296, 1927. (X5)
R20. Goodman, Jeffrey; American Genesis, New York, 1981. (X6, X7)

MMB4 Anomalous Associations of Animal Bones with Ancient Human Presence

Description. Examples of the colocation in space and time of animal bones and archeological evidence of human presence that place into question the validity of ten mainstream paradigms and presumptions, including the 12,000-year-old entry of humans to the New World and the Maori-first settlement of New Zealand. The complete list of potential anomalies is presented below in Anomaly Evaluation.

Data Evaluation. A wide range of literature from top-ranked science journals to foreign newspapers contributed to this section. The data evaluations for each claimed anomaly are given as the first figures in the ratings below.

Anomaly Evaluation. The ten anomalies suggested by the subject phenomena are defined below. The anomaly evaluations are the second figures in the ratings.

- Humans entered the New World by sea instead of or in addition to the Bering Land Bridge (X1). Ratings: 3/2.
- Human contacts with New Zealand preceeded the accepted date of Maori arrival by over a millennium (X2). Ratings: 2/1.
- A major migration route for humans in the New World was by sea along the Pacific Coast (X3). Ratings: 2/2.
- Inhabitants of the New World possessed well-developed marine capabilities as early as 10,000 years ago (X3). Ratings: 1/3.
- Human entry to the Americas was, at least in part, via South America and spread northward from there (X3). Ratings: 3/1.
- The inhabitants of South America domesticated ground sloths over 10,000 years ago (X4). Ratings: 2/3.
- Humans settled the Americas long before 12,000 B.P. (the Clovis Limit). (X4). Ratings: 3/1.
- Bears were kept tethered in Europe in ancient times for unknown purposes (X4). Ratings: 3/3.
- Cattle husbandry began in Africa rather than Europe or the Middle East (X4). Ratings: 2/1.
- In Europe and possibly the New World, too, horses were domesticated more than 30,000 years ago (X4). Ratings: 3/2.

Possible Explanations. (1) Humans developed effective marine capabilities much sooner than generally presumed and used them to colonize the planet earlier and by different routes than mainstream thinking presumes. (2) Animal husbandry began much earlier than presumed, possibly in Africa first.

Similar and Related Phenomena. Stone artifacts suggesting the pre-Clovis settlement of the New World (MSS1); mammoth bones, Santa Rosa fire areas (MME7-X1).

Entries

X1. Babirussa tusks in North America. A potential archeological anomaly was posed by F.W. True in an 1884 issue of Science.

> Many curious and unlooked-for objects are frequently found in Indian graves, and not the least among these is a pair of the tusks of the Babirussa. They were extracted in August of last year by Mr. James S. Swan from the grave of an old Indian doctor at Kah-te-lay-juk-to-wos Point, near the northwestern end of Graham Island, one of the Queen Charlotte Islands, off the coast of British Columbia. The Babirussa, as everyone knows, is an animal of the hog tribe, inhabiting only Celebes and the adjacent islands. The question then arises, How did these teeth come into the possession of the Indian doctor, who died some fifty years since at an advanced age? (R1)

The distinctive tusks of the babirussa, a native of Southeast Asia, were found in the grave of a Canadian Indian. (R1)

Since the tusks were excavated in 1883 from a 50-year-old grave, the Indian must have obtained them prior to 1833. At this point in North American history, the most likely source of the tusks was from the Pacific rather than overland from the east. More specifically, the source was probably one of the Japanese junks that have been frequently swept across the north Pacific by the Japan Current. This strong current piles all manner of Pacific debris on the western shores of the Queen Charlotte Islands. In fact, one junk is known to have wrecked there in 1831, although the Babirussa tusks could have made the Pacific crossing centuries or even millennia earlier. (R1)

Of course, Japanese wrecks in historical times are hardly anomalous, but they do highlight a mechanism for the early diffusion of people and artifacts from the Orient to the Americas. Most of this traffic was probably accidental, but not necessarily all of it. The Japan Current may have brought migrating Asians and their artifacts to the New World instead of, or in conjunction with, the vaunted Bering Land Bridge. Furthermore, the sea route was open before the waning of the Ice Ages.

This mode of cultural diffusion is strongly suggested by the existence of Japanese-style pottery found in ancient Ecuador. (MMP1) A further but more speculative bit of evidence is seen in those New World human skeltons, such as Kennewick Man, that seem to possess some Caucasian characteristics.

Expanding on this thought, the Ainu people of northern Japan display some Caucasian characteristics, and they were once an intrepid, seafaring people. In fact, Ainu settlements have recently been located on the Kuril Islands, which might once have been stepping stones to the Aleutians and North America for Asian people possessing knowledge of the sea. (R13)

X2. 2,000-year-old rat bones in New Zealand. Anthropologists have long assumed that the first humans to reach New Zealand were the Maoris some time around 1150 AD. Indeed, today's Maoris vigorously defend this paradigm, for it bears on their land claims against the New Zealand government.

However, the Maori-first paradigm has been weakened by the discovery in New Zealand of the bones of the Pacific rat (Rattus exulans) with radiocarbon dates of 2,000 years before the present. R.N.

Holdaway, the scientist presenting these data, was well aware of their anthropological and political impacts.

> The data suggest that the Pacific rat was established on both main islands of New Zealand nearly 2,000 years ago. The rat is unlikely to have arrived without human assistance, on, for example, natural rafts. It is more likely that the rats were introduced by transient human visitors, who either left immediately or quickly died out. (R8)

Work by New Zealand archeologist D. Sutton lends some support to Holdaway's assertion. He states that about 2,000 years ago there is evidence of burn-offs and unexplained erosion in New Zealand that can reasonably be related to pre-Maori contacts by some unidentified people. (R9)

Less vague but even more controversial are nearly 2,000 enigmatic stone structures in the Waipoua Forest in New Zealand's Northland. G. Cook suggests that these were likely the work of pre-Maori human arrivals. (R14)

X3. Early middens of marine creatures. The viability and success of ancient cultures owed much to the availability of abundant food. As a case in point, the advent of agriculture fueled the rise of the great civilizations of the Middle East. Similarly, in the New World, the Moundbuilders and the Hohokam culture were based upon agriculture. But, long before the advent of agriculture, other cultures developed near the world's oceans. Their acquisition of maritime skills allowed them to tap abundant marine protein sources. Archeologists are just beginning to dig deeply along the Atlantic and Pacific coasts of the New World. What they are finding may alter our long-accepted, temporal model of the peopling of the Americas; specifically, first-entrance across the Bering Land Bridge 12,000 years ago and then the overland expansion through the interiors of both of the New World continents.

North American east coast. The east coast of the Americas is marked by colossal ancient accumulations of discarded seashells; e.g., Florida's "shell keys." (MSM1 in Ancient Infrastructure) However these particular shell heaps are fairly recent and required no sophisticated maritime skills to harvest. This picture changed in the 1990s when divergent evidence was extracted from a limestone sinkhole near Biscayne Beach, Florida. The sinkhole's contents included datable fish bones that have revised our picture of the maritime capabilities of the ancient human cultures that once occupied the Atlantic coast of North America.

> The new radiocarbon dates, which put the site at 9670 years old, also pushed back by 3000 to 4000 years the earliest known time on either coast when people braved the seas to catch large fish. While most Native Americans are thought to have subsisted primarily on game, such as deer, these first Floridians clearly were keen fishers, says [J.] Dunbar. At the site's middens---places where the inhabitants dumped refuse---the archeologists unearthed the remains of sand sharks, barracuda, and tuna, indicating "a surprising level of maritime knowledge," he says. (R10)

There are probably other such traces of old Atlantic maritime cultures, but the rising seas following the Ice Ages have inundated them. Underwater archeologists of the future will doubtless expand our knowledge of these "low-sealevel" peoples.

While these discoveries on the Florida coast revise our dates and appreciation of Native America seafaring, there is little in them that is significantly anomalous. The Clovis Limit (12,000 years) is not violated, nor is the mainstream picture of human migration in the Americas. The salient point is the previously unappreciated marine capabilities of the humans living along the Atlantic coast about 10,000 years ago.

However, on the west coast of the Americas, we find more serious challenges to mainstream theories.

New World Pacific coast. In contrast to the single, recognized (as of 2001), ancient maritime site on the Atlantic side of the Americas, several locations displaying similar characteristics have been discovered along the Pacific coast---all the way from Alaska south to Peru. These Pacific maritime communities are markedly more ancient than the one in

Florida and, in consequence, raise serious questions concerning both the timing and the routes of human migrations in the New World as the Ice Ages loosened their grip.

In particular, we focus upon two locations on the Peruvian coast that cast doubt upon the accepted New World migration scenario.

One of these coastal sites, called QJ-280 (for Quebrada Jaguay-280), is located just north of the better-known and controversial dig named Monte Verde. Whereas 12,500-year-old Monte Verde is located inland, QJ-280 is on the sea and only about 11,000 years old. At the present time, QJ-280 is about 2 kilometers from the Pacific, but 11,000 years ago, when sea levels were much lower, it was 7-8 kilometers inland. QJ-280 is littered with the bones of fish and sea birds, such as cormorants. The inhabitants of QJ-280 were obviously familiar with the sea and exploited it almost exclusively. But whence this maritime culture? Did these people migrate down the coast from North America or sail across the wide Pacific, thereby bypassing the Bering Land Bridge? The latter possibility is anathema to most archeologists and anthropologists.

Further, the QJ-280 site has yielded obsidian, which could only have come from the highlands 130 kilometers to the east. Did the QJ-280 mariners penetrate that far inland, or did they acquire the obsidian by trading with some still unrecognized highland culture---or perhaps with the Monte Verde people?

The second coastal Peruvian dig that demonstrates early seafaring capability lies 220 kilometers south of QJ-280. Called Quebrada Tacahuay and providing dates between 10,530 and 10,770 years, it differs from QJ-280 in a complete absence of artifacts that might betoken an inland connection like that at QJ-280. (R12)

Although the middens of the two coastal Quebrada ("arroyo"in Spanish) sites are bone "artifacts" only in the collective sense, at least one tool made from the bone of a marine mammal has been found at Quebrada Tacahuay. (R12)

What can we make of these old coastal sites along the western edges of the Americas? They clearly demonstrate that a rather sophisticated marine-oriented culture prevailed along thousands of miles of coastline, almost from one polar region to the other. But it is a spotty archeological record. If scientists could only study those areas that must have been submerged by rising sealevels over the past 10,000 years, they would likely find many more, perhaps even older seaside villages. The salient question here has to be: Where did these sea-wise people come from? South from the Bering Land Bridge, or from the west across the Pacific, or even by land from the east? (The last direction is not out of the question. After all, the Pedra Furada site in Brazil is claimed to be 30,000 years old!) See MMS1.

Orthodox thinking has the first Americans trickling across the Bering Land Bridge about 12,000 years ago (the Clovis Limit). They are thought to have spread southward by inland routes until they populated both continents. The west-coast maritime sites suggest that coastal migrations might have also taken place. These would have been faster than those by land, and they would have reduced the logistical disconnect between the postulated 12,000-year-old Bering-Bridge crossing and the (still-controversial) 12,500-year-old archeological record at Monte Verde.

Everyone, even those still favoring the Clovis-first paradigm, cannot help noticing that Monte Verde seems to predate the Bering-Bridge passage. Could humans have first entered the New World by way of South America and then migrated north, contrary to the widely accepted migration scenario? Evidence for such wrong-way migration would represent a first-class anomaly.

Here is where the coastal, marine-oriented cultures under scrutiny in this section may be really important. The two Quebradas we have mentioned are about 11,000 years old. Thousands of miles to the north, there is another maritime site on San Miguel Island, in the Santa Barbara Channel, off California. It weighs in at 10,500 years---a bit younger than the two Peruvian sites. As radiocarbon dates go, this is not a big discrepancy. But farther to the north---Oregon, Canada, Alaska---there are additional coastal sites. And the oldest of these is only 9,700 years old! (R10)

Taken together, all the dates along the Pacific coast of the Americas suggest a south-to-north flow of humanity. This implied wrong-way flow is the significant anomaly introduced by the coastal sites.

We have finally arrived at the main reason for all of the preceeding revelations. It is an anomaly ultimately derived from bone artifacts; that is, the bony refuse of the early inhabitants of the American Pacific coast.

It is undeniable that the data supporting the claimed anomaly are not robust. Tomorrow's "finds" may change the picture completely.

X4. Anomalously early domestication of animals. Amidst the multitudes of animal bones intimately associated with ancient humans---in caves, middens, etc.---it is not surprising to find horses and cattle represented. These bones would concern an anomalist only if they implied the domestication of these species before, say, 6,000 B.C. the accepted date of the first domestication of animals. However, there is intriguing evidence that horses and cattle were pressed into human service long before this date. In addition, the fossil record suggests that prehistoric humans domesticated, or at least held captive, ground sloths (South America) and bears (Europe). Since humans have tried to domesticate virtually every mammalian species down the centuries, such accomplishments are worth cataloging only when they occurred before 6,000 B.C., or if they are so ancient that they imply the pre-Clovis human occupation of the New World.

Ground sloths. Paleontologists maintain that ground sloths have been extinct for thousands of years. Nevertheless, vague reports of sightings in South America persist to this day. (See BMD11 in Biological Anomalies: Humans II.) More tangible are several Mylodon (a species of ground sloth) skins that were collected in Argentina in the late 1800s. We can legitimately include these skins in this section on "bones" because Mylodon skins are armored with bony ossicles the size of coffee beans.

One of these Mylodon skins came from Cueva Eberhardt, a cave in southern Argentina. The apparent recent survival of a species believed long-extinct subsequently led to a thorough, professional exploration of Cueva Eberhardt. What was found inside overshadows the discovery of the ground-sloth skin---

Fossil evidence from an Argentine cave suggests that the Mylodon or giant ground sloth was domesticated by pre-Clovis inhabitants. (R2)

at least in the present context.

We quote now from a paper by A.S. Woodward that reveals the unusual contents of Cueva Eberhardt.

> It now appears that the remains of so-called Neomylodon [the ground-sloth skin] are not found at the exposed entrance of the cavern, which is of very large proportions (30 metres high), but occur only in an inner chamber which has every appearance of having been artificially constructed by cross-barriers. At a short distance from the entrance there is a rude wall of tumbled blocks extending the whole way across, except a narrow gangway left at one side. On passing through this the great chamber just mentioned is reached, and another wall-like barrier 50 metres further inwards extends completely across the cave from side to side, preventing any ingress except by scrambling. In the middle of the chamber there is an artificial mound. The floor proved to be covered with a layer of dust and stones, varying from 30 centimetres to a metre in thickness. In it at one spot were found numerous shells of mussels mingled with the broken bones of guanaco and deer---evidently the remains of food of man. Beneath the surface layer near the inner barrier was discovered a great mass of excrement of a herbivorous

> animal, in some places more than a metre in depth. Most of the material was in the form of impalpable dust, which almost choked the workmen, but a few large lumps were in a good state of preservation, and rivalled the droppings of the elephant in size. Part of the heap showed clear indications of having been burned. Nearer the middle of the chamber was dug up a considerable accumulation of dry cut hay in a good state of preservation. In the lower layer---in the excrement, the hay, and the surrounding rubbish---were found numerous broken bones of the so-called Neomylodon, belonging to several individuals, both old and young, with another well-preserved piece of skin. (R2)

The remains in Cueva Eberhardt certtainly suggest that one or more ground sloths were held captive in the cave for some purpose---probably dinner. These observations stretch the definition of "domestication" a bit, but no more than those of steers in a modern feeding lot!

The ground-sloth data truly fit in well in here. The exploration of Cueva Eberhardt indicated that very early South Americans had domesticated a very unusual mammal. At the very least, this has considerable curiosity value.

The sloth skin of Cueva Eberhardt also bears upon a potential anomaly that surfaces often in this volume: pre-Clovis humans in the New World. The sloth skin was carbon-dated at 13,500 years (R16), well before the Clovis Limit, which is pegged at 12,000 years, but nevertheless compatible with dates from Monte Verde in nearby Chile; i.e., about 12,500 years.

Bears. Bears are often held in captivity today, not only in zoos but for their ability to ride bicycles and perform other tricks in the circus. While young they also make agreeable pets. But why would European hunter-gatherers 6,000 years ago bother to keep captive for several years such large, food-consuming, and potentially dangerous animals?

That at least one large brown bear was kept tethered for years by Stone Age Europeans is suggested by a 6,000-year-old bear jawbone recovered from a rock shelter near Grenoble, France. An unusual groove in the bear's jawbone was probably made by a leather thong that was first fastened about the animal's lower jaw when it was only a few months old. Apparently, this bear lived in captivity until it was about 7 years old. How it died is perhaps the primary puzzle here.

L. Chaix, a Geneva archeologist, believes that the bear might have been kept for sacrificial purposes. Rites involving the ritual sacrifice of bears were not unknown in ancient times. In fact, as late as the medieval era, bears were sacrified in Sweden and by the Ainu in Japan. Bears figure large in mythology, and Chaix's surmise might be on the mark. (R11)

Cattle. Prevailing wisdom has long held that animal husbandry, a hallmark of civilization, first took root in the Middle East some 8,000 years ago. However, the excavation of cattle bones in a kitchen midden, dated as 15,000 years old, in the Kenya Highlands, places this paradigm at risk. Actually, more than age is significant. The diffusion of animal husbandry may have been from Africa to the Middle East instead of vice versa. This apparent flow of culture counter to established expectations is underscored by the discovery that grain crops were raised in Africa about 18,000 years ago. Again, Africa seems to have led Europe and the Middle East.

It is reasonable to ask how the supposed domesticated-cattle bones found in the African middens might be distinguished from wild-cattle bones. One clue is seen in the apparently complete absence of cattle bones elsewhere in Africa 15,000 years ago. Wild-cattle bones would have been widely distributed; instead, cattle bones seem to be found only in middens. Ergo, all African cattle were domesticated! But negative data and the foregoing logic are not very convincing. It is, therefore, reassuring to learn of a second sort of proof of cattle domestication.

> Further studies have shown that tsetse flies, the principal cause of cattle deaths in Africa, would have wiped out any wild cattle. But domesticated cattle herds, kept penned-up in the fly-free highlands and not permitted to wander off to water holes where tsetse flies abound, could survive without trouble. (R4)

Horses. Horses are easily tamed and

eminently useful as beasts of burden and as a food source. Their domestication, like that of cattle, was a key check point in the efflorescence of civilization. This transition away from hunting-and-gathering is said to have occurred along with the beginning of agriculture about 8,000 years ago in the Old World.

This timetable of human-horse mutualism was challenged when its origin was claimed to have taken place 30,000 years ago instead of 8,000. One scientist is even amenable to a figure of 100,000 years ago for the domestication of the horse! These two dates, 30,000 and 100,000 years, are much too early. They do not fit well at all into the accepted scenario of human cultural advance. Therefore, any data supporting such ancient equine husbandry is highly anomalous.

One sort of evidence leading to these extreme claims comes in the form of beveled horse teeth of great age. When a modern horse is seen to have beveled front teeth, it is confidently assumed that this dental deformity is the consequence of "crib-biting" that is, the chewing of wood railings, ropes, or even stone. Horses are theorized to do this when they are bored, and it is further supposed that only domesticated horses become bored. It follows then that beveled horse teeth, even if of great age, must have come from domesticated horses. Wild horses were obviously too busy trying to survive to be bored and gnaw on non-food items! That is how the argument goes.

Given the above presumptions, when beveled horse teeth 30,000 years old were uncovered in 1911 at a prehistoric site in France, that 8,000-year date for the first-domestication of horses was directly challenged. In fact, P. Bahn, an archeologist who has visited paleontological collections searching out and dating beveled horse teeth, is quite comfortable with the aforementioned date for horse domestication of 100,000 years! (R5, R6)

If substantiated by other researchers, the advent of animal husbandry would be pushed well back into the Ice Ages.

This highly accelerated development of a human-horse mutualism has been questioned by R.A. and L.A. Rogers in the journal Quaternary Research. Their most telling point is that some fossil horse incisors from the middle Pleistocene of North America are beveled like

"Crib-biting" by domesticated horses leads to distinctively beveled teeth. Such teeth, about 100,000 years old, have been discovered in Europe. (R5, R6)

those in Europe. Since humans supposedly did not enter North America until 12,000 years ago (the Clovis Limit again), these beveled fossil teeth had to be from wild horses. Although these North American horses had no humans to domesticate and thereby bore them, they did have tree bark to bite. The Rogers presumed that bark-biting was the cause of the beveling of the North American horse teeth. (R7)

It then follows that the anomalously ancient, European beveled horse teeth could also be from wild horses that had partaken of bark, thereby undercutting the claim of anomalously early domestication of horses in Europe.

Another side of this coin---another kind of anomaly---arises when we ask whether the beveled North American horse teeth might instead be evidence that pre-Clovis humans in North America had domesticated horses in the middle Pleistocene. In this line of thinking, two anomalies would prevail: (1) very early equine husbandry in both Europe and the New World, and (2) the middle Pleistocene existence of humans of the Americas. All this from deformed horse teeth!

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R15. Sandweiss, Daniel H.; "Quebrada Jaguay: Early South American Maritime Adaptations," Science, 281:1830, 1998. (X3)
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MMB5 Artificially Worked Animal Bones of Great Age

Description. The existence in Europe of animal bones dated as older than 1 million years that show signs of having been worked by human hands.

Data Evaluation. Our sources are well-recognized science journals, although they are rather old. Details as to the discovery and recovery of the subject bones are not available. "Worked" bones, like "worked" stones, are always subject to the charge that they were produced by natural forces rather than human hands. It is very difficult to prove conclusively artificiality. Rating: 3.

Anomaly Evaluation. Evidence supporting a hominid presence in Europe before 1 million years ago severely challenges the accepted timetable for the dispersal of hominids from Africa. Rating: 1.

Possible Explanations. (1) The supposed artifacts were really the consequence of natural forces. (2) The bone artifacts are incorrectly dated.

Similar and Related Phenomena. Pre-Clovis worked bones in the New World (MMB4); worked stones of anomalously ancient age (MMS1).

Entries

X0. Introduction. If artificially worked animal bones over 1 million years old were found in Africa, they would not be anomalous. Hominids and perhaps other creatures possessing sufficient dexterity had existed on this continent for several million before this time. However, if similar worked bones of like age or older were uncovered in Europe, we would have an important anomaly, for it is widely accepted that hominids had not reached Europe 1 million years ago.

Basically, this is a diffusion question, as is that of pre-Clovis humans in North America. (MMB4) Only the time and geographical location differ.

X1. Britain. The Red Crag, in Suffolk, Britain, provides the only examples we have found so far of non-African, artificially worked bones ostensibly older than 1 million years. The Red Crag strata yielding the subject artifacts are reputed to be of Pliocene age; that is, older than about 1.75 million years.

Perforated shark teeth. A presentation at an English scientific meeting in 1872 was summarized as follows in the Journal of the Anthropological Institute.

> Mr. Edward Charlesworth, F.G.S., exhibited and described a series of remarkable objects found in the Red Crag Formation of Suffolk, simulating human workmanship. Specimens were laid upon the table of shark's teeth of the genus Carcharodon, which appeared to show traces of action of some artificial force that had perforated the teeth through their thickest part, almost identical in character with perforations exhibited in the shark's teeth made by the South Sea Islanders of the present day. Mr. Charlesworth pointed out the conditions under which boring mollusca, as Pholas and Saxicava, perforate the texture of stones or other solid substances, and glanced at the perforating action of burrowing sponges (Cliona) and destructive annelides (Toredo). Reasons were given at length why these could not have produced such perforations as those now exhibited. (R1)

Other experts who examined the teeth echoed Charlesworth's opinion that they were drilled by human hands.

Sawn fossil rib. In 1912, O. Fisher described a fossil bone partially sawn at both ends that was excavated from the same Red Crag Formation that produced the drilled shark teeth mentioned above. Fisher wrote:

> The next in antiquity was the cut bone from the Crag, which I first saw in the collection of Mr. Whincopp, of Woodbridge, and which he called a bludgeon. It afterwards passed into the hands of Sir Joseph Prestwich, and is now in the British Museum. It was described by me and is figured in this Magazine. [See sketch]

An apparently "sawn" fossil bone from the Red Crag formation in Britain suggesting human presence. This formation is of Pliocene age (i.e., greater that 1.75 million years). (R2)

> The suggestion that man could have existed in Pliocene times was of course received with due scepticism; but the recent discovery of worked flints from the Crag is in remarkable accordance with the supposition that the thing was a weapon of a human being of that period. The two finds confirm one another. (R2)

The worked flints mentioned by the Reverend Fisher are, of course, as anomalous as the Pliocene worked bones. These are cataloged in MMS1 along with multitudinous other controversial worked flints of great age. Both bones and flints must face claims by doubters that they were "worked" by nature rather than hominids or other animals.

References

R1. Anonymous; Anthropological Institute, Journal, 2:91, 1873. (X1)
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MMB6 Grooved, Punctured, Pounded Human Bones

Description. Human skeletons, including fossilized bones, that are perforated, smashed, or worn in unusual ways that cannot be attributed to cannibalism.

Data Evaluation. Our references come from recognized science journals and magazines. The validity of the evidence for the subject phenomena is not in question, rather it is their explanations that are controversial. Rating: 1.

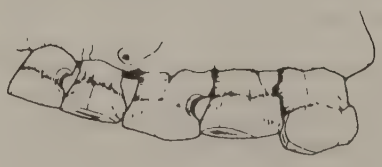
Anomaly Evaluation. The grooved teeth (X1) are well-explained. However, the perforated and smashed bones (X2, X3) have generated several hypotheses, including spirit release, the superstitious "pounding" of skeletons, and cannibalism. All in all, these phenomena merit only a rating of "curious." Rating: 3.

Similar and Related Phenomena. Trepanning (MMB7); human cannibalism (MMB8).

Entries

X1. Grooved teeth. It seems that some human and near-human skeletons possess teeth with the peculiar grooves shown in the sketch. The grooves occur near the cemento-enamel junction, mostly on molars and pre-molars, and usually on males. The diameter of the channel between adjacent teeth varies from 1-4 millimeters. The skeleton-age range is huge: from 1.84 million years to comparatively modern bones only 10,000 years old. These grooved teeth are found almost worldwide.

Some archeologists say simply that ancient humans just picked their teeth a lot in order to remove trapped food particles. Reasonable as this may be, the grooves do not seem to be correlated with dental-decay problems. This contrary observation has led to other explanations.



The teeth of ancient humans are often strangely grooved by wear. (R1)

The most popular alternative theory is the so-called "cultural" hypothesis," which holds that the picking of teeth was just another human bad habit, probably a sort of stereotype behavior that has nothing to do with food caught between the teeth. In truth, this habit still prevails just about everywhere. (R1-R4)

Other proposed solutions to this minor riddle of ancient human skeletons range from bacterial attack to gritty saliva propelled through the teeth.

Conveniently, today's Australian aborigines have provided an explanation that seems superior to all those suggested above. When the aborigines want thin, strong cords for fashioning spears and spear-throwers, they take a pliable, thinned, kangaroo sinew, pull it down between their molars like dental floss and begin "stripping" it by pulling it back and forth. They get their thin cords this way but also grooved teeth. (R4)

All in all, grooved teeth have more than one reasonable explanation and, therefore, cannot be considered to be more than a curiosity.

X2. Punctured human bones. Numerous prehistoric sites in the American Midwest have yielded human long bones with curious perforations. A study of this puzzling phenomenon by M. Torbenson et al centered on Smith Mound Four located in northern Minnesota. This mound was built by Native Americans of the Laurel culture and dates back to about 565 A.D. The conclusions of Torbenson et al regarding the perforated bones are as follows.

> The punctures from Smith Mound Four clearly are prehistoric and are not the result of a random or historic phenomenon. Although males were preferentially included in the mound, males and females were selected for bone perforation with similar frequencies. Only humeri, femora, and tibiae had holes. The femora and tibiae were perforated at about the same frequency, both at a higher rate than the humeri. A "typical" skeleton was punctured on the proximal end of the humeri, distal end of the femora, and proximal end of the tibiae. Perforation methods and location indicate that marrow extraction was not the purpose for the creation of the bone defects. We suggest the perforations were probably made just prior to burial on the basis of group affiliation and may have involved ideas of spirit release. (R5)

But skeleton damage can also let bad spirits in, as we shall now see in X3.

X3. Pounded skeletons. In X2, the puncturing of human skeletons was theorized to be for the release of a dead person's spirit. Perhaps so, but how then does one interpret the existence of badly smashed human skeletons; that is, human bones broken and shattered far beyond what one would expect to be necessary for spirit release. (Of course, this is a judgment call we cannot really make from our cultural perspective!)

Such smashed skeletons have been found associated with the Hopi, Anasazi, and Zuni cultures. The bones are fractured and bear cut marks. Their marrow has been removed. Skulls are also smashed in and brains removed. These damaged bones have been widely interpreted to be evidence of cannibalism among these cultures. (MMB8) There is, however, an alternative interpretation that ties in with the "spirit release" theory advanced in X2.

The smashed bones, states this theory, are those of witches. To prevent the witch from returning to her body, the corpse had to be pounded, mutilated, and dismembered. The resulting bone damage was much the same as one would expect from cannibalism.

Folk tales collected from Southwestern cultures by anthroplogists confirm the belief that a witch's body must be completely shattered to preclude the return of the witch. Witchcraft lore of this sort was so pervasive among the cultures of the American Southwest that there is legitimate basis for this speculation, bizarre though it may seem to us. (R6)

Even so, the "corpse pounding" theory has lost out to cannibalism as today's favored explanation for the heavily damaged skeletons found in the American Southwest.

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MMB7 Evidence of Ancient Skull Surgery (Trepanation)

Description. The existence in many parts of the globe of ancient human skulls exhibiting holes that were unquestionably surgically excised for therapeutic purposes. Many of these major surgical procedures were successful even 10,000 years ago. This type of medical intervention is called "trepanation."

Data Evaluation. Trepanation has long been recognized as a genuine and rather astounding example of prehistoric surgery. Literature on the subject is extensive. Below, we evaluate the scientific support for each of the four potential anomalies we recognize. The first figures in the evaluations apply to the data.

Anomaly Evaluation. The possibly anomalous features of trepanation are four in number, as described and evaluated below. The second figures apply to the estimated anomalousness of the features.

- Precocious knowledge of human cranial anatomy along with medical innovation that was accompanied by remarkable surgical skill in Neolithic times (X1). Evaluations: 1/3.

- Large geographical range of trepanation implying unrecognized long-distance prehistoric human diffusion (X2). Evaluations: 1/2.

- "Improbability" of the Neolithic invention or accidental discovery of trepanning, suggesting unexpected human insight and ingenuity (X3). Evaluations: 3/3.

- Unexpectedly early discovery of medical antiseptics (X4). Evaluations: 2/3.

Possible Explanations. Ten thousand years ago, humans were astute observers of physiological symptoms and insightful experimenters in surgery and the use of natural anesthetics and antiseptics.

Similar and Related Phenomena. Ancient medicine and surgery (MMT3 in this volume and MAS in another volume); ancient "high" technology (MMT).

Entries

X0. General observations. Archeologists have excavated and otherwise discovered hundreds of ancient human skulls with neatly cut holes in them. These are not holes made by weapons but rather by primitive surgery. Many of the bone excisions were made on living humans for signs of healing are often present. This surgical proceedure is called "trepanation" or "trephination."

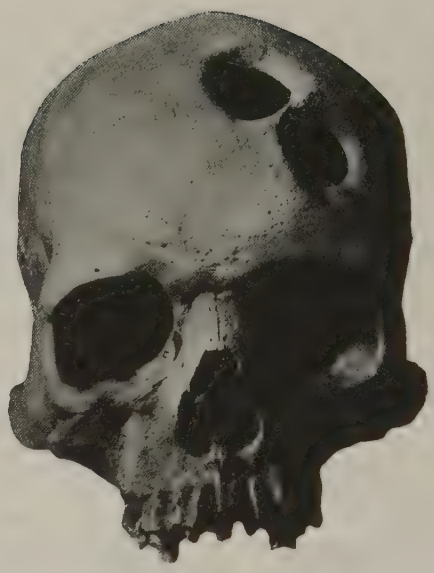
Even today, trepanning is not a trivial operation. The ancient surgeons had only crude stone tools with which to delicately remove sections of the skull without damaging blood vessels, the three membranes enclosing the brain, and the brain itself. The procedure requires great skill and care, but it was accomplished---often successfully---in many parts of the world in the Neolithic and Bronze Ages. The practice has continued right up to modern times.

It is no wonder that modern investigators express amazement at the accomplishments these surgeons who plied their trade as far back as 10,000 years ago. (R19) In 1918, G.G. McCurdy admired the work of these Neolithic surgeons in these words:

> One of the best known and most remarkable of Neolithic surgical operations was trepanation. It can be traced without a break from modern surgical practice back at least to Neolithic times and to a race closely akin to the Paleolithic hunters of western Europe. Its great antiquity is matched also by the boldness which led to its inception. The hardihood of the first attempt could scarcely have found sufficient basis in a knowledge of cephalic anatomy, and yet those who deposited their dead in communal sepultures must have been more or less familiar with the human skull. Given, however, a great emergency, this slight familiarity might have contributed towards a steadiness of nerve not otherwise attainable. (R6)

Obviously, the Neolithic surgeons were without modern metal instruments and antiseptics, yet many of their patients not only survived one but as many as seven trepanations, all of which show evidence of healing. (R11, R12, R15)

The most primitive procedure probably consisted simply of scraping away the bone with sharp flakes of obsidian or flint. Another technique involved drilling a circle of small holes in the skull, taking exquisite care, of course, not to puncture the membranes enclosing the brain. The ridges between the holes were then cut out and the circular piece of bone removed. These circular bits of skull are called "roundels," and they turn up frequently at Neolithic sites. In ancient Peru a more hazardous sort of trepanation was sometimes employed. Rectangular pieces of skulls were removed by making four straight incisions with metal saws. Despite proximity of the saw blades to the brain membranes, the Inca surgeons seem to have been successful 80% of the time. In sharp and surprising contrast, trepanation in the early Twentieth Century succeeded only 20% of the time. (R20)



A trepanned skull from ancient Peru. (R9)

The timing and geography of trepanation. The earliest record of trepanation comes from Spain, where a healed, trepanned skull has been dated at 8000 BC. (R19) In South America, trepanation began much later---about 400 BC--- and continued until the Spanish conquest about 1500 AD. (R20)

Hundreds of trepanned skulls have been collected in both Europe and the Andean region of South America. A few have also turned up in Central America

(R7) and Mexico (R7, R8). Some more came from North Africa (R8) and the Canary Islands (R1). Rather surprising is the prevalence of trepanning in the western Pacific: Melanesia (R8) and, more specifically, New Britain (R5), New Guinea (R8), Borneo (R1), and even Australia (R19). So far, we have found no reports of trepanation from the continent of Asia.

Trepanation in North America north of Mexico was rare. We have a scattering of skulls from: Mississippi Basin (R8), Lake Huron area (R8), Michigan (R1, R2, R13), Washington, D.C. (R10), Connecticut (R13), Maryland (R10) and Arkansas, Alaska, Georgia, New Mexico, British Columbia (R13). It would be interesting to know who the North American trepanners were, particularly in Alaska.

Possible reasons for trepanation. Most trepanations were probably carried out for therapeutic purposes, but the following list of suggested applications is broader in scope.

- Repair of battle wounds
- Headache relief
- Treatment of hydrocephaly (water on the brain)
- Removal of brain parasites
- Treatment of epilepsy
- Tumor removal
- Release of evil spirits
- Mystical and magical rituals
- Removal of brains for consumption
- Stringing up the skulls of vanquished enemies.

A reading of the many articles and book chapters discussing trepanation have led to the identification of four facts that seem sufficiently anomalous or curious to single out. We now treat these briefly.

X1. The precocious knowledge and skill of ancient surgeons. Simply put, the picture of surgically deft humans with a a knowledge of cranial anatomy 10,000 years ago does not square with the common picture of brutish cavemen.

X2. The ubiquity of trepanning implies Neolithic diffusion of remarkable scope. Trepanned skulls from four continents suggest either long-distance communication or multiple independent inventions. But trepanation has been called an "improbable invention" very unlikely to have been invented more than once. (R19) R. Rudgley defines the problem succinctly.

> It also needs to be asked whether trepannation as a surgical procedure was invented independently in the various areas of the world where it has been practised extensively (i.e. pre-Columbian Peru, Melanesia and Neolithic Europe), or did it arise first in only one place, from which it subsequently spread? In short, is the early emergence of trepanation due to independent invention in the three areas or diffusions from some common center? (R19)

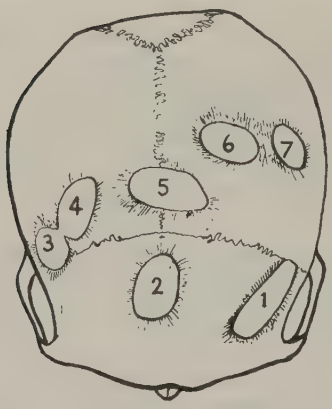
Of course, we see in X0 that trepanation took place in more than the three areas mentioned by Rudgley. This makes world-wide diffusion even more likely and greater than expected.

X3. Trepanation a remarkable innovation. As remarked above, trepanation is an "improbable" invention. Primitive humans had first to deduce that removal of a portion of a sufferer's skull would relieve specific symptoms. T. Parry eulogized this insight as follows:

> To the memory of these bold empirics who, in the dawn of the world, dared to do, and who were the first to lay the foundation of our present-day cranial surgery, I raise the glass to my lips, in admiration of their pluck and endurance, in a silent but reverential toast. (As quoted in R19)

X4. Early discovery of antiseptics and anesthetics. We can accept that early humans readily discovered how to identify and use natural psychoactive substances, such as coca leaves. Natural opiates are very common. Also, the art of brewing must have been learned early. Such substances were doubtless employed as anesthetics during trepanation.

Antiseptics were a different matter. Tasting and consuming natural substances is common in animals, but the



A Peruvian skull that was trepanned seven times, with healing evident around earlier surgeries. (R12)

deliberate application of plants and other products of nature to wounds requires some insight and ingenuity. We suspect that such substances have been used during and after trepanation because the many skulls show unmistakable signs of healing in an environment that must have been rife with germs. First, the Neolithic medicine men had to recognize that successful trepanation required the application of "something" to the wound to forestall infection, although (we think) they could not have comprehended the concepts of germs and infection. However, they might have accidentally, or by intuition, found that the application of certain plants to injuries and battle wounds promoted healing. Such knowledge would have been transferred easily to trepanation. The antiseptic properties of salt and tannin-containing leaves and bark were probably recognized fairly early. It follows that if one substance proves efficacious in helping wounds to heal, others would be tried. There are, in fact, many plants, such as poppies and jimson weed, that are used as antiseptics today in remote areas. Lye from wood ashes is also a possible antiseptic. The important and obscure thing was making the initial connection between wound healing and substance application.

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MMB8 Scratched and Smashed Bones: The Cannibalism Signature

Description. In several parts of the planet, ancient human bones that have been smashed (ostensibly to extract marrow), scratched (apparently by stone tools), burnt, and disarticulated. These characteristics along with others define the so-called "cannibalism signature."

Data Evaluation. The existence of bones fitting the foregoing description is generally accepted but the interpretation differs sharply. We evaluate only the data here. Rating: 1.

Anomaly Evaluation. Scientists are divided on the significance of the subject bones. One camp insists that the cannibalism signature proves ancient cannibalism; the other declares that ancient mortuary practices or the work of animal scavengers created the damaged bones. This difference of opinion is the basis for assigning a modest level of anomalous to this phenomenon. Rating: 2.

Possible Explanations. As outlined above.

Similar and Related Phenomena. The debate over whether some crude, tool-like stones were manufactured by humans (artifacts) or nature (geofacts) (MMS1).

Entries

X0. Background. In the modern world, cannibalism is no longer practiced to obtain protein on a regular basis. But only a surprisingly few decades ago, natives on Fiji, New Guinea, and New Zealand indulged in this practice now considered so revolting. Even today, under extreme conditions, humans sometimes eat their companions. Such so-called "emergency cannibalism" occurred with the Donner Party cut off in the mountains of the North American west in the winter of 1846. More recently, in 1972, the survivors of a plane crash in the Andes partook of their dead companions in order to survive. (R4)

Cannibalism is characterized as abhorrent these days. We are conditioned to be repelled by it. Perhaps this bias exists because we wish to distance ourselves as far as possible from the "lower animals" which do not hesitate to eat their own. Whatever the reason, the aversion to cannibalism is powerful, so powerful that many anthropologists like to believe that Homo sapiens never looked upon his neighbors as protein sources. Perhaps, there was a bit of ritual cannibalism here and there, but never routine consumption of fellow human beings. Any osseous evidence to the contrary was routinely attributed to weathering, burial practices, or the work of scavengers. (R4)

Here, we review recent challenges to the "never-cannibalism" paradigm and the responses of mainstream scientists. On each side of the controversy at the present time, we find a pair of anthropologists. The two proponents of ancient and not-so-ancient cannibalism are T.D. White (University of California, Berkeley) and C.G. Turner (Arizona State University). Across the aisle are P. Bahn, a British independent archeologist and W. Arens (State University of New York, Stony Brook). Arens is the author of the paradigm-framing 1979 book The Man-Eating Myth.

Recent evidence for cannibalism. The controversy over cannibalism heated up in 1973 in Colorado's Mancos Canyon, when excavators at a 900-year-old Ana-

sazi site uncovered a large jumble of bones displaying burned patches and deep incisions. Arm and leg bones had been broken and skulls crushed. T.D. White saw undeniable signs of cannibalism in this assemblage.

C.D. Turner, who had dug at several other sites in the Southwest also found what seemed to him to be certain signs of cannibalism at his digs. He formalized his evidence in a list of 14 characteristics that constituted, in his view, the "cannibalism signature."

> These include an array of stone-tool cut marks similar to those found on butchered animals, fractures produced by severe blows, skull abrasions generated by stones striking larger stone anvils atop the head, discoloration and cracking due to burning, limb-bone breaks that expose marrow, a predominance of cranial bones and scarcity of vertebrae, and few signs of bone weathering or animal gnawing (indicating that bone damage and the covering of remains occurred at or around the time of death). (R1)

The cannibalism signature is underlined when animal and human bones are found together bearing the same marks of food processing.

To White and Turner, cannibalism signatures are so plentiful in Anasazi country that the Anasazis, thought to be the ancestors of today's peaceful Hopi, were far from being the idyllic Native Americans proclaimed by the anthropologists.

Naturally, Turner's cannibalism signatures are emphatically rejected by Bahn and Arens, even though neither is intimately familiar with the osseous remains of the American Southwest. Rather, their challenges are generic, applying to all signs of human cannibalism regardless of time and place.

First, Arens' viewpoint. He believes that, except for rare cases of starvation or insanity, none of the evidence for cannibalism stands up under scientific scrutiny. He has remarked:

> I didn't deny the existence of cannibalism, but I found that there was no good evidence for it. It was bad science. (R3)

More philosophically, he says:

> I still do not think cannibalism has been a major feature of human life, and I don't see why people strive so hard to prove that it is---except to try to show how wonderfully advanced we now are, compared to our crude past. (R4)

P. Bahn, on the other hand, maintains that cannibal signatures are misinterpretations. Instead, he says, the skeletal damage is really consistent with the mortuary practices of many ancient peoples. Bahn uses Australian Aborigines as an example. They remove the flesh from their dead, smash the bones, and remove the marrow before burial---without consuming anything. One would easily mistake such remains as bearing the cannibalism signature. (R1)

In the end, Bahn's philosophical position is revealed in a question he poses:

> Do you prefer to imagine your ancestors as people with complex funerary rituals or as bloodthirsty cannibals? (R1)

Although, we duly register Arens' claim of "bad science" and Bahn's "misinterpretation," there exist at least six sites worldwide where over the millennia ancient peoples left behind bones that are smashed, scratched, burnt, and bear signs of "pot-boiling"; all very suggestive of cooking for consumption. We next summarize what exists at these six sites.

X1. North American Southwest. As previously indicated, the current flare-up of the cannibalism controversy seems to have begun in Anasazi country; i.e., the Four Corners area). Actually, the first suspicions of Anasazi cannibalism were reported in 1902. C.G. Turner's investigations were first published in 1970, when he presented evidence of cannibalism at Polacca Wash, Arizona. He now estimates that there are more than 40 Anasazi sites that yielded almost 500 cannibalized bones from the period 900 AD to a surprisingly recent 1700 AD. (R1, R3) Turner believes the strongest case for Anasazi cannibalism can be made at the Penasco Blanco great house at Chaco Canyon---the renowned focal point of the Anasazi culture. (R3)

T. White's major excavation was at

Mancos Canyon, Colorado. His findings there were the basis of his 1992 book Cannibalism at Mancos. It was there that he saw the cannibalism signature.

> When he applied these criteria to the Mancos remains, he concluded that they were the leavings of a feast in which 17 adults and 12 children had their heads cut off, roasted, and broken open on rock anvils. Their long bones were broken---he believes for marrow---and their vertebral bodies were missing, perhaps crushed and boiled for oil. Finally, their bones were dumped, like animal bones. (R3)

This is hardly the picture we have been shown of pre-Columbian Native American cultures. The Mancos Canyon bones and those at other Anasazi sites seem to bolster the case for Native American cannibalism---but Bahn and Arens remain unconvinced. Basically, they hold that cannibalism is inhuman.

X2. Mexico. C. Pijoan, who works at Mexico City's Museum of Anthropology, has looked for the cannibalism signature at three Aztec sites in Mexico. She contends that the bones she has examined show "a pattern of violence, cannibalism, and sacrifice through time. (R3)

X3. Europe. European anthropologists and archeologists have also detected the cannibalism signature on their continent. We now review briefly the data we have collected so far.

Neanderthal sites. Three European caves (Krapina, Vindija, and Moula-Gercy) have yielded both Neanderthal and animal bones displaying the cut marks, breakage, and disarticulation characteristic of the cannibalism signature. These bones date from 45,000-130,000 years ago. (R3)

Even older signs of Neanderthal cannibalism occur at Atapuerca, a site in northern Spain some 800,000 years old. Spanish researchers using scanning electron microscopy report V-shaped gouges in both Neanderthal and animal bones in exactly those locations where one would apply stone tools to strip meat from the bones. (R2, R4)

France. Human and animal remains about 6,000 years old were deliberately broken to get at the marrow. The bones also show cut marks similar to those produced by stone axes. (R1)

Britain. Excavations at Cheddar Gorge, Somerset, uncovered 12,000-year-old skeletons that had been scalped, beheaded, and smashed to extract the marrow. (R4)

X4. Fiji. Examination of both human and animal bones from a trash midden revealed that both showed clear signs of food processing; i.e., scratches, burns, and percussion marks. (R3)

X5. New Guinea. Until recently, natives in the highlands of New Guinea habitually consumed the brains of recently deceased tribesmen. This practice led to the spread of kuru, also called the "laughing sickness." Most anthropologists classify this habit as ritual cannibalism, but J. Diamond suspects that consumption may have gone farther than grey matter. Inland New Guinea, he points out, is a protein-poor place where the native eat all manner of rodents, insects, etc., to supplement their veggies (R4)

X6. New Zealand. In 1835, Maoris, who consider themselves to be the first New Zealanders, landed in the Chatham Islands 500 miles east of New Zealand and enslaved the indigenous Moriori people. Subsequently, the Maoris exterminated the Morioris, in the process cooking and eating many of them. The Maoris felt no guilt. J. Diamond quoted one Maori as follows:

> No one escaped. But what of that? It was in accordance with our custom. (R4)

As an aside, it should be remarked that the Morioris preceded the Maoris to mainland New Zealand.

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MMB9 Exotic Mummies

Description. The existence of mummies displaying physiological characteristics of ethnic groups that, according the accepted theory, never settled or visited the region in which the mummies were found.

Data Evaluation. Except for the well-publicized mummies with Caucasian features found in China (X4), we have only brief reports of other exotic mummies---no scientific studies at all. Our rating is based upon these less-than-satisfactory notices in the literature. Rating: 3.

Anomaly Evaluation. Exotic mummies, such as mummies with blond hair in pre-Columbian Peru, imply the anomalous diffusion of an ethnic group; that is, people in the wrong place at the wrong time. Caucasians in pre-Columbian Peru, for example, would fly in the face of the mainstream picture of the peopling of the Americas and would therefore be highly anomalous. Rating: 1.

Possible Explanations. Some ethnic groups, such as the Caucasians and Asians, travelled much more widely than present theories permit.

Similar and Related Phenomena. Every volume in the M-series of catalogs contains entries supporting the many claims of anomalous diffusion; for example, those volumes dealing with pottery, epigraphy, and the DNA of living individuals. Use the Subject Indexes in the other Catalog volumes.

Entries

X0. Introduction. Most, probably all, of the mummies cataloged below are merely unembalmed, desiccated corpses--not at all like those of ancient Egypt. Some were, however, carefully wrapped or clothed and then interred in natural shelters or shallow crypts.

Their crude preparation aside, these shriveled corpses provide us with evidence of possibly anomalous diffusion of Caucasian, Asian, and other peoples across and between the continents thousands of years ago.

X1. North America

Nevada. The story of Lovelock Cave, located 22 miles southwest of Lovelock, Nevada, derives from three sources: hard facts, a legend, and anthropological surmise.

First, the facts. In 1911, miners began carting away the rich guano deposits that had collected over the years in Lovelock Cave. In the process, they came across artifacts and the naturally mummified remains of an individual estimated to have been about 6½ feet tall and said to have possessed distinctly red hair. The mummy's size is unusual and, of course, the red hair raises many questions. Archeologists did visit the cave as early as 1912. They removed artifacts but apparently no bones or red hair. The only surviving bones pertinent to the Lovelock Cave story is a gigantic skull on display at the Humboldt Museum in Winnemucca, Nevada. It is said to have come from the Lovelock Cave "area," which implies it may have come from the cave. In any event, the existence of an unusually large skull supports the old description of the large cave skeleton and, in addition, a portion of a legend of the Piute Indians that tells of red-haired giants that once lived in the area. (R3, R4)

The legend is fascinating. It relates how giant cannibals with red hair and light skin preyed upon the Piutes. Eventually, the Piutes banded together and, according to the legend, exterminated the giants. In the final battle, the red-haired giants were driven into Lovelock Cave, where they were smothered by enormous fires the Piutes built at the cave's entrance. This all is said to have taken place early in the Nineteenth Century. (R3)

A. Bill, a Paiute woman, supplemented the legend as follows:

> All members of the tribe who were exterminated had red hair. I have some of their hair which has been handed down from father to son. I have a dress, which has been in our family a great many years, trimmed with this reddish hair. Old Piutes always called the redheads Siwash Indians, but many of my people really wondered if the redheads were Indians at all. (R3)

Obviously, one must treat legends and such vague testimony gingerly.

Anthropologists, predictably, discount both the size of the Lovelock Cave skeleton and its red hair. They claim that the largest skeleton ever found in that part of Nevada measured only 5 feet 11 inches. The red hair, they opine, was only the consequence of age and chemical alteration. Black mummy hair sometimes turns red when removed from a cave. Whether this was the case at Lovelock Cave cannot be assessed. (R4)

Pertinent to the Lovelock Cave problem are two unexamined references. In the Nevada State Historical Quarterly, pp. 153-167, Fall, 1975, it is acknowledged that redhaired people once did live in Nevada! Second, the Paiute legend is presented in detail in a book by S.W. Hopkins published in 1883, bearing the title Life among the Piutes. (R3)

Alaska. When the Russians first arrived in the Aleutian Islands in the mid-Eighteenth Century, they encountered the remnants of a mysterious ethnic group now called the "mummy people." Although these people did mummify their dead, they were far from being cadavers when they drove the Russians off a beach of Kodiak Island with a rain of sharp darts, spears, and lances. They are also said to have launched large stones at the Russians using catapults! Protected by body shields made of wood covered with rawhide, the mummy people ---what was left of them---were formidable warriors. But who were they?

Actually, the Russians were not the first to meet the mummy people in mortal combat. The eskimos had faced them in

their island-by-island conquest of the Aleutians begun several centuries earlier. Today's Aleuts carry a mixture of Eskimo and mummy-people genes.

It is the uncertain origin of the mummy people that intrigues the most. They are thought to have arrived in the Aleutians some 7,000 years ago---but from where? Helping to answer this question are thousands of their mummies unearthed over the last 300 years. Their bones resemble those of the Ainus still surviving in northern Japan. Like the Ainus, the mummy people possessed some Caucasian features. In fact, some had reddish hair. (R9)

The article upon which the above account is based does not reveal whether the subject mummies were embalmed or merely preserved naturally, like most of the mummies discussed in this section.

X2. Mesoamerica

Mexico. About 1886, the Mexican archeologist S. Marghieri discovered and explored a cave in the Sierra Madre Mountains between Coralitos and Casa Grande. At the far end of the cave, he came across four desiccated bodies; that is, "natural mummies."

> No embalming process was used in the preservation of these bodies. They were dried by the air alone. The bodies are not like those of the Indians of the present day, because the fingers and hands and feet are smaller than the average, and the woman's hair is brown and silky, and of the Caucasian type. The body of the man must have weighed in life from 180 to 200 pounds, but it now weighs only 14 pounds, while the body of the woman weighs only 12 pounds. In the lobe of each of the small and well-proportioned ears is a piece of hollow bamboo or reed as an ornament. The woman had a large forehead and well-developed reasoning powers. [?] (R1)

X3. South America

Peru. It has been claimed by some that the Inca nobles were white-skinned and larger than the rest of the inhabitants of the Inca Empire. This possibility is given some credence by some mummies found at Paracas, Peru. These mummies possessed blonde hair and their skeletons were substantially larger than the average Andean; specifically, an average 1.605 meters compared to 1.060 meters. (R5)

As in the case of the Nevada red-haired mummy, it is possible that the hair color could have been altered by age and environmental influences.

X4. Asia

China. Of all the exotic mummies presented in this catalog section, those recently dug out of the sand in northwestern China have attracted the most professional attention. Their authenticity cannot be questioned. But, because they were found so geographically close to countries with Caucasian populations, they are the least anomalous.

The Caucasian mummies (now called the "mummies of Urumchi") were first excavated by Chinese archeologists in 1978 and 1979. Over 100 have been exhumed from several burial grounds in the arid foothills of China's Celestial Mountains in Xinjian Province. The corpses were not embalmed, but that region is so dry and saline that they were quickly desiccated. Indeed, their preservation is so good that they do not appear to be upwards of 4,000 years old.

The Chinese mummies were extracted from small cysts located just a couple of feet below the sands.

> Most were found on their backs with their knees drawn up---a position that allowed the bodies fit into the small burial chambers. They are fully clothed in brightly colored woolen fabrics, felt and leather boots, and sometimes leather coats. The men generally have light blond or brown hair, while the women have long braids; one girl has blue tattoo marks on her wrist. (R7)

In addition to the blond hair, the mummies possess round eyes and prominent noses. The men sometimes sport long beards and may reach heights of 6½ feet. All of these features are typical of Caucasian peoples. (R10)

The brilliantly colored textiles from the burial chambers are characteristi-

cally European, possibly Celtic. In fact, they are much like those woven in the same time frame in Germany, Austria, and Scandinavia. (R10, R12)

China's mummies demonstrate that people of Caucasian descent pushed far to the east on the Eurasian land mass as early as four millennia ago. One has to ask if they may have gone farther than northwestern China. To Japan, perhaps, where the Ainus have Caucasian features; possibly even to Kodiak Island to repel the first Russian visitors in the mid 1800s! (See X1.)

X5. Oceania

New Guinea. Over 60 naturally mummified bodies have been found sitting chin-to-chin in a limestone cave in the gold-fields district of Morabe, New Guinea. The most remarkable feature of these mummies is their light skin. (R2)

We suppose that skin color, like hair color, may be affected by age and the environment.

References

R1. Anonymous; "Aztec Mummies," Scientific American, 59:65, 1888. (X3)
R2. Anonymous; "Nature, Not Man, Made Mummies in Island Cave," Science News Letter, 29:370, 1936. (X5)
R3. Anonymous; "Red-Haired People-Eaters," Pursuit, 4:15, 1971. (X1)
R4. Editors, Reader's Digest; Mysteries of the Unexplained, Pleasantville, 1982, p. 41. (X1)
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R6. Davidson, Keay; "Ancient Corpses Discovered," San Francisco Examiner, March 6, 1994. Cr. J. Covey, (X4)
R7. Hadingham, Evan; "The Mummies of Xinjiang," Discover, 15:68, April 1994. (X4)
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R10. Sattin, Anthony; "Chinese Mummies?" London Times, date unknown. Cr. A.C.A. Silk. (X4)
R11. Hillinger, Charles; "Tall, Red-Haired Nevada Tribe Remains Archeological Mystery," Sunday Oregonian, September 27, 1970. (X1)
R12. Barber, Elizabeth Wayland; The Mummies of Urumchi, New York, 1999. (X4)

MMC CLOTH ARTIFACTS

Key to Phenomena

MMC0 Introduction

Textiles, like wooden artifacts, do not survive the centuries well. The best places to find specimens of ancient textiles are in the high, dry, cold Andes and the polar regions. A few bits of cloth have also been preserved in Indian mounds and in human-controlled environments where they are protected from the elements.

Textiles, unlike stone and wooden artifacts, are the products of rather sophisticated technologies. A mature textile technology requires the breeding and cultivation of plants and animals, the spinning and carding of fiber, weaving devices, the knowledge of dyes and mordants, and methods for producing patterns.

The anomalies presented by cloth artifacts mainly involve the claims of early diffusion of textile know-how to the New World, probably from Asia, and, in at least one case, "reverse diffusion"; that is, from the New World to Asia. Some cloth artifacts have been discovered in surprising places, such as the North American polar regions. And we must not forget the most famous cloth artifact of all: the Shroud of Turin, which bears an eerie human image and has been protected for many centuries and possibly modified by the hand of man.

MMC1 Viking Cloth in the High North American Arctic

Description. Cloth artifacts of Viking manufacture in the high Arctic of North America; that is, to about 80° latitude; dating back to about 1000 A.D.

Data Evaluation. Short notices in science journals and magazines. No detailed science reports. Rating: 2.

Anomaly Evaluation. Archeologists are surprised at a Viking presence so far North, but the fact is really only mildly anomalous given proven Viking daring at sea. Rating: 2.

Similar and Related Phenomena. Claimed Viking structures, artifacts, and runes are widespread in the New World. Consult the Subject Indexes of the Series-M catalogs.

Entries

X1. North America. Archeologists agree that the Norse once had a foothold in North America at L'Anse aux Meadows in Newfoundland. More controversial are claims that the Vikings ventured farther north into the high Arctic. But analysis of artifacts recovered from Eskimo winter camps on Baffin and Ellesmere Islands strongly suggest either trading contacts with the Vikings or possibly Viking shipwrecks only ±10° from the North Pole.

Baffin Island. When Canadian archeologist P. Sutherland examined artifacts recovered from a Dorset Culture winter site on Baffin Island, she found two strands of soft yarn, one of which was 3 meters long. The yarn had been spun from the hair of the Arctic hare. Since the Dorset people did not spin yarn, Vikings were the most likely source. This surmise was supported other items of Norse manufacture found at the site. Age of the yarn: about 1,000 years. (R1, R3)

Ellesmere Island. Similar deductions were made by two other Canadian archeologists, P. Schledermann and K. McCullough, upon inspection of materials collected at Inuit Thule Culture sites still farther to the north, where Ellesmere Island closes with northern Greenland. From these sites came woolen cloth, Viking-ship rivets, pieces of chain mail, and other items of definite Norse manufacture. Age of the artifacts: again about 1,000 years. (R2)

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R1. Pringle, Heather; "Hints of Frequent Pre-Columbian Contacts," Science, 288:783, 2000. (X1)

R2. McGhee, Robert; "A New View of the Norse in the New World," Discovering Archaeology, 2:54, September-October 2000. (X1)

R3. Nickerson, Colin; "New Clues Emerge on Viking Voyage," Boston Globe, February 14, 2000. Cr. M. Colpitts. (X1)

MMC2 Diffusion of Dyed, Patterned Textile Technology

Description. The Precolumbian, transoceanic transfer of the technologies for textile manufacture, textile-dyeing, and the production of patterned, dyed textiles. Although a flow of textile know-how from the Old to the New World would seem most likely, the innovation of tie-dyeing may have moved in the other direction.

Data Evaluation. The sources employed here are all from a single, off-mainstream journal. However, the referenced articles are backed by solid citations from the scientific literature. The totality of the evidence supports the claims of diffusionists. Rating: 2.

Anomaly Evaluation. The evidence here suggests New World contacts perhaps 2,000-3,000 years ago---a highly anomalous result. Rating: 1.

Possible Explanation. The multiple, rather obscure, technical developments in the manufacture of dyed textiles could have been invented independently in both the Old and New Worlds.

Similar and Related Phenomena. Cultivated, pigmented, New-World cotton (MMC3); quipus employing colored yarns (MGQ0); information woven into textile patterns (MGW).

Entries

X0. Introduction. We modern humans take colorful, patterned textiles for granted. It is difficult for us imagine the many accidental discoveries and remarkable technical innovations made by ancient artisans to clad their elite in their finery.

The required technical developments were both complex and sophisticated. Since virtually identical innovations occurred in both Old and New Worlds long before Columbus sailed, the question of early trans-ocean diffusion appears once again. Some elements in the development of dyed textiles are simply so specific and improbable that independent invention, though always possible, does not seem very likely.

We divide the developments into three groups: (1) Textile production; (2) Dye discovery, manufacture, and application; and (3) The creation of patterns in dyed textiles. None of these steps is as simple as it seems. In fact, the production of patterned, dyed textiles millennia ago represents a remarkable series of technological discoveries and innovations. The fact that these developments transpired in both the Old and New Worlds provides strong support for Precolumbian diffusion of several of the technologies involved. And it apparently was not one-way diffusion!

X1. Possible diffusion of textile manufacturing technology. The production of textiles in both the Old and New Worlds commenced in antiquity. The oldest Old World fabrics date from 8,600-8,000 B.C. In the New World, the oldest preserved fabrics came from a dry cave in the Peruvian Andes. Apparently, they were manufactured in the first millennium B.C. (R2)

The conversion of cotton fibers and animal wool into raw textiles requires fiber extraction, carding, spinning, and weaving. Very likely, the first three of these processes were developed independently many times in many places---they are not overly complex. Even the coarse weaving of threads and yarns requires little technological sophistication and, therefore, cannot be used as evidence for diffusion from advanced to more backward cultures.

The invention of the backstrap loom, however, provides us with a stronger hint of Precolumbian contacts between

the west coast of South America and Asia. This device required a level of innovation that makes independent invention less likely. The backstrap loom is known to have been used in Peru circa 400 A.D. and probably as early as 600-800 B.C., as deduced from the known, well-woven cotton textiles of that period along the Pacific coast of South America. (R2)

Underlining the possibility of trans-Pacific acquisition of textile technology from the Old World is the apparently sudden appearance of rather advanced textile technology in South America. In other words, there is little evidence of experimental stages of development. The technology blossomed quickly---a symptom of outside influence. (R2)

X2. Possible diffusion of dye knowledge, preparation, application, and fixing. Brightly colored textiles were and still are greatly prized the world over. The raw materials of ancient textiles---cotton and wool---are not. The textile engineers of that period had to develop dyes to color the products of their looms. Some of the early dyes came from most unlikely sources: insects and shellfish. Plants, such as indigo, were more obvious dye sources. Most of these sources were probably discovered accidentally---probably 3,000-4,000 years ago. The extraction, purification of these dyestuffs required much ingenuity and chemical sophistication. In addition, mordants had to be invented to make the dyes "fast."

The diffusionist can point to the fact that the same basic dye sources (plants, insects, shellfish) were employed in both Old and New Worlds. The species were different and the New-World time frame different, but otherwise there were many similarities. In fact, they were so similar that J.C. Jett was impelled to comment as follows in his 1993 paper on potential Precolumbian contacts:

> Of interest for the present paper are the following dyestuffs that were shared in pre-Columbian times by southwestern Asia, on one hand, and Peru and Mesoamerica, on the other; madder red, indigo blue, scale-insect scarlet, and shellfish purple. These dyestuffs are obscure and are not easy to use, for they are not obvious in the environment and generally require complex procedures be effectively applied in order to fix the colorants. Therefore, it is important to examine both the materials and the technologies as possible items of transfer by humans, via early sea voyages. (R1)

It should be noted that shellfish purple was apparently not used in the New World until after Columbus's contact. However, the very early application of the dyes derived from plants and insects in the New World is certainly suggestive of Precolumbian diffusion.

X3. Possible diffusion of ways to manufacture dyed patterns. Simply dipping a fabric into a dye vat does not create the patterns that humans desire. The most primitive method of creating textile patterns involved simply painting the blank cloth with dyes. A slightly more sophisticated technique omitted the mordants that fix the dyes from appropriate locations on the cloth. Then, when the fabrics were washed these spots would lose the dye and be uncolored.

Two other pattern-generating techniques are less-obvious and, therefore, more useful to the diffusionist's cause.

- Tie-dying, in which the parts of the fabric not-to-be-dyed are tied up in bundles and excluded from the dyes.

In tie-dying, protruding portions of the fabric are bunched and held in place before dyeing, thereby protecting the background color. (Adapted from R2 and CIBA Review)

- Batik, a technique in which a paste or wax is applied to the areas not-to-be-dyed. After dyeing, these shielding substances are washed or boiled off.

Both methods were used in the Old and New Worlds. If independent invention can be ruled out, batik technology probably flowed into the New World from the Orient. The present chronological evidence, however, suggests that tie-dyeing originated in the New World and was transferred early to the Old world. (R2, R3) Of course, further research may reverse the presumed direction of technology flow.

References

R1. Jett, Stephen C.; "Dyestuffs and Possible Early Contacts between Southwestern Asia and Nuclear America," NEARA Journal, 28:31. 1993. (X0-X3) (NEARA = New England Antiquities Research Association.)
R2. Bauer, J. Louis; "Origin of Tie-Dye Textiles: Java, India, China or America?" NEARA Journal, 32:19, 1998. (X1, X3)
R3. Jett, Stephen C.; "Resist-Dyeing," NEARA Journal, 33:41, 1999. (X3)

MMC3 The Early Selective Breeding of Colored Cotton in the New World

Description. The very early selective breeding and cultivation of a wide spectrum of strains of colored cotton in South and Mesoamerica.

Data Evaluation. Our sole reference is a 1999 article in Scientific American. This article is by an expert on ancient New World textiles. The existence of many hues of natural cotton is well known. In fact, today, since dyeing is unnecessary, these naturally colored cottons are deemed environmentally friendly and are being used more widely. Rating: 1.

Anomaly Evaluation. The selective breeding of plants in the New World some 5,000 years ago was either a remarkably early, independent innovation or, possibly, the diffusion of this agricultural knowledge from Asia in pre-Christian times. Rating: 2.

Possible Explanations. As just stated above.

Similar and Related Phenomena. Advanced New World textile technology (MMC2).

Entries

X1. General observations. Cotton cultivated for textile production has a long history in Asia, Oceania, and the New World. About 5,000 years ago, farmers in Mesoamerica and the Caribbean domesticated two indigenous species of cotton. From these species came their rich tradition of textile technology. A remarkable aspect of New World cotton cultivation was the selective breeding of various strains of naturally colored cotton, thereby circumventing the dyeing process. Ecru, deep chocolate, mauve, and many other shades are found at ancient South and Central American archeological sites. In the high, dry Andes, the colored textiles survived the passing millennia well.

When the Spanish conquered South and Mesoamerica in the 1500s, they were amazed at the wide fields of cotton of various hues. They took some of this colored cotton as tribute and shipped it back to Europe, where, it should be noted, the textile industry lagged that in the New World.

Thus, we see in the New World the precocious discovery and use of selective breeding to attain better agricultural products. The Europeans may have had superior weaponry, but the inhabitants of South and Mesoamerica were farther advanced in textile technology.

References

R1. Vreeland, James M., Jr.; "The Revival of Colored Cotton," Scientific American, 280:112, April 1999. (X1)

MMC4 Stone-Age Clothing Surprisingly Modern

Description. Clothing 100,000 years old that is remarkably well made. This dispels the notion that Stone-Age people wore only shaggy, ill-fitting animal skins.

Data Evaluation. Only a brief report in a science magazine, probably from a Russian source. Rating: 3.

Anomaly Evaluation. The data merely dispel a popular assumption about "cavemen" being brutish and ill-dressed, as is often portrayed in cartoons. No scientific paradigms at risk here. Rating: 3.

Possible Explanation. Our distant forebears were much more intelligent and capable than the popular press assumes.

Similar and Related Phenomena. Many of the items of surprisingly high technology found at ancient sites (MMT); effective wooden hunting spears 400,000 years old (MMW2).

Entries

X1. General observations. The familiar pictures of Stone-Age humans clad in crudely fashioned animal skins are pervasive. But they may be in error.

Some 100 miles east of Moscow, a Russian archeological expedition has discovered two human skeletons dressed in surprisingly modern clothing. The strata in which the find was made was estimated to be 100,000 years old.

> The clothing remnants consist of leather trousers and shirts, decorated with beads carved from mammoth tusks, and fur-lined boots. (R1)

O. Bader, leader of the expedition, remarked that the craftsmanship of the clothing compared well with that of the present-day inhabitants of the Far North and Arctic.

We recognize that leather is not cloth; nevertheless, the Russian discovery fits well here.

Highly pertinent here is that European cave art (circa 25,000 B.P.) that depicts humans of that time clad in remarkably stylish garb---although probably made of animal skins rather than woven cloth. (MGP)

Reference

R1. Anonymous; "Modern Stone-Age Men," Science News, 96:583, 1969. (X1)

MMC5 Llama Wool Indicates Selective Breeding

Description. The discovery of mummified llamas bearing wool much finer than can be produced today.

Data Evaluation. Since this entry is supported by only a newsletter item derived from a newspaper, we must be cautious. Rating: 3.

Anomaly Evaluation. The selective breeding of large mammals for a specific property---fine wool, in this instance---requires: (1) the careful, accumulated observations of animals that are required to recognize the principles behind selective breeding; and (2) the lengthy, patient application of these principles that is essential with mammals with long gestation periods, as is the case with llamas. Again, we see the remarkable superiority of some New World accomplishments when compared to those of Europe, and which, in this case, is emphasized by the inability of modern llama raisers to duplicate the Inca's accomplishments. Rating: 2.

Possible Explanation. As in MMC3.

Similar and Related Phenomena. Suprisingly advanced New World textile technology as compared to that of Precolumbian Europe (MMC3).

Entries

X1. General observations. This entry parallels MMC3 for it again illustrates the acute observations of the natural world made by ancient peoples. In this case, it is the Incan realization that selective breeding of llamas could produce superior wool. In fact, the Incas were so capable in this respect that modern man has not been able to reproduce their results.

> An ancient llama wool, far superior to most yarns known in the world today, has been found in a group of mummified llamas that were sacrified in the desert of southern Peru 1000 years ago...The discovery raises the question of how a fiber---finer than cashmere---could have been lost to civilization and whether modern genetics could bring back clothing as fine as Incas wore. One theory is that the superior art of breeding, along with their finest animals were lost during the chaos that followed the Spanish conquest. (R1)

Reference

R1. Robinson, Dave; "Mummified Llamas Yield Superior Wool," NEARA Transit, 10:6, Spring 1998. Source cited: Vancouver Sun, January 9, 1998. (X1)

MMC6 Similarity of Chinese and Aztec Plumagery

Description. The feather cloaks and other adornments woven from feathers are so much alike in China and Mesoamerica that Precolumbian, trans-Pacific diffusion is suggested.

Data Evaluation. Our sole source is authoritative but probably too old to be the last word on the claimed phenomenon. Rating: 3.

Anomaly Evaluation. Precolumbian, trans-Pacific contacts are, at this writing, highly anomalous. Rating: 1.

Possible Explanations. Feather-weaving is so simple that independent invention is more reasonable than diffusion.

Similar and Related Phenomena. Claimed diffusion of textile-dyeing technology (MMC2). See also: Diffusion in the Subject Index.

Entries

X1. General observations. The art of weaving wild-bird feathers into gaudy garments and adornments was practiced widely in Precolumbian Asia, Oceania, and South and Mesoamerica. Plumagery techniques were so much alike all around the Pacific Rim that diffusion is a distinct possibility. This fact was emphasized in a 1854 paper in the American Journal of Science.

> Whether plumagery or the art of work-in feathers, which was formerly practiced in this part of the world [China], and also by the Aztecs of Central America, originated with Asiatics, or Americans, or with both, must be left to conjecture: in any view of the case, the fact is invested with interest. Attention was attracted to this subject by perusing the chapter devoted

to an inquiry into Aztec civilization in Prescott's History of the Conquest of Mexico, where the distinguished historian shows that the ancient Americans excelled in the arts of plumagery and jewelry, in both of which they appear to have followed the same methods that are adopted by the Chinese. (R1)

It must be emphasized that the direction of the suggested diffusion of technology diffusion is left indeterminate in the quotation.

Reference

R1. Macgowan, D.J.; "Chinese and Aztec Plumagery," American Journal of Science, 2:18:57, 1854. (X1)

MMC7 Woven Cloth in North American Mounds

Description. The discovery of specimens of woven cloth in a North American Indian mound.

Data Evaluation. We have only a short mention in an old issue of Scientific American. There must be additional information somewhere on the detailed nature of these cloth specimens and other examples undoubtedly found in other mounds. Rating: 3.

Anomaly Evaluation. Although the North American mound-building Indians did not manufacture woven cloth, they could have acquired it by trade with Mesoamerica. Additionally, the cloth could have been obtained from European explorers or settlers and introduced to the mound in post-Columbian times. Since many similar "alien" objects have been found in North American mounds, the cloth specimens are interesting but scarcely anomalous. Rating: 3.

Possible Explanations. As noted above.

Similar and Related Phenomena. Sundry alien metal artifacts uncovered in North American mounds (MMM1).

Entries

X1. General observations. In contrast to the advanced textile technology of the Precolumbian South and Mesoamericans, the Indians of North America were mostly content with animal skins. They did not cultivate cotton, not did they domesticate wool-bearing mammals. So, circa 1851, the discovery of woven cloth in an old Indian mound surprised the archeologists.

Dr. J.W. Foster, U.S. Geologist, read a paper on several specimens of cotton cloth found in one of the ancient mounds, in Charlestown, Jackson Co., Ohio, by a Mr. John Woods. The manufacture of the cloth was attributed to another race---a previous one---to that of the present Indians. It was presumed they were the same as the old Peruvians who were acquainted with making cloth while our Indians were not. (R1)

Reference

R1. Anonymous; "Cloth Found in the Old Mounds," Scientific American, 6:403, 1851. (X1)

MMC8 A Woven Mat Encased in Salt

Description. The discovery of a woven mat deep in a salt deposit.

Data Evaluation. The sources cited here are usually reliable, and we do not question the discovery. Unfortunately, geological details are wanting. It is not possible to even guess at the age of the artifact. Rating: 4.

Anomaly Evaluation. If the salt deposit and encased woven mat are truly ancient, say, a million years old, we would have an anomaly of the first order. Rating: 1.

Possible Explanations. The mat in question was deposited catastrophically or engulfed by petrifying fluids, or left behind by Native American salt miners and afterwards naturally encased in the salt by flowing salt solution.

Similar and Related Phenomena. The Coso geode (MMM3-X1) and the "Ordovician" hammer (MMM3-X2); and, most pertinent here, the prehistoric salt mine near St. Thomas, Clark County, Nevada (MSE5-X1) in Ancient Infrastructure.

Entries

X1. General observations. Given the power of petrifying fluids in geology and the plasticity of salt deposits, it is impossible to ascertain the age of the mat described below. Ancient or recent, it is nevertheless interesting.

> At a late meeting of the San Francisco Academy of Sciences, Mr. B.B. Redding presented, from Captain Mellon, an interesting fragment of a prehistoric mat or garment with a piece of wood attached, found in a deposit of salt, seven feet below the cap rock of the Belding ledge, on Virgin River, six miles above its junction with the Colorado, in Lincoln County, Nevada. Mr. Redding said it was probably very old indeed, and was knit by hand from the inner fiber of some tree. He believed only one similar case had been found in Louisiana, where, like this one, it was directly over a bed of salt; and that was among bones of the mastadon and fossil elephant, thus clearly establishing its great antiquity.
>
> He has written to learn if the cap rock was formed by accretion, or if a land slide could possibly have recurred in the vicinity. If it came where found by the ordinary sedimentary process, and not by any cataclysm, it is a most valuable proof of the vast period of time during which man has existed on this continent. It may be thousands of years since this work was woven, and it has only been preserved to come down to our day by the immediate presence of extensive salt beds. This will add to the rapidly accumlating evidence of the great antiquity of man on the American continent. (R2)

Obviously, the above was written before the establishment of the Clovis Limit of about 12,000 years for human incursion into North America.

References

R1. Anonymous; "A Curious Discovery in California," American Antiquarian, 4:78, 1881. (X1)

R2. Anonymous; "An Ancient Mat," Scientific American, 45:103, 1881. (X1)

MMC9 The Uncertain Origin of the Image on the Shroud of Turin

Description. The presence on a centuries-old swatch of linen of the curious image of an apparently crucified man. Called the Shroud of Turin, it is claimed by some to be the burial shroud of Christ. The scientific anomaly here is neither the age of the shroud nor the identity of the person it covered if, indeed, it really covered anyone. Rather, the origin of the image, which possesses unusual properties, is at issue.

Data Evaluation. The literature, both scientific and popular, is voluminous. The science journals, magazines, and books recognize the image's peculiar properties. Rating : 1.

Anomaly Evaluation. Although some assert that the image of the Shroud of Turin must have had a miraculous origin, say, a supernatural radiation scorching, at least one mundane art technique, known for centuries, can account for most of the properties of the image on the shroud. Rating: 3.

Possible Explanation. The image on the Shroud of Turin is a "rubbing" and may ~~had~~ had nothing to do with the burial of anyone.

Similar and Radiation Phenomena. Lightning shadowgraphs (GLL22 in Remarkable Luminous Phenomena).

Entries

X0. Introduction. For over 600 years, the Shroud of Turin has excited curiosity and speculation. Is it truly the burial shroud of Christ? The image appearing on the surface of the shroud certain looks like the visage of Christ that we see so often in books and paintings. But perhaps the shroud is only the product of a good artist who perpetrated a hoax centuries ago.

The Shroud of Turin appears in written history in France in the 1350s. It was declared a hoax then by many. The battle between believers and skeptics has still not ceased. The former believe that the shroud proves the existence of Jesus ---but most people will acknowledge that Christ existed without the evidence of the shroud. For the Shroud of Turin to have scientific import there must be something anomalous about it---perhaps something signifying a miracle, something supernatural, something inexplicable by today's science.

Much effort has gone into proving the shroud's "authenticity"; that is, that it originated in the Middle East about 2,000 years ago and that it covered a crucified person who looked like Christ.

Pollen entrapped in the shroud's fibers do suggest a Middle East origin, and spots that seem to be blood appear where one would expect them on a cloth covering a crucified corpse. However, these things do not prove the identity of the body covered by the shroud or, indeed, if the shroud even did cover a body. The image, blood spots and all, could have been applied by a clever hoaxer sans corpse. (R1, R2)

Some scientists have focussed on the radiometric dating of the shroud. But, as already mentioned an age of 2,000 years would not prove that the shroud was that that enfolded Christ, though that fact plus the Christ-like visage on the shroud would be very meaningful to the most Christians. Since the controversy over the shroud's radiometric dating has scientific implications beyond the question of shroud authenticity, it is treated separately below, even though no anomaly seems to exist in the matter of dating. (X1)

The scientific anomaly of the Shroud of Turin, if one exists, has to do with the creation of the image on the cloth. The image has a strange 3-D quality and is confined to the cloth surface; that is, the markings do not penetrate the cloth.

It is not obvious how the markings got there. They could have been applied externally by a hoaxer. Or, vapors from

the decomposing body could have left the markings. (Although this seems unlikely because the image is on the outside of the shroud.) Or, the image might have a supernatural origin. If no human involvement or reasonable natural phenomenon can be shown, the gate is wide open for a supernatural (and highly anomalous) origin. This critical image question is covered below. (X2)

An astounding amount of effort has been expended on scientific analyses of the shroud. Scientists who would sneer at UFO reports invested time and laboratory facilities in attempting to measure shroud age and identify the image source. In 1977, involved scientists coverged on Albuquerque for a "Conference on the Shroud of Turin." There even exists a Holy Shroud Guild. There is also a group of scientists operating under the name STURP (Shroud of Turin Research Program). Many articles and several books have been published on this single swath of cloth. Here, we can hit only the high points.

X1. Validity of the radiometric dating of the shroud. We dwell first on radiometric dating because this widely used technique is not infallible and its results must be scrutinized carefully whenever it is used. The dating of the Shroud of Turin highlights some pitfalls of radiometric dating that are discussed in more depth in Section CND in another volume of this Catalog.

The Shroud of Turin has been radiometrically dated and, in 1989, was declared to be of Medieval origin. (R5, R9) Those scientific measurements should have convinced everyone that the shroud could not have covered Christ's body and thus have put the whole matter to bed. But many doubts have cropped up about the dating results. Chief among these were the facts that the radiometric tests were not blind and were not controlled to everyone's satisfaction. (R6)

Two subsequent discoveries cast still more doubt upon the accuracy of the radiometric dating of the shroud. These criticisms are also instructive in that they confirm that all radiometric dates in all of archeology should scrutinized carefully.

The specter of contamination. During the 1980s, the skeptics had a lot of fun debunking the Shroud of Turin, the supposed burial cloth wrapped around Christ. Their glee was unbounded when radiometric dating "proved" that the shroud could not be older than 700 years. The skeptics may have been too quick to celebrate, because the samples that were sent to the radiometric labs may have been contaminated.

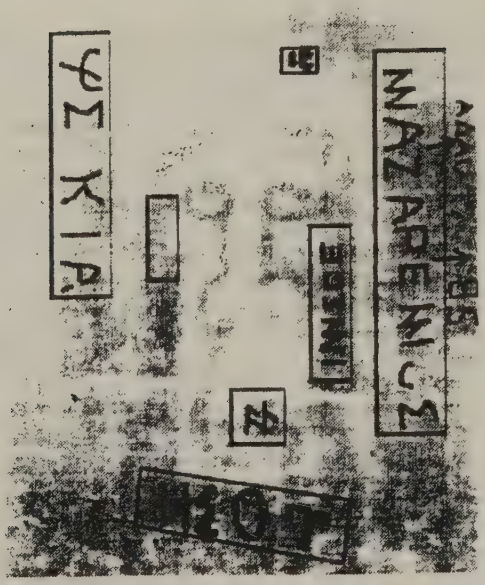
A reality of our biosphere is that virtually everything is permeated with microbes and their products. S.J. Mattingly and L.A. Garza-Valdes, of the University of Texas at San Antonio, have been studying "biogenic varnishes" for years. These plastic-like coatings are produced by bacteria and fungi. Sure enough, microscopic examination of a few linen fibers from the Shroud of Turin show that they, too, are coated with such varnishes. These biogenic varnishes may introduce carbon that has been recently fixed from the atmosphere and thus make the sample's age appear younger than it really is. (R6)

More than the shroud is at stake here. Bacteria contaminate just about everything, including wood and bone from archeological sites. Bacteria may, therefore, "rejuvenate" samples sent in for radiocarbon dating.

We have seen no estimates on the effect of this sort of contamination upon the age of the Shroud of Turin.

Image-processing discovery challenges radiometric dating of the shroud. In 1998, almost a decade after shroud radiometric dating supposedly "closed the book" on the contrversy, digital-image-processing of the shroud produced a major surprise. Some Latin and Greek letters---undiscernable by the naked eye---have been discovered around the face of the shroud. Probably these marks were intentionally erased ages ago but not completely enough to be missed by modern technology.

Paleographists believe these long-unnoticed letters are oriental rather than occidental and ancient rather than medieval. Once again, the Shroud of Turin seems like it might be an authentic relic 2,000 years old. Thus the saga continues. (R8)



Greek and Roman inscriptions claimed to be superimposed upon the image on the Shroud of Turin. (R8)

X2. Potential methods of image production. As stated earlier, the real anomaly connected with the shroud relates to the origin of the image. Proposed methods of image-origin on the shroud must account for the following characteristics:

- •Photographic negatives of the shroud are much more impressive than the positives---a hard-to-duplicate situation;
- •The image is basically a surface phenomenon that barely penetrates the linen fibers;
- •The image possesses a strange 3-D property;
- •No brush marks are apparent;
- •The image and supposed blood spots do not fluoresce under ultraviolet light; and
- •The image was unaffected by a 1532 fire during which air temperatures around the shroud probably reached 200-300°C.

The major proposed sources for the image on the Shroud of Turin are:

- •Deposits from vapors emitted by a decomposing body (assuming the shroud once did cover a body);
- •Painting by a "cunning" artist;
- •"Rubbing," a method of image production explained below; and
- •Radiation scorching by a supernatural source or some other "miraculous" phenomenon.

The heat of the 1532 fire would have blurred the image if it had been biogenic; that is, deposits from the body vapors. Blurring would also have occurred if the image been applied by an artist using pigments and stains available in the 14th. century. No blurring of the image can be discerned, so the biogenic origin and ordinary artwork seem to be eliminated. Any marks made by radiation scorching would fluoresce under ultraviolet light, but such is not observed. So, we are left with either some undefined sort of miracle or a the "rubbing" possibility.

J. Nickell, a well-known dispeller of far-out claims, demonstrated in 1958 that a rubbing could duplicate most of the features of the Shroud of Turin's image, including the unusually striking photographic negatives of the shroud. This technique, which was used in the 12th. century and probably earlier, leaves no brush marks and has the proper tonal quality.

> The technique is to wet-mold a cloth to a bas-relief sculpture, let it dry, and then rub on the pigment medium with daubers of various size, depending on the contours. Nickell's early work was done with myrrh and aloes, but lately he has been using either dry hematite powder or hematite in a cake matrix. (R4)

In fact, using a bas-relief of Christ, as we now suppose he looked, Nickell can create an image that yields a photographic negative that is eerily like that on the shroud. (R4)

Since we cannot admit undefined miracles to a scientific discussion, the best present, objective explanation of the image on the Shroud of Turin is that it is a rubbing made in the 14th. century or earlier by an unknown, artistically talented hoaxer.

References

R1. Anonymous; "Shrouded in Mystery," New Scientist, p. 720, September 22, 1977. (X0)

R2. Culliton, Barbara J.; "The Mystery of the Shroud of Turin Challenges 20th-Century Science," Science, 201:235, 1978. (X0, X1)

R3. McCrone, Walter; "Shroud Image Is the Work of an Artist," in K. Frazier, ed., Science Confronts the Paranormal, Buffalo, 1986, p. 344. (X2)

R4. Mueller, Marvin M.; "The Shroud of Turin: A Critical Appraisal," in K. Frazier. ed., Science Confronts the Paranormal, Buffalo, 1986, p. 324. (X0-X2)

R5. Waldrop, M. Mitchell; "The Shroud of Turin: An Answer Is at Hand," Science, 241:1750, 1988. (X1)

R6. Pourrat, Olivier; "Shroud Dating Still Questioned," Nature. 349:558, 1991. (X1)

R7. Travis, John; "Microbes Muddle Shroud of Turin's Age," Science News, 147:346, 1995. (X1)

R8. Marion, Andre; "Discovery of Inscriptions on the Shroud of Turin by Digital Image Processing," Optical Engineering, 37:2308, 1998. Cr. P. Ferryn. (X1)

R9. Damon, P.E., et al; "Radiocarbon Dating of the Shroud of Turin," Nature, 337:611, 1989. (X1)

MME GEOLOGICAL ARTIFACTS

Key to Phenomena

MME0 Introduction

In addition to the well-recognized and researched stone tools, cave paintings, and simple stone structures, ancient societies left behind their garbage, footprints, the remains of hearths and campfires, and sundry "waste" or "secondary" artifacts. Some of this debris was fossilized, giving archeologists additional insights into the diffusion of these cultures across the globe as well as some of their social habits.

Often it has been difficult to distinguish human-originated evidence from that made by Nature herself; that is, separating artifacts from naturally created "geofacts." This problem is particularly severe when deciding between the remains of hearths and natural fire areas. Even more hazardous and controversial has been distinguishing human footprints from those of animals, particularly where erosion has been at work. "Footprint" controversies have not always been objective because belief systems have swayed scientific judgment.

Geological anomalies have been important in the long-running debate over the dates of the early arrivals of humans in the New World and Australia and the dates when various hominids began controlling fire. The immense Bronze Age middens have revealed surprisingly large, organized gatherings of widely dispersed people for rites and celebrations of some sort.

MME1 Megamiddens: Giant Bronze-Age Waste Deposits

Description. The existence in Bronze Age Britain of several middens (waste dumps) far larger that would have been required by any settlements in that time.

Data Evaluation. Three megamiddens have been excavated by professionals and duly reported in the science literature. Rating: 1.

Anomaly Evaluation. The proximity of the megamiddens to Stonehenge, Avebury, and major ancient trackways suggest that they served large seasonal gatherings convened for religious or political purposes. With such a reasonable explanation at hand, we must classify these middens as merely curiosities. Rating: 3.

Possible Explanation. As above.

Similar and Related Phenomena. Giant Neolithic cooking hearths (MSI2); ancient British trackways (MSR1-X4). Both of the foregoing cross references are to be found in Ancient Infrastructure. Apparently, North America's Chaco Canyon was also a regional center for large, seasonal gatherings (MSB1-X11) in Ancient Structures.

Entries

X1. General observations

Britain. Several enormous middens dating from the Bronze Age have been uncovered in Wiltshire. The colossal sizes of these deposits of kitchen waste, dung, and other sorts of trash greatly exceed what archeologists would expect near any known Bronze Age settlements.

> At East Chisenbury, near Salisbury, archaeologists have unearthed 65 000 cubic metres of dark, slimy material, deposited in the 7th century BC and covering an area of three hectares. Two nearby sites with megamiddens at Potterne and All Channings Cross seem to be of similar extent and age.
>
> Middens are often found associated with Bronze and Iron Age farms, but usually consist of a few cubic metres of deposits in a ditch or pit. "You would need an enormous amount of people to create so much waste," says Andrew Lawson, unit director at Wessex Archaeology, of the latest discoveries. "No settlements at that time seem large enough." In a 20 metre by 10 metre section at Potterne, excavators found one tonne of pottery, 400 000 animal bones and over 100 bronze fragments. The East Chisenbury midden contains large amounts of highly ornate pottery. (R1)

Interestingly, the East Chisenbury megamidden holds the remains of many new-born lambs, suggesting that it was used mainly in the spring.

The most reasonable explanation for these huge accumulations of waste envisions regional, seasonal gatherings for some political or religious purpose. This makes sense in light of the fact that the megamiddens exist in Wiltshire near Stonehenge, Avebury, Silbury Hill, and other ritual centers. Several ancient trackways also converge on Wiltshire, including the extraordinary Icknield Way, some 200 miles long and, in some places, as wide as a modern four-lane highway. (MSR1-X4) One can easily imagine crowds of Bronze Age people thronging along the trackways toward the ritual centers on Salisbury Plain for spring rites.

Reference

R1. Harris, Sophie; "We're All Going Down the Dump," New Scientist, p. 17, April 6, 1996. (X1)

MME2 Fossil Food

Description. Fossilized or otherwise preserved remains of ancient human meals that reveal the kinds of foods consumed. In some cases, such evidence challenges current thinking about megafauna overkill and the dates of human inventions of different methods of food processing.

Data Evaluation. Only one suitable article is at hand. It appeared in a well-respected science magazine, but it deals with only a single site in Australia. Our data, therefore, are very limited in time and geographical scope. Rating: 2.

Anomaly Evaluation. The fossil food examined at an Australian site advances the following two potential anomalies. The anomaly evaluations are the second figure in the ratings.

- Although Australians 30,000 years ago did hunt megafauna for food, this practice was extremely rare and could not have been responsible for the rapid extinction of the Australian megafauna. This constrasts sharply with the much later extinction of North American megafauna, which is widely believed to have been the result of human overkill (X1). Ratings: 2/3.

- Ancient Australian grain processing and cooking was 20,000 years ahead of the rest of the world (X1). Ratings: 2/2.

Similar and Related Phenomena. Claimed overkill of North American megafauna by humans (MAE in another volume).

Entries

X1. Early Australian food processing. Cuddie Springs, in New South Wales, is now arid like most of interior Australia. But 30,000 years ago, there was a permanent lake with a human encampment on its shore. Archeologists find stone tools, charcoal, and the butchered bones of large marsupials, such as diprotodons, along with the remains of giant emu-like birds, and huge reptiles. This Australian megafauna disappeared long ago and was replaced by the diminutive marsupials we see there today. North America's megafauna (giant ground sloths, for example) vanished in like manner, but some 20,000 years later toward the end of the Ice Ages. Why these extinctions on opposite sides of the planet were not synchronous is a puzzle. Wouldn't a global climatic catastrophe have affected both continents at the same time?

In North America, the popular thesis is that this continent's megafauna were slaughtered by human hunters streaming across the Bering land bridge. Did the same happen in Australia, which was populated much earlier? Such is unlikely because Cuddie Springs is the only spot on the continent where there is hard evidence that the early Australians hunted the megafauna at all.

Thus Australia is different in two ways: (1) Australian megafauna disappeared much earlier than in North America; and (2) Human hunters apparently had nothing to do with the extinction. Perhaps North American immigrants were innocent of overkill, too.

Just as interesting as the megafauna problem are the side dishes served with the marsupial steaks. The Cuddie Springs people were eating porridge or cakes made from expertly milled grass seeds. This kind of food processing occurred in Australia 20,000 years earlier than elsewhere. This major advance in food processing Down Under is not widely recognized. (R1)

X2. Really stale chewing gum! In 1997, the journal Nature printed the photograph of a tooth-marked wad of chewing gum said to be 6,500 years old. This particular wad came from a Swedish bog, but similar wads have been found all over Northern Europe. Not having access to South American chicle, ancient confectioners made the gum from birch bark. Birch bark was also the source of the tar primitive humans used for gluing and waterproofing.

E. Aveling, University of Bradford, has concocted a fresh batch of birch-bark gum for a taste test. (No one volunteered to try the "old" stuff!) She reported that it is neither pleasant nor unpleasant, but neither are modern-day Moxie and Vegamite. The tooth impressions on the ancient gum wads prove that they were chewed mainly by children and teenagers---probably to annoy their parents. (R2, R3)

We add the chewing-gum item because of its curiosity. One can hardly term it anomalous.

Fossilized chewing gum about 6,500 years old. (R2, R3)

References

R1. Pain, Stephanie; "Cooking Up a Storm," New Scientist, p. 36, November 8, 1997. (X1)

R2. Battersby, Stephen; "Plus C'est le Meme Chews," Nature, 385:679, 1997. (X2)

R3. Aveling, E.M., and Heron, C.; "Chewing Tar in the Early Holocene: An Archaeological and Ethnographic Evaluation," Antiquity, 73:579, 1999. (X2)

MME3 Unexplained Ground Disturbances

Description. Aerial photographs showing unexplained soil markings possibly indicative of buried ancient structures and/or infrastructure.

Data Evaluation. The photographic evidence is unassailable, but it's interpretation is difficult short of excavation. Unfortunately, we have only one report dealing with this phenomenon. Rating: 3.

Anomaly Evaluation. Impossible to say without some digging.

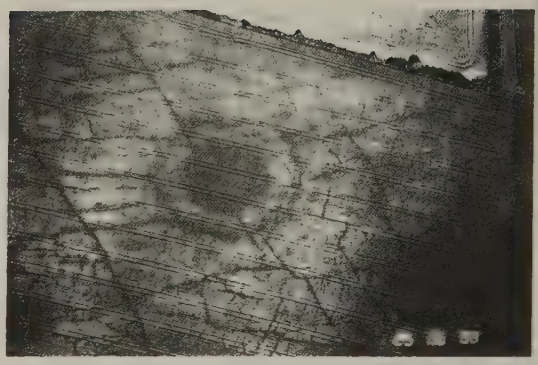
Similar and Related Phenomena. The successful location of many buried or otherwise obscured archeological sites through aerial photography, such as the Nazca lines (MGS in another volume) and ancient British wooden structures (MSH23 in Ancient Infrastructure).

Entries

X1. General observations. For over 50 years, J. Pickering of Leicestershire, Britain, has been taking aerial photographs in a search for buried archeological remains. Even though modern agricultural activities may have covered or defaced ancient roads, henges, and other ancient structures, vestiges may still show up in aerial photos when the light is favorable.

> He calls aerial indications of subsurface phenomena 'crop marks', a general term that covers crop or soil contrasts that might be of archaeological, geological, geographical (drainage?) or other origin. Over the years, he has accumulated more than 80 000 records, but whilst the interpretation of some are clear, those of others are not...Incidentally, not all crop marks are permanently visible; some are very transient indeed. One site kept under observation by Pickering for over 50 years has only produced crop marks once, and then for a few days at most. (R1)

We reproduce two photographs of unidentified crop marks submitted to Geology Today by Pickering. Of course, age and origin are unknown; the marks may be one year or 10,000 years old. They are simply unknowns.



Enigmatic ancient ground disturbances, Yorkshire, England. (R1)

Enigmatic ancient ground disturbances, Nottinghamshire, England. (R1)

Reference

R1. Anonymous; "Mysteries: What Lies Buried?" Geology Today, 14:87, 1998. (X1)

MME4 Apparent Metal Tool Marks on Coalified or Petrified Wood

Description. The appearance on coalified or petrified wood of marks that seem to have been made by metal tools such as saws and axes. The state of the wood suggests great age, while the use of metal tools implies recent human action. A temporal disconnect seems unavoidable.

Data Evaluation. Unfortunately, several of the reports in our collection are quite old and originated on what was then the frontier, where wild tales circulated freely. However, there may be some truth to the old stories, so we are inclined to receive them with caution. We can lower the barrier a bit here because the phenomena probably have easy explanations and are also entertaining. The data evaluations are the first figures in the ratings below.

Anomaly Evaluation. Three potential anomalies arise here. The anomaly evaluations are the second figures in the ratings:

- Humans with metal tools preceded European settlers by many years in Ohio, Louisiana, the Southwest (X1). Ratings: 3/1.
- Ditto in New Zealand where humans with metal tools apparently preceded the Maoris, who claim to be the first settlers (X3). Ratings;: 3/1.
- Humans were cutting wood with metal tools in Britain roughly a million years ago---long before the Bronze Age (X2). 3/1.

Possible Explanations. Hoaxes come first to mind; tricks of nature (simulacra) are next. Both are certainly possible here. In particular, nature is well known to produce many objects seem to have been made by the hand of man; e.g., the now-fallen Old-Man-of-the-Mountain in New Hampshire. Actually, explanations may not be needed here.

First, wood may, under the right conditions, coalify or fossilize very rapidly. Only months, maybe a few years can suffice. So-called petrifying springs take just a few months to turn a dead animal into stone. See ESC7 and ESC14 in Anomalies in Geology for many examples.

Second, ancient people could saw wood and even stone without metal tools. All that was required was a leather strip and quartz sand to act as a cutting agent. Such may not have actually been used in the examples provided below, but the possibility exists.

Similar and Related Phenomena. All manner of rapidly coalified and petrified objects and animals (ESC7, ESC14, both in Anomalies in Geology).

Entries

X0. Background. It was not uncommon as America expanded westward in the 1800s, to hear of remarkable discoveries being made out on the far fringes of civilization. Some of these tales were manifestly false, such as the fabled city of Quivera, but others were ultimately found to contain some truth.

The old stories that intrigue us here are a handful of accounts describing deeply buried or fossilized (and therefore very ancient) wood that seemed to bear the marks of metal tools, such as axes and saws. Had someone with metal technology preceeded the American pioneers, perhaps by a few decades if the buried wood had not decayed much or by millennia if the evidence had been total-

ly lithified? Or, alternatively, one might maintain that wood be fossilized or coalified much more quickly than thought possible? Both possibilities: early, metal-using humans and rapid litification; are possibilities in the following examples.

X1. North America

Ohio. The wonderful story that follows is almost two centuries old. Besides presenting us with the apparent pre-Columbian manufacture of iron tools in North America, we are exposed to the assumed effects of the Biblical flood. The scene is on the shores of the Ohio River near what is now Cincinnati.

> A Gentleman who was living near the town of Cincinnati, in 1826, on the upper level, had occasion to sink a well for his accommodation, who persevered in digging to the depth of 80 feet without finding water, but still persisting in the attempt, his workmen found themselves obstructed by a substance, which resisted their labor, though evidently not stone. They cleared the surface and sides from the earth bedded around it, when there appeared the stump of a tree, three feet in diameter, and two feet high, which had been cut down with an ax. The blows of the axe were yet visible.
>
> It [the stump] was nearly the colour and apparent character of coal, but had not the friable and fusible quality of that mineral; ten feet below, the water sprang up, and the well is now in constant supply, and high repute.
>
> Reflections on this discovery are these, first; that the tree was undoubtedly antediluvian. Second; that the river now called the Ohio, did not exist anterior to the deluge, in as much as the remains of the tree were found firmly rooted, in its original position, several feet below the bed of that river. Third, that America was peopled before the flood, as appears from the action of the axe, in cutting down the tree. Fourth; that the antediluvian Americans, were acquainted with the use and properties of iron, as the rust of the axe was on the top of the stump when discovered, (R1)

Louisiana. The Cincinnati phenomenon was duplicated almost exactly in 1838 in Louisiana along the banks of the Mississippi. In this case the bituminized (coalified) wood had been extracted from an eroded bank of the great river some 60 feet below the top of the bank. Both prostrate logs and in-situ stumps bore axe marks, which must have been made before coalification. Scientists who examined the specimens compared them to lignite in their degree of coalification.

Again, as at Cincinnati, we apparently have to choose between unexpectedly rapid coalification or the presence of an iron-using culture that long preceded the European settlers. Also pertinent is the absence of any record of a flood that could have buried the wood to a depth of 60 feet. (R5) But, in this vein, we recognize that the Mississippi is a powerful and idiosyncratic river. It might have accomplished many geological feats that escaped the thinly scattered pioneer historians.

Colorado. Circa 1874, near Pikes Peak, at an altitude of 7,000 feet, a petrified forest survives. In this jumble of petrified logs and debris, was discovered a "chip" of petrified wood 6 inches long and 3 inches wide.

> The most remarkable point, however, was the very form of the specimen, which led the authors to conlcude that it was a chip cut artificially from the tree prior to silicification.

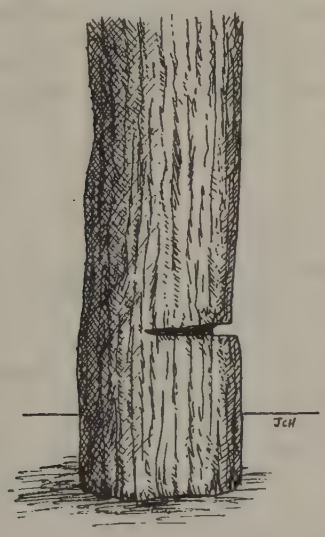
The authors of the paper present long details reasons why this "chip" not have been produced by the forces of nature alone. Rather, the curvature of the sides are remarkably like the chips made by a modern woodman. Furthermore, each end of the chip is sharp and clean, cutting directly across the grain of the wood. (R2)

We must admit that this is weak evidence. In a huge jumble of rocks one can find almost anything.

Somewhere in the American Southwest. M.C. Lorang wrote in a 1956 issue of Nature Magazine (not Nature) of a mysterious sawmark.

> We have in our fossil collection at Maryknoll Teachers College, New York, a piece of silicified wood with a strange 'saw mark.' It is the kind of

a mark one would make, were one to hold a piece of soft wood flat on a support and saw, not up and down, but slantwise, for the cut is about twice as deep on one side of the specimen as on the other. On the deep side one can trace an area not yet cut but rubbed by the saw, The edges of the cut are slightly grooved as though the wood pulled along the grain as pine does while being sawed. The inner surface of the cut is about as smooth as a carpenter's saw would leave it. On this inner surface is a most interesting stain. It appears to be an iron stain and is found nowhere else on the specimen.



Petrified wood from the North American Southwest with an apparent saw cut. (R1)

This curious specimen of petrified wood was acquired by Dr. Arthur A. Whitney when he practiced medicine in the Southwest in the early 1800s. The Indians had brought it to him among many other trinkets in gratitude for his services or, perhaps, in barter. Eventually, part of Dr. Whitney's collection ended up at Maryknoll Teachers College.

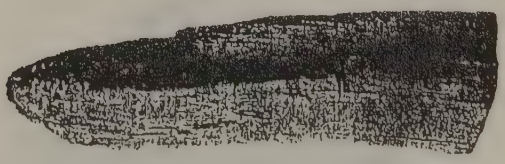
The only information we have been able to obtain regarding the fossilized wood specimen bearing the 'saw mark' is that it is a fossil. This raises interesting questions such as how long does it really take wood to fossilize? Need it take thousands of years? Could it be done in hundreds? How long ago was a metal saw used on this piece of wood? Or was it a metal saw?...Who did it? Could it be that some twenty-five thousand years ago, a man in the southwestern area of the United States used a metal saw on wood? (R4)

X2. Europe

Britain. Circa 1917, S.A. Notcutt extracted a piece of wood from the Cromer Forest Bed, at the foot of a cliff near Mundesley. The piece seemed to have been deliberately and cleanly sawn at one end. A potential anomaly arises when one learns that the stratum from which the specimen was taken is dated variously between 0.8 and 1.75 million years.

If the wood had been sawn by humans, as was proposed by some scientists who inspected the wood, it would have to have been a saw with stone teeth, for this bit of carpentry was completed long before the Bronze Age. However, flint teeth mounted in a wooden frame could not have cut such a narrow groove due to the width of the wooden frame. Seeming to be inexplicable, the whole subject seems to have been forgotten. (R6)

It was probably was just a freak of nature.



A fossilized piece of wood apparently sawn cleanly by a tool at right end. Age of rock formation: 0.8-1.75 million years! (R6)

X3. Oceania

New Zealand. In 1874, J. Goodall read a paper before the Auckland Institute in which he testified as follows:

> During last March, while works were being carried on in Coburg Street, near the junction of Wellesley Street East, the workmen came upon the tree stump now before you, lying in the centre of a narrow channel below the road level, this channel having been cut out for the purpose of laying sewer pipes. Through the intelligence of Mr. James Williamson, the contractor's overseer, who at once recognized its value, it was saved. Shortly after, I was by the spot, and my attention was drawn to it.
>
> It being important that the discovery be verified by undoubted authority, I immediately went for, and returned accompanied Theophilus Heale, Esq., Inspector of Surveys, who satisfied himself as to the genuineness of the discovery, and the undisturbed stratification of the volcanic debris of about 25 feet lying above... The stump is asserted by those who have a knowledge of New Zealand woods to be of tea-tree (manuka), the wood that has been chiefly used ~~my~~ Maoris for making paddles. It has an undoubted appearance of having been cut by some tool, and being so must have been by the hand of man.

A deeply buried stump excavated in New Zealand was apparently cut by a metal tool. (R3)

After a long discussion of how the stump might have been buried so deeply and yet still bear the marks of a metal axe, Goodall concluded his paper in this manner.

> It is therefore beyond any doubt that we have evidence of the existence of man long before the period indicated by the traditions of the Maoris of their advent to this island, and at a period before what is probably the oldest volcano in Auckland became extinct. In the Maori traditions there is no mention of any of the volcanos near Auckland having been active, (R3)

The Maoris insist that they were the very first inhabitants of New Zealand, but this deeply buried hewn tree testifies otherwise, as do many other artifacts described in other volumes of this Catalog. (See, for example, MMB8-X6.)

References

R1. Priest. Josiah; American Antiquities and Discoveries in the West, Albany, 1834, p. 125. (X1)

R2. Nicholson, H. Alleyne, and Ellis, W.H.; "On a Remarkable Fragment of Silicified Wood from the Rocky Mountains," British Association, Report, p. 88, 1874. (X1)

R3. Goodall, John; "On the Discovery of a Cut Stump of a Tree, Giving Evidence of the Existence of Man in New Zealand at or before the Volcanic Era," New Zealand Institute, Transactions and Proceedings, 7:144, 1874. Cr. T. Brown. (X3)

R4. Lorang, Mary Corde; "Mysterious 'Saw Mark'," Nature Magazine, 49:43, 1956. (X1)

R5. Sanderson, Ivan T.; Investigating the Unexplained, Englewood Cliffs, 1976, p. 125. (X1)

R6. Cremo, Michael A., and Thompson, Richard L.; Forbidden Archeology, San Diego, 1992, p. 80. (X2)

MME5 Fossilized Human-Like Footprints in Ancient Rocks

Description. The appearance in solid rock of impressions that resemble the footprints of hominids. The prints are usually those of bare feet but a few seem to be shod with sandals or moccasins. Two types of anomalies may prevail in such situations:

(1) The age of the rock involved is greater than that accorded the hominid lineage---about 5 million years.

(2) The age of the rock in a specific region is older than the date when that region was first inhabited by hominids according to the prevailing paradigms of anthropology; i.e., about 20,000 years for the New World; about 100,000 years for Australia; about 1 million years for Eurasia.

There are, of course, human footprints in solid rock that are not anomalous, such as some of those in Nicaragua (X2) and Africa (X3).

Data Evaluation. The interpretation of fossilized human-like footprints is made difficult by the softness of the mud, ash, and other possible substrates where they are first formed. The prints may thus be distorted before lithification. Even after the rock has hardened, erosion and other geological forces may reshape the prints. Footprint-like indentations may also be created naturally by spalling and other geological conditions. Such false representations are termed "simulacra." Finally, humans have carved petroglyphs on rock walls and elsewhere for millennia, and some of these petroglyphs are of human feet, hands, and other parts of the human anatomy.

The data ratings for three potentially anomalous situations are the first figures in the evaluations below.

Anomaly Evaluations. We recognize three situations in which fossilized human-like footprints may be anomalous. The anomaly ratings are the second figures in the evaluations,

- The age of the rock bearing the claimed impressions is greater than 5 million years and therefore older than the hominid lineage (X1-X4). Evaluations: 4/1.

- The age of New World rock bearing the claimed impressions is greater than 20,000 years thereby contradicting the Clovis-first paradigm (X1, X2). Evaluations: 4/1.

- The age of Australian rock bearing the claimed impressions is greater than 100,000 years (X5). Evaluations: 3/2.

Possible Explanations. Petroglyphs and, rarely, simulacra. Most false claims for human footprints are probably due to the misidentification of the distorted footprints of nonhuman animals.

Similar and Related Phenomena. Handprints in rock (MME6); claims of footprints of unrecognized hominids (Bigfoot, Yeti, etc.) in unlithified sediments (BHU in Biological Anomalies: Humans III).

Entries

X0. Background

Nature of the Phenomenon. The appearance of undeniable human footprints in solid rock dated, say, 200 million years in age, could mean one of two things:

(1) The age of the human race is much greater than scientists have supposed---far more than the accepted 5± million years.

(2) The age of the rocks bearing the impressions of human feet is really much younger than the geologists have calculated---younger by at least two orders of magnitude.

No trivial phenomenon this. Back in 1940, scientist A.G. Ingalls wrote the following in connection with some then-controverted fossil footprints found in Kentucky:

> If man, or even his ape ancestor, or even that ape ancestor's early mammalian ancestor, existed as far back as in the Carboniferous Period in any shape, then the whole science of geology is so completely wrong that all geologists will resign their jobs and take up truck driving. (R43)

The geologists and paleontologists could save their jobs if one of the three following conditions prevailed.

(1) The human-like footprint in rock could be shown to be merely a petroglyph or rock carving made in the ancient rock in recent times by a human sculptor for one purpose or another.

(2) The controversial footprint was made by a suitably ancient animal that just happened to have feet resembling ours, perhaps made more so by erosion or other geological forces.

(3) The "footprint" in question is not a footprint at all but a simulacrum, a footprint-look-alike, a caprice of nature ---perhaps just a cast of a fossil, a concretion, or the hole left by an oddly shaped stone.

In other words, some reasonable explanations are at hand when a human-like footprint (or handprint) is discovered in very ancient stone. Of course, all this does not exclude the possibility that bona fide hominid footprints do exist in solid rock less than 5 million years old. Scientists have no trouble picturing hominids trooping across muddy flats in Africa 3-4 million years ago that in the fullness of time turned into stone. That's where the race evolved and their fossilized footprints are allowable in that time frame.

On the other hand, fossilized human footprints would be anomalous if they appeared in New World rocks older than, say, 20,000 years, because a strong prevailing paradigm does not allow humans in the Americas any earlier.

Criteria for identifying bona fide human footprints in stone. Real human footprints are usually easy to separate from those of other animals. Some useful criteria are:

- Size about 10 inches long;
- Five, rarely more, digits per foot
- Lack of long claws;
- Presence of an unusually large toe accompanied by four smaller ones;
- A narrow raised arch and broad heel;
- Occurrence in trackways revealing the presence of bipedalism;
- Strides of 2-3 feet, with alternate feet separated;
- The separation of right and left footprints (the "straddle") by about 18 inches;
- Possible inclusion of children's smaller footprints;
- Lack of tail and belly marks; and
- Desirable but not essential, the association of the tracks with unquestionable human artifacts of other sorts; i.e., tools.

Even though such specific criteria exist, some sets of tracks have remained contentious for decades; usually because they are not clearly and completely formed or have been subjected to the effects of erosion and vandalism.

It should be added that accomplished ancient sculptors have chiseled scores of realistic footprints all over the planet. Ususally, though, they are accompanied by other engravings or are placed on cliff walls or in locations where humans would not tread. Many of these petroglyphs are distorted in size and configu-

ration, but a few are superb copies of human footprints. Some, in fact, are too precise to be real footprints and thereby identify themselves.

The long and sometimes miraculous history of human footprints in stone. We cannot resist mentioning at the beginning some famous legendary and mythical footprints.

•St. Thomas' footsteps were left on the shore of Bahia, Brazil, and also in Peru where they were worshipped before the arrival of the Spanish. (R32)

•A left footprint of Christ is said to mark his Ascension of Mount Olivet, while an associated right-side print was carried away by the Turks and now resides in a mosque. (R32)

•One of the Buddha's footprints is reputed to reside on the summit of Adam's Peak, Sri Lanka. (R31)

Although we cannot avoid a few of these engaging "footprint" legends in what follows, we will focus upon those many unfabled, human-like tracks that may have scientific import. Some of these fossil footprints have engendered many controversies over the past 200 years, particularly between scientists and creationists in recent years.

X1. North America. Our heavy reliance upon American science journals insures that most of our cases of purported human footprints in stone are located in North America. It is also on this continent that the most vociferous arguments concerning the reality and significance of these tracks have taken place.

As is our custom, we begin with the northeastern states.

Connecticut. The sedimentary deposits along the Connecticut River contain an abundance of curiously shaped concretions as well as fossil footprints (called "ichnolites" in the science literature). These represent the passages of birds, various quadrupeds, and other animals in some of the river's mudstones and other lithified sediments.

In 1855, in the American Journal of Science, C.H. Hitchcock wrote about his discovery of the impression of a boy's footprint in the mudstone along the river. It was accompanied by a crow's prints and raindrop impressions. This mudstone bed, originally under some 20 feet of alluvial sand, was classified as being of Triassic age (about 200 million years old) in 1855. We have seen no scientific resolution of this apparently anomalous observation. (R4)

The mudstone may have been misdated back in 1855. Native American petroglyphs seem unlikely given the raindrop impressions. Since today's anthropologists take scant interest in ancient human ichnolites, this boy's track is lost in the dusty stacks of retired library volumes.

New Hampshire. From an 1890 issue of Science:

> In a field belonging to Mr. J.G. Bemis, in the town of Whitefield, Coos County, N.H., there is a rock of granite upon which is the impression of a man's left foot. It is a naked foot, and has slipped slightly in passing over the rock when in a muddy condition. (R28)

Granite is an igneous rock and unlikely to be "muddy." If soft enough to take a foot's impression, it would have been too hot for a human to venture near. Most likely the Whitefield footprint is a petroglyph.

New Hampshire is, in fact, home to many artificially carved footprints and handprints. In particular, the Brentwood and Henniker carved footprints are well-known to New Hampshire archeologists. (R54)

New York. In New York State we seem to have an occurrence of footprint simulacra; that is, naturally-made depressions resembling human footprints in addition to those of other animals. Unfortunately, our reference is vague in many respects including the matter of exact location.

> In New York State there are rock markings which have the resemblance of footprints of men and animals. These markings are found at the side of a brook which is dry in summer but flows in winter. The supposed footprints all lie lengthwise in the current of the stream, and were pro-

bably made by pebbles which were lodged in the depressions of the Silurian rock. (R30)

As usual, scientists of the time [1845] showed little interest in such trivia.

Pennsylvania. In 1868, the Buffalo Courier printed the following scientifically incomprehensible fact:

> There are now on exhibition at the rooms of the Society of Natural Sciences in this city, two of the most remarkable discoveries recorded in the annals of science. One is the fossil imprint of the foot of a man, or rather the cast of such an imprint. It was discovered by a workman in a colliery in western Pennsylvania, in the shale overlying a run of coal and underlying two other veins which were being worked by the company. The spot where it was found was nearly a mile from the pit's mouth and some three hundred feet from the surface. The rock in which it was imbedded belongs to the Paleozoic age, and the imprint, if such it be, was made millions of years before the present geological era commenced. It is the cast of the left foot of a man of ordinary size, and is perfectly defined. The foot was evidently protected by a sandal or mocassin; the heel, the arch, and the ball of the foot, and the slight depression made by the toes are perfect, and whether produced by the foot of a man or a trick of Dame Nature, the cast is as perfectly defined as if it were the work of a sculptor. (R6)

A petroglyph seems impossible here since the footprint was found deep inside a modern coal mine. No scientific study of the find was made as far as literature survey reveals. The whole matter might be merely a hoax---not uncommon in the 1860s.

The subject footprint may have been on the roof of the coal mine. The newspaper was unclear in this matter. We will see a case "roof prints" in Europe in X3, where we will describe how such "impossible" footprints are physically possible. In this connection, bona fide dinosaur tracks have been found in the roofs of several North American coal mines. (R94)

Tennessee. On the crest of a ridge about 20 miles west of Nashville, an outcrop of sandstone bears a series of six human-like footprints, evidently those of a woman and a child. The feet are bare and are impressed about ½-inch deep in the sandstone. Other well-formed footprints are nearby. (R10) These could well be petroglyphs. The age of the sandstone is not given.

Kentucky. More enigmatic are some human-like footprints in sandstone from the Carboniferous era near Berea, Kentucky. They were discovered by W.G. Burroughs and W. Finnell in 1938. So human did these tracks appear that F. Thone, an editor of Science Service (publisher of Science News Letter), suggested that the animal that made them be named Phenanthropus mirabilis (i.e., "remarkably human-looking").

Suspect human tracks in Carboniferous rocks, Berea, Kentucky. (R38)

(R38) In actuality, as we shall see, the Berea tracks invoke some suspicions in the minds of many observers.

Due to the widespread publicity accorded them, the Berea footprints have also received considerable scientific scrutiny. They remain somewhat enigmatic in the eyes of most professionals. We quote from a short report Professor Burroughs presented to the Kentucky Academy of Science.

> Human-like footprints occur sunken into the surface of a nearly horizon-

tal bed of Pottsville, Pennsylvanian limestone about eleven miles southeast of Berea. Each track has five toes spread somewhat apart, a distinct arch, and tapers back like a human foot to the heel. The tracks are about 9.5 inches from heel to end of longest toe. The width is 4.1 inches across the ball of the foot. Three pairs and four single tracks are entirely exposed and two are partly covered with solid limestone. The tracks of one pair are nearly parallel and are 3.22 inches distant at their forward parts. Two pairs have one foot advanced, the distance from left to right heel being 18 inches. Parts of other footprints are dimly visible. The tracks extend in various directions. No imprint of [quadruped] front feet or body markings was found.

Proofs that the tracks were made in Pottsville sand are: the sand grains within the tracks are closer together than those outside due to the pressure of the creature's feet, not to foreign matter washed in. The sandstone uprolls adjacent to each track about two-tenths to four-tenths inch above the general surface of the stratum, where the sand was pushed outward and upward from beneath the foot. Two tracks are partially covered with Pottsville sandstone in situ. Photomicrographs and infra-red photographs reveal further proofs that footprint are real tracks. (R40)

Two additional observations bearing on the maker(s) of the 200-million-year-old footprints are: (1) the variations in size; and (2) the peculiar shapes of the prints. Some of the prints are only 4½ inches long compared to the average 9½ inches. The strange track shapes are the most worrisome to those who believe they are really natural human footprints:

> If the big toes were only a little bigger, and if the little toes didn't stick out nearly at a right angle to the axis of the foot, the tracks could easily pass for those of a man. (R39)

The fact is that the Berea prints just don't look human enough. Could they be petroglyphs? Possibly, but there seem to be no signs of tool marks. Then, there are the tracks that seem to be still partially covered by higher strata. Would a human sculptor carve an incomplete track ending at a rock face? We don't know because no one ever removed the overburden to determine that the tracks <u>really</u> did continue on under the overlying stratum. (R88)

Some of the Berea tracks outlined by chalk. (R43)

The best guess seems to be that the Berea footprints were made by an unknown animal in Carboniferous times and are not human. Of course, a Native American sculptor remains a strong possibility, given the curious "stylized" nature of the tracks. (See sketch.)

Putative human footprints occur elsewhere in Kentucky. A photograph of a man-like track in ancient sandstone was printed in an 1881 issue of <u>Scientific American</u>. Discovered in Union County, this track is about 10 inches long and one of a series of three. The tracks' location is 1¼ miles from the Ohio River. The toes of the track in the photo are splayed just like those in the Berea footprints. (R8, R88) In fact, all of the Union County tracks are virtually identical to those at Berea. Evidently, we have the same species of animal that made the Berea tracks---or, possibly, the same human sculptor!

The Berea situation is prelude to the much more contentious tracks that appear along the Paluxy River, Texas. There it was claimed (vociferously) that human tracks are mixed with dinosaur tracks. Some creationists still hold that belief. (See the lengthy "Paluxy" discussion below under the <u>Texas</u> heading.) At Berea, the matter was effectively put to rest by A.G. Ingalls when he invoked a powerful scientific paradigm that discouraged further objective debate.

> Confronted with this claim, the scientist exclaims, "What? You want <u>man</u> in the <u>Carboniferous</u>? Entirely and absolutely---totally and completely---impossible. We admit we don't know exactly what made the prints, but we

do know one agency that didn't, and that is man in the Carboniferous. (R43)

Thus, scientific authority was used to suppress an awkward observation.

Arkansas. On the lighter side of this subject, there exists, on a long rock 4 feet high, 5 miles west of Clarksville, a set of three obviously human footprints carved into the stone. Two of the feet are bare and of adult size. The third footprint is smaller, probably that of a woman or child. It wears a moccasin.

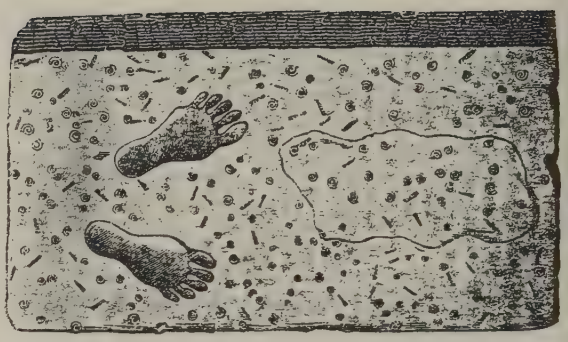
A wonderful old legend is associated with these tracks. The adult prints belong to a white man who was in love with an Indian woman against tribal law. As he was standing on the rock preparing to meet his death, his Indian lover shot him with a magic arrow, which somehow induced a mysterious earthquake. This was obviously a potent omen. The execution was halted and all ended happily. The footprints record this miraculous event in stone. (R46)

Indiana. Between 1814 and 1825, a religious sect called the Harmonists prospered on the banks of the Wabash in a town called, not surprisingly, Harmonie (later, New Harmony). Johann Georg Rapp was the leader of the group. He operated a tyrannical theocracy. Orders of the day were conveyed divinely.

> Rapp had a visit each morning from an angel who came barefooted and stood before him on a large stone giving him directions for the affairs of the day. This stone is still preserved...This stone in Rapp's time showed clearly the prints of the angel's feet, and these, a little worn, are represented on the stone as it is preserved today. (R33)

We might assume that Rapp himself carved the footprints, but who knows! Confusion deepens on this matter when we learn next about the famous St. Louis footprints in stone and their removal.

Missouri. Until 1819, early residents of St. Louis could, when the Mississippi waters were low, see a pair of footprints engraved in limestone on the western bank of the river. French explorers had noticed the prints even earlier, and



The famous St. Louis footprints were carved in a block of limestone. (R35)

the Native Americans before that. In fact, it is most probable that the local Indians had carved the footprints, for there are many similar rock carvings of feet and hands in the region.

In 1819, however, the residents of St. Louis lost their renowned footprints. A slab of limestone containing the tracks was quarried by a Frederick Rapp (or Rappe) and removed to that settlement of Harmonists at Harmonie, Indiana, on the banks of the Wabash. (R2) (We could not discover the relationship between Johann Georg Rapp, the founder of Harmonie, and Frederick Rappe, said to be "head" of the sect at Harmonie in one reference.) (R88)

It is tempting to suppose that the St. Louis footprints were the same ones the angel-of-the-day stood in to deliver instructions to the Harmonists. But we do not know anything further. There is doubtless a lot more to this story to be found in the records of the local historical societies in Missouri and Indiana.

Incidentally, the St. Louis tracks are, to the best of our knowledge, the first to attract formal scientific attention in America. A report on the tracks appeared in an 1822 issue of the just-born American Journal of Science. H.R. Schoolcraft wrote as follows about these St. Louis footprints:

> The prints are those of a man standing erect, with his heels drawn in, and his toes turned outward, which is the most natural position. The distance between the heels, by accurate measurement is 6¼ inches, and between the toes, 13½ inches; but it will be perceived, that these are not the

feet accustomed to a close shoe, the toes being very much spread, and the foot flattened in a manner that happens to those who have been habituated to go a great length of time without shoes. Notwithstanding this circumstance, the prints are strikingly natural, exhibiting every muscular impression, and the swell of the heel and toes, with a precision and faithfulness to nature, which I have not been able to copy, with perfect exactness, in the present drawing. (R1)

The St. Louis footprints are almost certainly petroglyphs, but they are far better executed than most, and certainly far more "human" in appearance than the curious and awkward Berea tracks.

Dakota Territory. Selecting another set of human-like tracks from among many candidates, we journey to the mouth of the Little Cheyenne River, in Dakota Territory. There, curious indentations on a large block of limestone were reported in 1882 by H.P. Hubble.

On the surface, near the southeast corner of it, is a perfect foot-print as though made by the left, moccasined foot of a woman, or boy, of, say, fourteen years. The toes are toward the north. The indentation is about half an inch deep. About four and a half feet in front of it and in line with it, near the middle of the rock, is a deeper indentation made with the right foot, the heel being deeper than the rest of the foot. And again, about five and a half feet in front of this, and in line with both the others, is a third foot-print, this time with the left foot.

The three foot-prints are of the same size, and are such as would apparently be made by a person running rapidly...The rock is hard, and not of uniform texture, having vein-like markings about a quarter of an inch wide running through it, which, weathering harder than the body of the rock, present slightly raised surfaces. This difference in the weathering of the rock is the same in the bottom of the foot-prints as on the surface of the rock. (R9)

The author implies in his underlined sentence that the footprints must have been made when the rock was in a soft state because rock and footprints received equal weathering.

We do not know the age of this limestone but presume it is in the millions of years. Human carving of the footprints is possible, but, if so, their purpose is obscure in this venue.

Wyoming. There are few details in the following quotation from a popular magazine, however, it connects with the Utah footprint (described next) because it also involves a footprint pressing on a fossil.

One of the most unusually-recorded foot steps upon time's shifting sands was discovered in 1935 by William G. Paden, noteworthy educator and historian of Alameda, California, during a tour of exploration through Wyoming.

Here, archeology has unearthed a wealth of preserved organic remains at Spanish Diggings, also at the seven-million-year-old Fossil Fish Cliffs, and in many other places throughout the state.

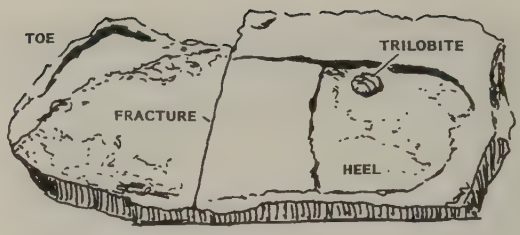
The find in question was made at Grindstone Butte, adjacent to the city of Douglas. At this point the high terrain was cut by a shallow boulder-strewn canyon, and 'mid the rubble of its broken floor, lay a uniquely-marked flake of reddish rock, bearing the imprint of a human foot overlapping the impression of a clam shell. (R41)

Six-toed, giant footprints (20 inches long) engraved in rock near Douglas, Wyoming. (R41)

The claim inherent here is that a human stepped on the clam shell laying on the soft lakeshore some millions of years ago, and both were fossilized together.

Most of the required scientific details are missing in this brief account. Apparently, no one followed up the lead, which, in principle, could challenge today's most revered paradigms concerning the antiquity of man and his occupancy of the New World.

The next entry, however, is similar in purport and is accompanied by some useful scientific details.



Utah's "Meister footprint" containing a trilobite! Length: 27 centimeters. It was found in Cambrian rock. Note the absence of mud pushups. (R86)

Utah. On June 1, 1968, at Antelope Springs, 43 miles northwest of Delta, Utah, J. Meister, Sr., was fossil-hunting among some Cambrian strata. Trilobite fossils are commmon at Antelope Springs, but Meister came across one that seemed to have been stepped upon by a shod human. Other apparent footprints of the same description were also in the vicinity. Meister exhumed two of the footprints and took photographs. It seemed that he had found undeniable proof that humans and trilobites coexisted in the Cambrian some hundreds of millions of years ago.

News of this remarkable discovery was quickly published in The Deseret News. A few days after Meister's find at Antelope Springs, the supposed footprints were submitted to M.A. Cook, a Professor of Metallurgy at the University of Utah---and, it must be noted, an admitted creationist.

Creationists are partial to observations that cast doubt upon mainstream geological dating; and a fossilized human footprint impressed upon an equally fossilized trilobite seemed to be strong evidence against conventional geological dating.

Prefaced by a short introduction by M.A. Cook, Meister described his find in the December 1968 issue of the Creation Research Society Quarterly. (R49)

The significance of the trodden trilobite was spelled out in Cook's introduction:

> While I am by no means an authority on fossils and footprints, the Meister specimen seems to me clearly to speak for itself. Even aside from any doubt as to the identity of the formation in which the discovery was made, it is a serious contradiction of conventional geology. That is, the feature of this specimen is the intimate simultaneous occurrence of modern (sandal-shod) men with trilobites. Furthermore, an intellectually honest individual examining the specimen cannot reasonably deny its genuine appearance. (R52)

Two paragraphs from Meister's following article are worth inserting here.

He was cracking apart the layers of stratified rocks:

> I broke off a large, approximately two-inch thick slab of rock. Upon hitting it on the edge with my hammer, it fell open like a book. To my great astonishment I saw on one side the footprint of a human with trilobites right in the footprint itself. The other half of the rock slab showed an almost perfect mold of the footprint and fossils. Amazingly the human was wearing a sandal.
>
> The footprint measured 10¼ inches in length, 3½ inches in width at the sole, and 3 inches in width at the heel. The heel print was indented in the rock about an eighth of an inch more than the sole. The footprint was clearly that of the right foot because the sandal was well worn on the right side of the heel in characteristic fashion. (R49)

Meister also showed his fossils to Professor W.L. Stokes of the Department of Geology and Geophysics at the University of Utah, Salt Lake City. Stokes was quick to point out that the "footprint" was probably not a footprint at all because there was no rim of material squeezed up around the edges of the

print, as is typically the case with genuine fossil footprints. He suggested that the specimen might be only a spall or a natural break in the rock that just happened to resemble a footprint; i.e., it was a simulacrum. (R95, R96)

A. Strahler, a noted critic of pseudoscience, echoed Stokes' analysis, noting that:

> The [spalling] phenomenon is familiar to all geologists. Joint blocks and slabs of hard shale freshly fallen from a cliff commonly show rectangular faces and sharp edges. (R86)

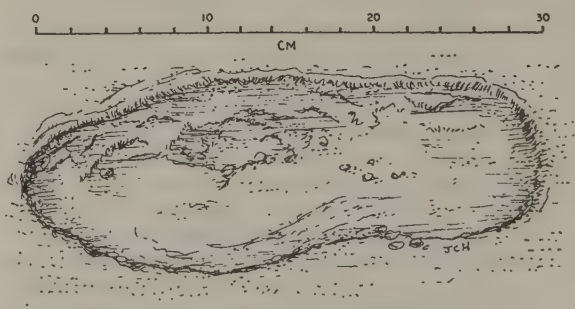
A shod human footprint is very simple geometrically. Add the vicissitudes of natural erosion, and you have the possibility of creating many shapes that superficially seem crafted by human hands or, in the present instance, human feet. Nature is full of such simulacra. Some stone artifacts resembling human-made tools are simply "geofacts" or simulacra, as discussed at length in Chapter MMS.

Arizona. Some human-like fossilized tracks near Tuba City came to light accidentally in the late 1960s when E. Cummings was forced to land his light plane on a small dirt road in northern Arizona. Next to the road, he noticed some dinosaur tracks plus what seemed to be the fossilized footprint of a barefoot human child. Cummings recognized that the track-bearing sandstone was part of the Kayenta Formation and, therefore, probably a couple hundred million years old. Once again, humans seemed to have been consorting with dinosaurs hundreds of millions of years before the beginning of the human line!

It wasn't until 1984 that a group of four acknowledged creationists, three of whom had scientific backgrounds, began studying the Tuba City site. The results of their research are reproduced in great detail, along with many photographs, in the Creation Research Society Quarterly. (R89)

In view of the previous difficulties in establishing the human origin of fossilized footprints to the satisfaction of mainstream science, the four drew up a list of seven criteria that would hopefully separate true human prints from those of other animals and also quirks of nature (the simulacra). These criteria are reasonable and logical; they should have been adopted earlier by the creationists in their attempts to revise geological dating through the medium of fossilized footprints.

1. The fossil print is within the size range of the foot of modern man.
2. The print is shaped like a modern footprint.
3. The print is one of many of similar size and shape.
4. The print is part of a trail or series of tracks which suggest the natural human gait or stride.
5. The print manifests some internal detail suggestive of human toes or shoe marks.
6. The print is bordered by lithified mud or sand which was squeezed out from under the foot as the track was formed.
7. Fossil human bones and/or artifacts exist within the same time period represented by the geological formation. (R89)



A Tuba City, Arizona, human-like footprint. The ridges around the edges suggest they were made in soft mud and not human-made carvings. (R89)

In the field study of the Tuba City prints, the seven criteria were carefully applied and recorded in great detail by the four researchers. Logical as the criteria are, different opinions were manifest when the results were studied. One person, a minister, was absolutely certain that the tracks were human. Two other participants rather grudingly admitted the possibility that some of the

footprints were human. A fourth person had serious doubts but still felt that the Tuba City site geology was not consistent with mainstream declarations about the age of the formations involved. (R89)

If the creationist researchers, who were philosophically wed to the "young earth" paradigm, had reservations about the Tuba City footprints, what did the skeptics think?

G. Kuban, a long-time student of fossil footprints and a strong critic of all multimillion-year-old fossil human footprints, was negatively inclined in the matter of the Tuba City prints. He published a list of six serious complaints about the creationists' work at Tuba City in a tabloid-format publication called Origins Research. Two of these reservations are worth quoting here:

> In contrast to report statements, even the "best" individual markings in the Kayenta reports show at best a superficial resemblance to human prints. Many bottom contours appear incompatible with genuine human tracks. Supposed "toes" are either unclear and/or did not occur in normal or consistent human shapes and positions.
>
> None of the photos or maps show a natural striding sequence of even a few paces. The "best" alleged series appear inconsistent in step length and direction, and the individual markings are not consistent or distinctly human in shape or detail. Supposed tracks and trails do not stand out readily from many other equivocal markings distributed in a helter-skelter fashion around them. (R92)

Clearly, Kuban was far from convinced that humans and dinosaurs coexisted at the Tuba City site 200 million years ago.

Surprising and suspicious to Kuban (and any scientist) was the refusal of the creationist investigators to allow independent (noncreationist) professionals to examine the site and their work. Even K. Wise, a Harvard paleontologist and student of S.J. Gould (but still---amazingly---a believer in a young earth), was rebuffed when he offered to assist with the research at Tuba City. (R92)

In a pair of later papers (R99, R100), J. Auldaney et al present many new photographs of the Tuba City tracks plus photomicrographic data---the results of six years of additional research. Their belief that these tracks are indeed human has been strengthened.

> Photomicrographic analysis indicates that the human-like impressions were created by pressure which created relatively smooth surfaces, unlike the rougher surfaces of impressions formed inside concretions and unlike surrounding surfaces. Comparison with the quasihuman ichnofossils with modern tracks in wet mud shows them to be closely comparable, supporting our theory that the fossil imprints were made by human feet. (R100)

In fact, one of the four researchers (J. Auldaney) who was originally doubtful about a human origin for the Tuba City tracks now firmly supports that conclusion. (R100)

In their second paper (R100), J. Auldaney et al answer the six criticisms of their work raised by G. Kuban. To the two criticisms of Kuban quoted above, the authors reply: (1) In their opinions, the tracks---especially those from Site 2, unseen by Kuban---possess a convincing number of human features; and (2) The tracks were made in wet sand and some irregularities are to be expected. (R100)

As for the complaint that non-creationists have not seen the Tuba City site, Auldaney et al reply that actually several independent researchers have visited the site, but it is deemed "premature to call in outsiders before we publish more information." (R100)

Texas. Fossilized dinosaur tracks are rather common in the American Southwest. Texas has its share, and among them---once again---there are tracks of other species, some of which appear to have been left behind by human feet. Texas has at least two sites where dinosaur and human-like fossilized tracks coexist. One site is at Dinosaur Flats near Canyon Lake in south-central Texas. But by far the most renowned assemblage of dinosaur tracks and "mantracks" is found on the shelf-like limestone layers along the Paluxy River, near Glen Rose, some 40 miles southwest of Fort Worth.

The first "mantracks," as they are called locally, were exposed in 1908 after a powerful flood. There were many excellent dinosaur tracks, too. Both kinds of tracks were excavated and sold

to tourists during the Depression. In fact, the real fossil tracks were popular enough to encourge local sculptors to manufacture fakes of both types.

The Paluxy "mantracks" didn't catch the attention of scientists until 1938, when fossil-collector R.T. Bird saw two huge human-like footprints in a curio shop in Gallup, New Mexico. Bird saw immediately that they were phonies. Asking about their source, he ended up at another shop in Lupton, Arizona, where the tracks (dinosaur tracks, this time) were also fakes. But these dinosaur tracks were so realistic that bird inquired about their source. He learned that both the fake mantracks he saw at Gallup and Lupton dinosaur tracks came from Glen Rose, Texas.

Bird finally ended up wading in the Paluxy River, where he found not only genuine dinosaur tracks but more of those strange mantracks. The mantracks Bird saw in the Paluxy limestone were real and to his expert eye not human artifacts. Bird wrote about his Texas discoveries in an 1939 issue of Natural History. (R42)

Six years later, Bird's article caught the attention of C. Burdick, a creationist. Burdick decided to investigate the mantracks and, like Bird before him, ended up wading the waters of the Paluxy River. There, he, too, saw what seemed to be human tracks coexisting with dinosaur tracks in limestone from the Lower Cretaceous Period---about 120 million years old according the conventional geological dating. To creationist Burdick, though, here was proof that the earth was really young because God is said to have created humans and dinosaurs within a few hours of each other, contrary to the evolution paradigm.

Many of the Paluxy mantracks were huge---upwards of 20 inches long. But Burdick knew from the Bible that there were giants in those days, and that modern man had long since degenerated from the Golden Age. He wrote:

> Not only has man decreased in stature from a magnificent specimen ten or twelve feet tall, to an average today of less than six feet, but his average life has shortened from many centuries to a little more than half a century. Where do we find any evolution here? (R80)

Not only was the geologists' time scale apparently negated by the contemporaneous human and dinosaur tracks but evolution itself was questioned.

From here on, the battle was joined, although mainstream scientists, as usual, were slow to respond to the creationist articles, books, and even a documentary film Footprints in Stone, created by S.E. Taylor from Films for Christ. J.D. Morris from the Institute for Creation Research produced an entire book on the Paluxy prints: Tracking Those Incredible Dinosaurs and the People Who Knew Them. The last part of the title was a red flag to Darwinists.

Obviously, mainstream science had to respond to such overt challenges. It did so vigorously through professional investigations along the Paluxy with results published in various journals, books, and films. It was a major clash of belief systems; a subject we can only touch on briefly here.

First, it must be registered that the geological and paleontological evidence accumulated at the Paluxy site indicate that this area, when not under water, was a busy place during the Lower Cretaceous. Dinosaurs were the dominant quadrupeds, but the limestone shelves also hold traces of other reptiles, invertebrates, etc. Even the so-called "mantracks" are not scarce, with over 100 trails of them being recorded by the creationists. J.D. Morris stated that many of the bare mantracks would fit nicely in modern shoes, sizes 7-13. Some childrens' footprints showed up, too. Some footprints even seemed to be shod with sandals or moccasins.

But many other mantracks were huge. On one trail, the footprints are 16 inches long with all of 7 feet between steps! One footprint was 21½ inches long---truly a giant "something." (R59)

The creationists have devoted much attention to the Paluxy site---no wonder since they believe that much mainstream geology and biology is at risk in the fossil tracks found along this Texas river. The Appendix of J. D. Morris' book (R64) provides a large collection of dimensions, maps, photographs, and textual descriptions. Unquestionably, the Paluxy site is paleontologically rich, but did humans really wend their ways along those dinosaur trackways?

In view of the creationists' revolutionary claims, Glen Rose became a popular destination for not only creationists but also professional and amateur scien-

tists---not to mention the inevitable tourists.

The creationists who visited Paluxy were conditioned to see humanity in the "mantracks," but most noncreationists ---mainstream scientists especially---had trouble accepting the "human" interpretation. Somehow, the mantracks did not really impress everyone as being bona fide human footprints. In the journal Creation/Evolution, a challenger of creationist claims at Paluxy, C.G. Weber, remarked on this problem:

> However, John D. Morris's "genuine" prints are not very impressive. Two series of elongated tracks are often considered to be human, but Neufeld points out that some of the tracks in these series are the eroded remnants of three-toed dinosaur prints; since the dinosaur placed most of its weight on its middle toe, the side toes of the tracks are a little shallower and erode away more easily, yet some of the tracks in these series retain traces of the side toes. The rest are simply erosional marks in eroding undulating rock, most of which do not appear in any photos, to have anything around them that resembles splash marks. John D. Morris inadvertently admits that the tracks are not impressive. (R68)

Not only is difficult for skeptics to see a human foot in single prints, but the trails themselves also seem to belie a human origin. L.R. Godfrey, again in Creation/Evolution, voices this concern after carefully reviewing the film Footprints in Stone:

> Even without good resolution, it is possible to tell that the "man prints" in the film are not genuine human footprints. Most noticeable is the fact that the stride-length/foot-length relationships are wrong for humans, especially for the "children's tracks." When the film makers pointed out "man tracks," they consistently took two or three, sometimes even four, steps between supposed right-left impressions. Conspicuously lacking was any discussion of stride, other than the assertion that the giant humans of the biblical past must have had long ones. But large distances separated supposed "normal human" footprints as well as "giant" (sixteen- to eighteen-inch) impressions. Perhaps their makers did not walk in a manner characteristic of modern humans. (R97)

Compounding the problems with the nonhuman appearances of the individual prints and the trails of them is the geological question of how the mantracks could have been imprinted on the various successive layers of limestone (all laid down at different times) in the context of Creationist flood geology. C.G. Weber looked into this side issue.

> Regardless of proof to the contrary, creationists still accept the "man-prints" as evidence. However, once they do accept them, they still have to find a way to fit them into their flood geology model. This isn't as easy as it seems. The flood geologist actually has more trouble explaining how these "footprints" formed than does the orthodox geologist. Are we to imagine that a tidal wave from Noah's flood dumped over two thousand meters of sediment in the Paluxy Riven valley, that people and dinosaurs ran around making tracks and that another tidal wave miraculously covered the tracks without obliterating them in the process? John D. Morris vaguely admits the difficulty.
>
> "The main problem of geologic origin for biblical catastrophists stems from the fact that underlying the Paluxy River basin is nearly eighty-five hundred feet of sedimentary rock. According to the catastrophic model, this must have all been laid down by the flood of Noah's day. The problem is how could man and dinosaurs witness such massive deposition at the beginning stages of the flood and survive long enough to leave their prints so high up in the geologic column?" (R68)

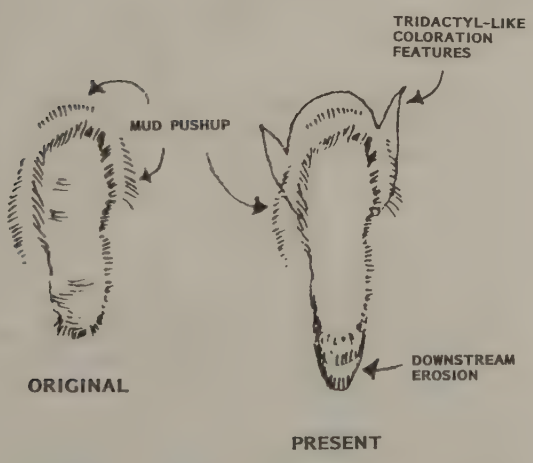
The literature records many additional challenges to the origin of the Paluxy "mantracks." (R72, R73, R75, R80) In general, the scientific consensus in the 1980s was that some reptile alive during the Lower Cretaceous must have created the tracks and that erosion and time had modified them to give them a quasihuman appearance. As a matter of fact, many creationists had their reservations about the Paluxy tracks, too.

(R77)

The case for the Paluxy "mantracks" collapsed in the mid-1980s when the tracks themselves---helped by erosion---revealed their true nature. As early as 1980, G.J. Kuban, when reexamining some of "genuine" mantracks, noticed faint outer toe impressions that had hithertofore gone unnoticed or had just been ignored. These were obviously not human toes, but the triple, bird-like toes of dinosaurs. In 1984, these hints of dinosaurian toes became more prominent, and in a colorful way.

Writing in the New York Times, J.N. Wilford related what seems to have been be the last important act in the Paluxy saga.

> Two summers ago, pursuing the investigation, Mr. Kuban said he found evidence that "practically jumped out at you." Ronnie J. Hastings, a high school science teacher from Waxahachie, Tex., made a similar discovery at about the same time. Almost every one of the alleged human tracks, they found, was accompanied by distinct colorations in the rock that, upon detailed analysis, revealed the pattern of dinosaurian digits. (R85)



Early and later appearances of a "mantrack" on the Taylor Trail, Paluxy River, Texas. After some erosion, the human-like features were replaced by dinosaur-like characteristics. (R77)

The claw colorations ranged from rust to blue-gray, and they stood out well against the ivory-to-tan of the limestone matrix. Evidently, the toe impressions in the unlithified limestone had filled in with colored sediments that didn't become obvious until the Paluxy's water had removed the concealing covering of limestone. Kuban (a Christian, by the way) was forced to state: "I have concluded that no genuine human tracks have been found in the Paluxy riverbed." (R85)

J. Morris and other creationists who had staunchly defended the Paluxy "mantracks" for so long, now admitted that the tracks were probably not human and could no longer be used as evidence against evolution or the geological time scale. (R82, R85)

Morris's book was withdrawn from sale and the once-influential film Footsteps in Stone is no longer used by creationists. Despite all the negative evidence, the Paluxy "mantracks" will probably never be completely erased from the minds of some creationists.

Nevada. A full century before the great Paluxy mantrack controversy flared in the 1980s, another large display of fossilized human-like footprints made news in both America and Europe. (R12-R16) In this instance, scientific judgment was rendered quickly and with such finality that the general public knew little of this discovery.

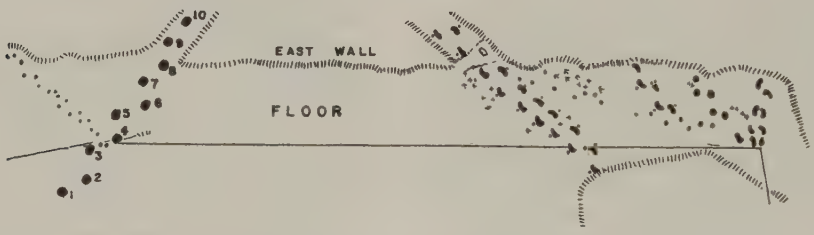
During August 1882, both H.W. Harkness and J. Le Conte delivered papers before the California Academy of Sciences regarding a remarkable assemblage of fossilized tracks that had been uncovered in Pleistocene shale during quarrying operations in the State Prison Yard, Carson City, Nevada. We quote the description by J. Le Conte that appeared in Nature of May 31, 1883.

> The whole surface of the shale exposed in the prison yard is literally covered with tracks of many kinds, but the mud was so soft when the tracks were made that the nature of many of them can only be guessed... The nature of the so-called human tracks, however, is far more doubtful. These occur in several regular alternating series of 15-20 [footprints]. In size they are 18-20 inches long, and 8 inches wide. In shape there are many of them far more curved than

the human track, especially in soft mud. The stride is 2½ to 3 feet, and even more. The outward turn of the track is in many cases greater than in human tracks, especially in soft mud. But the most remarkable thing about them on the human theory is the straddle, i.e., the distance between the right and left series. This I found to be 18 and even 19 inches, which was fully as great as that of the mammoth tracks. This is probably the greatest objection to the human theory. On the other hand, the great objection to the quadrupedal theory is the apparent singleness of the tracks and the absence of claw-marks.

Le Conte's assessment won out in the court of scientific opinion for at least five reasons:

(1) The so-called human tracks were too large.
(2) The prints are too curved.
(3) In human prints the foward part of the print is deeper, but the opposite is the case in the Carson tracks.
(4) The straddle (distance separating right and left prints) is far too great for a human.
(5) There are (not surprisingly) no human artifacts in the area from that geological Period. (R34)



Footprints in Pleistocene shale at a quarry near Carson city, Nevada. When first found, some thought they had been made by humans. (R15)

But it must be remembered that the tracks are deep, and the outlines somewhat obscure, and also that the mammoth tracks, on account of tracking the hind with the fore-foot, are in most cases, though not always, single.

After careful examination for several days, the conclusion I came to was that the tracks were probably made by a large plantigrade quadruped, most likely a gigantic ground-sloth. (R12)

In contrast to Le Conte's conclusion, we have that of H.W. Harkness, who examined the same tracks at about the same time.

Dr. Harkness' conclusion is that the tracks are those of progenitors of the present human race, and he has given them the title of "Nevada Man" --- Homo Nevadensis. (R14)

The giant-sloth interpretation has since been questioned by creationists, but seems unassailable.

X2. Mesoamerica

Nicaragua. When quarrymen near Managua were removing stone for building purposes in the 1870s, they exposed several sets of fossilized footprints---many of which appeared human. In 1878, these prints came to the attention of E. Flint, who was in Central America collecting antiquities for Harvard's Peabody Museum. Flint visited the Managua quarry and reported his findings in an 1884 issue of the American Antiquarian. His report was lengthy, so we suffice by quoting only his first and second paragraphs, which establish the basic dimensions of the situation.

In a recent trip to Managua for the Peabody Museum, to examine the human footprints found there in one of the quarries, now being worked for building purposes, I uncovered six rows of impressions, breaking through a layer of rock seven inches thick, over a space of six yards by two. Under this was a a layer of black sand with an average thickness of one inch, resting on a layer of friable rock from one and one-half to two inches thick, covering the surface of the lowest layer of rock found in the quarry. Below this thin layer was a thin deposit of volcanic sand and gravel, filling up the inequalities caused by the [foot] impressions, with an average of one inch in thickness, as seen in the side cuttings.

.....

The footprints are from one half to three inches in depth, consequently not made, as some had judged, by a people fleeing from an inundation. (R18)

Some genuine human footprints in stone found in a quarry near Managua, Nicaragua in the 1870s. They stimulated a long debate in the scientific literature. (R55)

The fossil tracks reported by Flint and others following him have never been challenged as being nonhuman in origin. They look human; their sizes are correct; their trails are typical of human strides and straddle; and soil push-ups exist around the edges of most. Furthermore, abundant human artifacts are found associated with them. This discovery would be only of historical interest except that Flint determined that the Managua footprints resided 14 feet 10 inches below the present ground surface and must, therefore, be of great antiquity. (R18) In fact. Flint argued in several subsequent papers that the Managua prints were 50,000 years old, perhaps 200,000 years old. Long discussions about the Nicaragua prints ensued in the late 1800s, because it was science gospel that humans had occupied the New World for only 12,000 years or less.

An objective account of the Nicaragua situation appeared in an 1888 issue of the British journal Knowledge. Here, we find better descriptions of the tracks and also of the rather tumultuous recent history of Central American geology.

> As far back as 1884 it was announced by Dr. Earl Flint that human footprints had been found upon the volcanic rocks of Nicaragua in Central America, and Dr. D.G. Brinton has recently given an interesting account of these remarkable discoveries. [In: American Philosophical Society, Proceedings, vol. xxiv]
>
> .....
>
> The largest of the footprints measured 10 inches...The foot corresponding to this impression was probably about 8 inches in length, and appears to have been well shaped with a great toe slightly longer than the second toe. It need hardly be mentioned that the latter is a somewhat important race character, a long great toe (being further removed from the ape type) showing a higher stage of development. All the footsteps at Managua are those of bare feet, but others were found by Dr. Flint on the southern slope of the Sierra de Managua, one of which was that of a foot protected by some kind of sandal or moccasin...
>
> Of course the importance of these

discoveries entirely depends on the antiquity which can be ascribed to them. That the traces are human is beyond question, but how old are they? Unfortunately the shells found in the underlying bed of yellow sand were of only one species, and do not appear to the geologists who have examined them to afford direct evidence of the age of the deposit, which Professor Heilprin inclines to consider Post-pliocene rather than Eocene.

At first sight no doubt, the great number of the deposits overlying the footmarks seems evidence of enormous antiquity, and it certainly is an important consideration. But it must be considered that those layers are mostly of volcanic origin, and need not, therefore, demand any great length of time for their deposition. Still, while each bed may have been rapidly deposited, the different beds are well marked, and mostly separated by seams of sand, which almost certainly indicate that they were caused by successive eruptions, which might have been separated by considerable periods of time. (R23)

Given the geologically active environment of Nicaragua, it is quite possible that the subject footprints, though deeply buried, might be of recent provenance. The advent of radiocarbon dating confirmed this possibility. In 1969, the soil below a mudflow bearing supposedly ancient fossilized footprints was carbon-dated at 5945 years. (R55) Of course, other prints may be older, but this radiocarbon date settled the antiquity issue for most scientists.

Apparently, the many exchanges on these Nicaragua prints in the science literature of the late 1800s were forgotten because, in 1941, in the Scientific American, the Nicaragua footprints seem to have been rediscovered.

An archeological discovery which promises to be of the utmost importance ---footprints in rock of persons fleeing from a volcanic eruption 2000 to 5000 years ago---has been made by an archaeologist of the Carnegie Institution of Washington on the outskirts of the city of Managua in Nicaragua.

Aside from the dramatic story told by these footprints, they constitute the earliest known evidence of human beings in Central America, where the most advanced of the New World cultures were to arise many centuries later.

The prints were made in a layer of volcanic mud while it was still soft, probably within a few hours after it covered the area. There is some evidence that cinders from a nearby volcano were raining on the heads of the people as they fled. (R44)

El Salvador. Bordering Nicaragua, El Salvador is likewise subject to catastrophic mudflows and volcanic activity. In 1955, "footprints in stone" were uncovered during road construction 10 kilometers southwest of Usulutan. These prints were believed to have been laid down about 200 A.D. and are of no interest to anomalists. (R51)

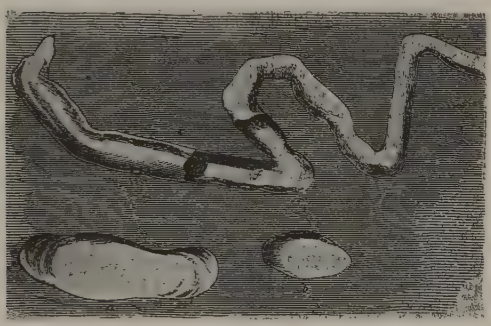
X3. Europe. Fossil human footprints never raised much interest in Europe---perhaps because few creationists live there. Whatever the reason, we have uncovered only a few examples in our literature ramblings that are worthy of entry here.

England. In the mid-1800s, a series of "strange impresssions" were noticed in the Millstone Grit in a Cheshire quarry. A few of these strongly resembled human footprints. Since these impressions were located about 1,000 feet deep in the quarry, they had to be sufficiently ancient to attract the anomalist. In fact, common opinion at the time was that the prints had been made by members of Noah's family!

An investigation of the Millstone Grit footprints by E.W. Binney revealed that the impressions along the trail varied from simple ovals to a few that appeared to have been impressed by a human foot with a shoe on! Unfortunately for the Noah theory, some of the impressions bore marks like those made by claws or nails. Binney was convinced that the trail had been made by a slow-walking animal, perhaps an immense tortoise. He was so certain that he named it Chelichnus ingens. (R5) We have seen nothing more on these fossil tracks.

South Wales. The date was 1867; the place, deep in a South Wales coal mine. An anonymous author provided the accompanying sketch and description.

> The sketch inclosed is an exact tracing of one [footprint] taken on the spot at the time, and represents what are apparently, I might say evidently, footprints impressed in a stratum of hard shale, almost immediately overlying a seam of coal, and forming the roof of a "heading" in the colliery, and also what appears to be a fossil snake or eel of large dimensions half-embedded in the same strata within a short distance of the footprints. The



Human-like impression in hard shale overlying a Welsh coal seam. Nearby is a possible fossil snake or eel. (R7)

> surface on which these impressions appear is perfectly smooth, nearly black, and almost as polished as glass, and in other respects quite free from distinct indentations of any kind, and as level as a good many ceilings; the general appearance of the footprints is just what one would naturally expect to find; that is, in some places so close together as to be quite confused, and in others wide apart; there are also large and small ones...the latter being generally of an oval form; there are none, however, so small as to preclude the probability of their being footprints, and, of course, they must all have been produced by some kind of sandal worn under the foot, the largest bearing some resemblance in outline to a modern boot sole. (R7)

Indeed, some of the Millstone Grit footprints appear to have been made by modern boots; and, indeed, they must be far too old to have been made by humans. So, we are left with the usual mainstream explanation that the anomalous footprints are those of some non-human animal of the period equipped with human-like feet.

But a second puzzle attends this entry. This is the fact that the prints are indented in the roof of the coal mine. Geologists do not write about it often, but dinosaur footprints are found rather frequently on the roofs of American coal mines---but they are projections not indentations. (R98) Actually, they are easily explained. A dinosaur walking on a thin layer of soft mud or sand resting on a peat deposit would leave deep prints extending down into the peat and might eventually be fossilized as such. When the peat-converted-to-coal is mined millions of years thereafter, the coal-mine roofs could be decorated with projections of dinosaur footprints, but not indentations.

Belgium. Back in 1921, Scientific American Monthly (not Scientific American) printed a curious article claiming evidence for the existence of an early form of humans in the Tertiary Period; that is, well over a million years ago, perhaps tens of millions of years. This evidence was in the form of fossilized footprints in a stratum near the North Sea in Flanders (now part of Belgium). Today, the nearest town is Sint-Niklaas. The argument is rather interesting.

> Unsightly enough are the footprints left behind him for our inspection by the Tertiary man at Hol-by-St. Gilles in Flanders. These consist of impressions of the ball of the foot in which are plainly seen the marks of the papillary ridges and furrows---so clearly marked are these indeed after the lapse of a million years that they might attract not only the investigating eye of the studious anthropologist but that of a modern detective! Even the small toe has left its imprint ---only half that of the fourth toe, however, is visible in the impression. This footprint now hardened into stone, was once impressed in a lump of the tenacious Tertiary clay which formed the aforesaid shore or island.

.....

> What was the creature who left these footmarks doing there? Was he really a man or merely one of a race of anthropoid apes, traces of which have already been found in the older Tertiary strata and which we recognize by their bony remains and their teeth? To begin with, while we may concede that these creatures were quadrupeds they were by no means ape-like since their toe prints are all short.
>
> .....
>
> The ball of the foot of this prehistoric Tertiary man, assuming that it belongs to the same species as the aforesaid toes of human appearance, has the furrows of the tactile papillae so far apart as to make it evident that the impression was made by an adult foot. The curvature of the impression of the ball of the foot, however, indicates plainly that its maker must have been less that one meter tall. (R37)

About all one can make out of the above excerpts is that one million years ago Flanders might have been home to some unrecognized pigmy anthropoid that had hominid-like toes. This conclusion does not jibe with current theories concerning the evolution and geographical dispersion of hominids.

One's suspicions about this report are raised further by a footnote stating that a fossil of a small marsupial had recently been found in the clay at Antwerp.

Turkmenistan. While western Europe seems relatively free of claims of fossil human footprints mixing with those of dinosaurs, farther east, in Turkmenistan, a former Soviet republic, we seem to have another Paluxy River situation. The following information was reported in the Moscow News, which sometimes runs sensational items. (R71) The story was retold in Creation/Evolution more or less as a cautionary tale! (R83) We now quote the report's key paragraph.

> This spring, an expedition from the Institute of Geology of the Turkmen SSR Academy of Sciences found over 1,500 tracks left by dinosaurs in the mountains in the south-east of the Republic. Impressions resembling in shape a human footprint were discovered next to the tracks of the prehistoric animals.

Professor Kurban Amanniyazov, leader of the expedition elaborated.

> We've discovered imprints resembling human footprints, but to date have failed to determine, with any scientific veracity, whom they belong to, after all. Of course, if we could prove that they do belong to a humanoid, then it would create a revolution in the science of man. Humanity would 'grow older' thirty-fold and its history would be at least 150 million years long. (R71)

We have seen nothing further on this set of prints.

Turkey.

> This footprint may be 250,000 years old: one of the oldest recorded prints of man. Pressed into volcanic ash, it was uncovered with some others in 1920 during the construction of a dam near Demirkopru in Turkey. It is now on display at the Museum of National History in Stockholm, as part of an exhibition about the origins and future of man. (R57)

Thus reads the first paragraph in the April 17, 1975 issue of Nature. Unfortunately, the extraction of the footprint from the hardened ash was not observed by the author or anyone else with scientific training. The article continues with expressions of doubt about the true age of the ash and whether the footprint is really human---the perennial questions whenever fossilized human-like footprints are discovered! However, the maximum age suggested for the volcanic ash is only 250,000 years, and Neanderthals are known to have been present then in that part of Europe. In other words, there may be questions about the precise age and the species that made the footprints, but there is no claim that hominids were consorting with dinosaurs or had diffused beyond their recognized boundaries. (R57)

X4. Africa.

Tanzania. The human-like footprints found by M. Leakey's team in northern Tanzania in 1976 require only a short notice here, for they are well accepted and now part of mainstream paradigms.

The prints were discovered at Laetoili. about 25 miles southwest of Olduvai Gorge where so many bones of our truly ancient ancestors have been excavated. The Laetoili prints are about 3.5 million years old and were apparently impressed by a biped about 4 feet tall. Hominid paleoanthropology is presently in a state of flux, so we will not attempt to place the Laetoili footprints on a specific branch of the hominid family tree with any precision. The point to be made here is that the famous Tanzania footprints are bona fide and certainly not anomalous. (R51, R61-R63, R90)

Kenya. More ancient biped tracks were found in Africa by A.K. Behrensmeyer and L.F. Laporte in 1978; this time in northern Kenya along the northeastern shore of Lake Turkana. The abstract of their paper in Nature goes as follows:

> We report here that in 1978, while studying Koobi Fora Formation sedimentary environments and fossils in northern Kenya. we discovered single footprints and trails of large vertebrates in a number of different strata. One of these trails is that of a bipedal hominid, the second known record of early hominid tracks in Africa, the other being that reported at Laetoili. (R67)

The Kenyan tracks are much younger than those found by the Leakey groups, being only about 1.5 million years old. As at Laetoili, these fossil footprints of early hominids cannot be labelled as anomalous, because many species of hominids ranged throughout Africa 1-5 million years ago.

X5. Australia. This island continent was reached by hominids at least 40,000 years ago, perhaps much earlier. Within this accepted time frame, fossil human footprints less than, say, 50,000 years old, would not challenge current anthropological thinking. However, the tracks at issue here are claimed to be 300,000 years old or even from the Tertiary Period over a million years ago.

The footprints at issue turned up in 1890 in a limestone quarry on the coast of Victoria. Amusingly, the fossil footprints are accompanied by fossil buttock prints, as now noted.

> There were on the slab in question four distinct impressions, two resembling those of human buttocks, being large, oval-shaped impressions separated by 7/8 inch. About 7 inches in front of these are two imprints very like a set of human footprints, being 9 inches long, 3 inches wide at the broadest and at their closest, separated by 2 inches. Officer records that the footprints were deepest at the end further away from the buttock impressions, and that toe impressions could possibly be made out in the left footprint. He also states that in both footprints a narrow part corresponding to the instep could be distinguished. (R84)

Immediately to the right of the impressions just described was a set of larger footprints that were damaged when the slab of limestone was removed,

One gets from all this the image of a child and an adult sitting next to one another on an ancient sand dune. The presence of buttock impressions humanizes the site because few, if any, other animals could leave such a combination of impressions: i.e., human-like footprints and buttocks!

While most, but not all, scientists were inclined to believe that humans actually did leave the fossil imprints on the limestone, the dating of the coastal deposits in this region turned out to be more contentious. The Australian science literature contains dozens of articles arguing about the correct age for the Dune Limestone---the official name of the rock bearing the impressions.

> Thus it can be seen that the question of the origin of these imprints has occasioned considerable debate in Australian scientific circles. The general opinion is that while most were open-minded concerning the possible origin of the prints themselves, they were understandably unwilling to backdate man in Australia to what most believed to be Tertiary times on the basis of a single set of prints. (R84)

In other words, the influence of the reigning paradigm was too strong to be overcome by a few fossil impressions in a rock formation of debatable age.

X6. Oceania

Tarawa. At the beginning of this long section on fossilized human-like footprints, we pointed out that prehistoric peoples had a penchant for carving very credible petroglyphs of human footprints for various purposes. These, of course, are not considered anomalous in this catalog.

The ancient inhabitants of many of the Pacific Islands also indulged in the carving of various parts of the human anatomy in whatever rock was available ---usually coral. It seems fitting to conclude this "footprint saga" by describing one of the several sets of footprints carved in the rocks of Tarawa, an

Giant footprints carved in coral rock, Tarawa, Oceania. (R48)

atoll in the Gilbert Islands and the location of a bloody battle in World War II.

One of the carved footprints is said to be that of Tabuariki, a giant so large that he could pick the nuts off the coconuts trees without climbing them! One of his footprints---the left one--- is found carved an inch deep in coral limestone. The print measures 3 feet, 9 inches across the twelve toes, and 4 feet, six inches from toe to heel. So, Tabuariki was truly a giant, at least in legend. The carving of his right foot is located on a small island 20 miles away suggesting an immense "straddle"! (R48)

No dinosaur footprints have been found in Oceania. Although, there are endless legends of strange sea creatures, superhumans, gods, etc. Many of these imaginary beings were carved in stone and wood and now adorn the museums.

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MME6 Ancient Human Handprints

Description. The purported presence in a New Mexican cave of a human handprint in fire-hardened clay estimated to be about 28,000 years old.

Data Evaluation. So far, we have found only two short notices of this discovery in the science literature. From these, we find several criticisms leveled against the above claim; most importantly, the questionable association of the handprint with the nearby dated charcoal, the human origin of the print, and the human origin of the supposed tools located in the cave. No definitve responses to these criticisms have yet been seen. Rating: 3.

Anomaly Evaluation. A genuine human presence in North America 28,000 years ago would demolish the Clovis-first paradigm (claiming a first human presence in the New World 12,000 years ago). It would also challenge some other controversial New World, early-arrival dates, such as that at Monte Verde, Chile (about 13,000 years). Rating: 1.

Similar and Related Phenomena. Controversial hominid footprints in solid rock (MME5); the many other arguments over the origin of tool-like "geofacts," as at Pedra Furada, Calico, Texas Street, etc. (MMS1).

Entries

X1. General observations

New Mexico. Dusty Orogrande Cave was carved by nature out of limestone in southern New Mexico. Its contents are a confusing, physically disturbed mix of archeological and anthropological debris, which we now itemize with comments.

Bones of local fauna. In Orogrande Cave is found a succession of bones of fauna that roamed the surrounding environs from 40,000 years ago up to today's pack rats. Although the cave is a paleontological treasurehouse, nothing anomalous appears in this osseous assemblage. (R1)

Possible human tools. R. MacNeish and his colleagues have collected many chipped pebbles and rock flakes that he believes were used by ancient hunters---say, 30,000+ years ago---to butcher their prey, which was then cooked over fire-hardened clay hearths inside the cave. (R1)

Since many archeologists still hold that the Clovis culture was the first to occupy this region about 12,000 years ago, 30,000+-year-old human tools would be most anomalous.

Many archeologists, though, dispute the purported tools, avering that they do not have the characteristics of human-made tools and were most likely the product of natural chipping and breaking. MacNeish counters this opinion by pointing out that half of the contested "tools" are made of rock not found within the cave. (R1)

A human handprint.

> Such doubts might be harder to sustain if MacNeish's most dramatic piece of evidence holds up: what looks like a human palm print on a fragment of fire-baked clay, 27,900 years old according to a carbon date from nearby charcoal. (R1)

A skeptic would note that the nearby charcoal might have had nothing to do with the baked clay and its handprint given the natural turnover of cave debris. (R2) Other observers also question the claimed human-origin of the handprint.

In fact, S. Emslie has warned that MacNeish's dated charcoal samples could have been moved stratigraphically by natural forces. They could, for example, merely be burned sticks from ancient pack-rat middens. (R3)

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MME7 Anomalous Hominid-Built Hearths and Fire Areas

Description. The appearance in the geological record of human-built hearths, fire areas, campfires, and heat-altered soil and stones at times and places where hominids are not believed to have been present. The specific times and places considered here are listed below under Anomaly Evaluation.

Data Evaluation. At most suspect sites less than 50,000 years old, radiocarbon dates have been adequate. Additional physical dating methods are possible for older sites. Stratigraphic dating is used at very old sites where the ages of the geological formations are known. Stratigraphic dating along shorelines may be unreliable where there has been repeated deposition and disturbance of sediments.

It is often difficult to prove convincingly the involvement of hominids in the creation of hearths and fire areas. Objects found at these sites that appear to be simple stone tools may be only products of nature (geofacts). The presence of hominid skeletal material, animal bones that have bear marks of butchering and cooking are helpful in proving hominid association with these hearths. Artificial structures, such as roasting pits and hearth structures would also help prove human presence.

The data evaluations for four potentially anomalous situations are the first figures in the ratings below.

Anomaly Evaluation. The anomaly ratings are the second figures in the ratings for the four potentially anomalous situations.

(1a) Evidence for hominid use of fire prior to 5 million years ago; i.e., before the time the hominid lineage is supposed to have begun (X2-X5). Ratings: 3/1.

(1b) Evidence for hominid use of fire before 1 million years ago outside of Africa; i.e., the time hominids supposedly first dispersed from that continent (X3, X5). Ratings: 2/2.

(2a) Evidence for human use of fire prior to 12,000 B.P. in the New World; i.e., before the Clovis-limit (X1, X2). Ratings: 1/3.

(2b) Evidence for human use of fire before 40,000 B.P. in Australia; i.e. before humans are supposed to have occupied that continent (X5). Ratings: 2/2.

Possible Explanations. Any indications of human use of fire before 5 million years ago are probably misinterpretations. In the cases of other hearths and fire areas, human diffusion throughout the Old World prior to 1 million years ago, and into the New World before 12,000 B.P. was probably more frequent and widespread than currently maintained.

Similar and Related Phenomena. Anomalous human footprints (MME5); controversial, simple stone tools at many New World sites (MMS1). Evidence for anomalous hominid diffusion is found throughout this and other volumes in the M-series. See the Subject Indexes in each volume.

Entries

X0. Background. Today and long before the advent of man, lightning and volcanos have kindled forests and grasslands. So, the discovery of ancient fire areas need not signal that hominids warmed themselves and cooked their food at these spots. More positive evidence of hominid presence is required, such as artifacts and signs that animals were butchered and consumed at the sites in question. Of course, hominids eventually did learn to control and even create fire at will. So, fire-area anomalies, if such there be, lie in their dating. There are two ways in which fire-areas can be designated as anomalous:

(1) The unexpectedly early control, use, and creation of fire by hominids anywhere on the planet. Dates earlier than 1 million years are considered anomalous here.

(2) The control, use, and creation of fire in specific geographical areas well before the paradigms of the archeologists and anthropologists envision human occupation of these areas---in other words, premature diffusion of the human line. In the New World, the Clovis-first limit of about 12,000 years is adopted here, although it is now in the process of being breached in some places. For Australia, we consider evidence of hominid fire-building more than 40,000 years ago as anomalous.

X1. North America. So far, all candidate ancient fire-areas in North America challenge only the Clovis-first position; that is, no one claims human-built fire areas millions of years old in North America, only hearths and campfires that challenge the 12,000-year Clovis-first limit. Interestingly, all potentially anomalous fire-areas in North America are to be found in the American west and northern Mexico, except for first site on our list. We begin with this very questionable hearth excavated in New York state.

New York. An 1887 meeting of the Anthropological Society of Washington was dedicated to "the antiquity of man in America." A paper by G.K. Gilbert of the U.S. Geological Survey related the discovery of a hearth on the south shore of Lake Ontario. Discovered by D. Tomlinson of Gaines, New York, the claimed hearth was at the bottom of a 30-feet-deep well. (R1)

While the depth of the well does suggest great age, it is impossible to date it accurately by stratigraphic means. Furthermore, the bottom of a well is hardly a place to claim the existence of a hearth. The charcoal there could have been produced and collected by nature. No artifacts or bones of butchered animals were produced from the well. Evidently no one descended into the well to do the required digging!

One can have little confidence in this particular "hearth" claim.

Texas. The Lewisville archeological site, a few miles north of Dallas, comprises more than 21 hearths containing the burnt bones of now-extinct animals of the Upper Pleistocene. Charcoal from two of these hearths have been carbon-dated as 37,000 years old. (R9, R14)

But normally one would expect to pick up a few human artifacts around such a large site. A Clovis point was dug out of one of the hearths, but it is thought to have been deliberately planted there; i.e., it was a hoax. Defenders of the Clovis-first theory surmise that the complex of hearths at Lewisville are per-

haps simply burnt wood-rat houses! (R6) It is a rather forced explanation, but the lack of stone tools is a serious deficiency in this instance.

New Mexico. In MME6-X1, we described a fire-hardened clay hearth at Orogrande Cave. A nearby piece of charcoal was dated at 28,000 years, but its contemporaneity with a clay hearth in the cave is hard to establish convincingly. (R13)

Here, too, the pre-Clovis use of fire is difficult to prove.

Nevada. In 1954, charcoal extracted from beneath an ash bed near Tule Springs was said to be 23,800 years old by W.F. Libby, the pioneer of radiocarbon dating. (R2) Less than a decade later, the date was moved back about 8 millennia according to an item in Science News Letter.

> Man lived in the Western Hemisphere 32,000 years ago, about twice as long in the past as previously believed.
>
> On the windswept desert ten miles north of Las Vegas, Nev., a group of 28 archaeologists, paleontologists and geologists led by Dr. Richard Shutler Jr., curator of anthropology for the Nevada State Nuseum, found charcoal, from what they believe to be ancient campfires, that showed a range in age from 26,000 to 32,000 years by radiocarbon dating. (R5)

Stone tools and the bones of mammoths, camels, and horses were also unearthed at the Tule Springs. In fact artifact collecting began at Tule Springs as far back as 1933 when the site was first explored, and long before radiocarbon dating was available.

The Tule Springs findings seem rather convincing, because charcoal, tools, and animal bones all exist there. But the Clovis-first adherents did not budge from their paradigm on this evidence.

California. Many probable ancient hearths---all apparently older than 12,000 years---line the coast of southern California. Many of these were discovered and/or investigated by G.F. Carter (R20, R21), who is still considered a maverick in the fields of archeology and anthropology for his strong opinions on the fragility of the Clovis-first paradigm and the early diffusion of humankind about the globe.

We will concentrate on two California sites: Texas Street and Santa Rosa Island. First, though, a listing of other sites in California deemed worthy of mention by Carter. (R21)

- La Jolla: hearths scattered over a wide area; crude stone tools, and burials. Charcoal dated at about 50,000 years. (R21)
- Crown Point: obvious hearths at the base of the oldest sands, which are easily 40,000 years old. (R21)
- San Nicholas Island: many hearths and temporary camp sites among the dunes. No charcoal dates provided. (R21)
- Scripps Campus: fire levels occur beneath shell middens, dating from 20,000 to 35,000 years. (R21)
- Calico. Unlike the other California shore sites cataloged here, Calico is located in the Mohave Desert and is infamous for its many "geofacts"; i.e. stones that appear to be tools made by ancient humans but may actually be the products of nature. Some insist that real tools do exist at Calico. But, missing at Calico are hearths with datable charcoal. Substituting for the charcoal is a ring of stones arranged as in a fireplace, which, according to magnetic analysis had been heated at their inner sides. The Calico site is thought, by some, to be about 100,000 years of age. (R21, R22))

Texas Street. Belying its name, this site is a succession of terraces facing the Pacific Ocean at San Diego, California. The archeological value of Texas Street became apparent when a huge pit was dug in one of the cliffs for building materials.

G.F. Carter recognized the promise of Texas Street and began work there in 1947. The work continued for years and resulted in his 1957 book Pleistocene Man at San Diego. (R20) The very idea of Pleistocene humans camping on the southern California shore thousands of years before the arrival of the Clovis people was anathema to mainstream science. Carter's findings were unbelievable.

Fortunately, Carter was a geographer rather than an archeologist and his professorship at Johns Hopkins was not endangered by archeology heresy. His controversial views, however, made it difficult for him to get his archeological research published in mainstream journals. Even though the Editor of Science had invited Carter to write a paper on his Texas Street work, the referees recommended that it not be published. (R14)

A major controversy at Texas Street involved the simple stone "tools" that Carter and his associates had collected. Most archeologists of the time considered them the work of nature or "geofacts." Others even designated them as "Cartifacts"! The same artifact/geofact controversy occurs at Calico, Pedra Furada (Brazil), and many other locations. This very large topic is dealt with in Chapter MMS.

Here, at Texas Street, our focus is on the hearths. Of these, Carter had the following to say in a later book, Earlier Than You Think.

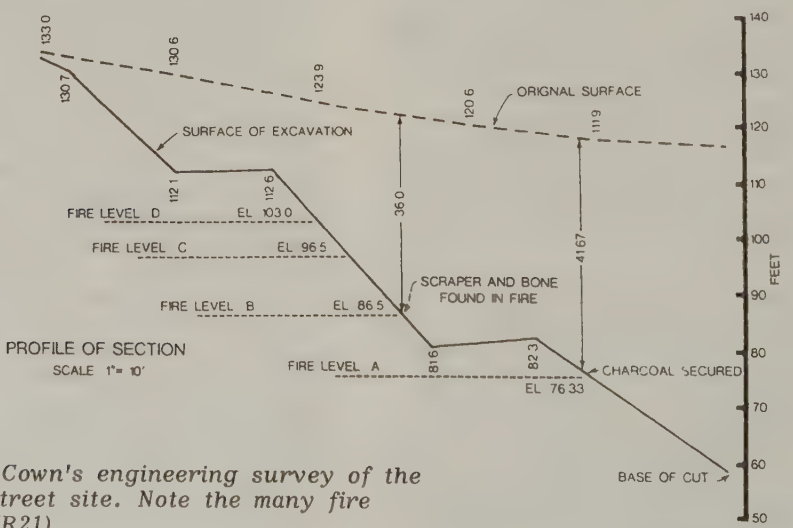
> There were two kinds of hearths at Texas Street. Small ones of about thirty inches in diameter were simple, hollowed areas showing some signs of burned earth, charccoal and ash. Larger hearths were about four feet in diameter and often were lined with large fire-stained rocks. In one of our five-by-five squares we encountered a conical pile of burned rock, and in the adjacent square we found a pit where plural floors of burned earth and charcoal showed repeated use.
>
> If one has two types of hearth---with living floors, with food bone and marine shell in a terrestrial deposit, and with an abundance of stone broken into a pattern---one wonders what more could be asked [for proof of human activity]. (R21)

The age of the Texas Street hearth and tools went back in time 80,000-90,000 years---far too long for mainstream archeologists and anthropologists to stomach. Most of the professional criticism was directed at the controversial stone tools, but the fire areas were attacked, too. One authority relegated the hearths to the action of "forest fires," another identified the burned areas as being merely "manganese deposits." (R21)

One of the Texas Street hearths has yielded a radiocarbon date of 36,050 B.C. (R23)

Several archeological sites in the New World, such as Monte Verde (Chile) and Meadowcroft (Pennsylvania) are now widely accepted as being pre-Clovis by a millennium or two, but Texas Street remains much too old to make the list, and those tools must be merely geofacts.

Santa Rosa Island. Santa Rosa is the central member of a trio of large islands about 25 miles off the coast at Santa



B.E. McCown's engineering survey of the Texas Street site. Note the many fire areas. (R21)

Barbara. This island is characterized by 3 kilometers of cliffs about 30 meters high and an interior labeled as "badlands." On this island, so unpromising in appearance today, have been found over 100 "fire areas." Some of these seem to have been hearths where dwarf mammoths that once roamed the island were roasted and consumed by early humans.

Obviously, Santa Rosa was once a verdant place if it supported such large mammals. On the archeological time scale, the Santa Rosa fire areas, burned mammoth bones, and the hypothetical hunters who frequently the island were about 30,000 years ahead of the Clovis people.

The early archeological work on Santa Rosa was carried out by P.C. Orr and R. Berger. Unlike Carter, they were able to get their findings published in the mainstream Proceedings of the National Academy of Sciences. (R7, R8)

A more popular description of the archeological significance of Santa Rosa appeared in a 1977 issue of Science News.

> Conclusive evidence that early man was present in North America at least 40,000 years ago---nearly twice the previously accepted estimate of man's entry into the New World---has been confirmed for the first time by carbon-14 dating. The find was made in a deep gully nestled in the barren "badlands" area of California's Santa Rosa Island, off Santa Barbara.
>
> There, last summer, UCLA archaeologist and geophysicist Rainier Berger found what scientists have been combing the island for since the turn of the century: an Ice-Age "pit barbecue" where some form of human beings roasted and ate dwarf mammoth elephants they had hunted and killed. Berger, a specialist in radiocarbon dating methods, recently completed his analysis of four charcoal samples from the 3-meter-wide, 16-centimeter-deep hearth. (R10)

Like Texas Street, Santa Rosa is not yet on the list of "possible" pre-Clovis sites, even though Science News called the evidence "conclusive." The reason for mainstream archeology not accepting Santa Rosa is the claimed lack of clear evidence of human presence; that is, stone tools and other signs of occupation. (R22) (See MMS1-X1 for Santa Rosa stone tools.)

On the other hand, Carter did collect what he deemed were simple stone tools from Santa Rosa. (R21) But these were again considered geofacts.

Finally, if humans did not hunt and consume the dwarf mammoths, why are their burnt bones found in the vicinity of the hearth-like areas? It is hard to believe that dwarf mammoths would immolate themselves in large numbers or could not escape forest fires.

Charcoal from one of the Santa Rosa fire areas has been carbon-dated at 37.700 B.C. (R23)

Mexico. A archeological enigma much like that at Santa Rosa Island exists in northern Mexico.

> For example, geological, archeological, and paleontological research at El Cedral, in the state of Sinaloa, northern Mexico, revealed human artifacts along with bones of extinct animals in "undisturbed stratified deposits on horizons carbon-dated at 33,000 B.P., 31,850 B.P., 21,960 ± 540 B.P., and older than 15,000 B.P." The date of 31,850 B.P. corresponds to a hearth found in situ and consisting of "a circle of proboscidean tarsal bones surrounding a zone of charcoal about 30 cm [a foot] in diameter and 2 cm [almost an inch] thick." (R14, quoting J.L. Lorenzo and L. Mirambell)

X2. South America.

Chile. Monte Verde in south-central Chile is unquestionably the most renowned archeological site on the continent. The evidence of pre-Clovis man unearthed there by T.D. Dillehay and his teams over several years have convinced many---but not all---anthropologists that humans dwelt there 12,500-13,500 years ago. (R22) These dates are not highly anomalous when compared to the Clovis-first date of about 12,000 years, but they are old enough to weaken what has long been a powerful paradigm.

We mention Monte Verde here because large communal hearths and clay-lined charcoal ovens constitute part of the human evidence. Without question, Monte Verde is a far more sophisticated site

than Texas Street and Santa Rosa. It has everything the archeologist requires to make a convincing case for pre-Clovis occupation. Still, Monte Verde is not universally accepted.

Brazil. A much more controversial South American archeological site than Monte Verde is situated in northeastern Brazil. Once again, the artifact-or-geofact question dominates. N. Guidon, a French archeologist, claims to have found ash-filled hearths and stone tools at least 30,000, perhaps 50,000 years old.

Lacking at Pedra Furada, however, are the butchered, osseous remains of the extinct animals that one would expect at a human-occupied site as old as Guidon claims. As discussed further in Chapter MMS, the claim of stone tools at Pedra Furada are highly suspect in the eyes of many. (R22)

Argentina. Over a century ago, the most famous scientist in South America was probably F. Ameghino. Indeed, Ameghino made some remarkable paleontological discoveries, but also he also ventured that humanity may have originated in South America rather than Africa! So, we are not particularly surprised to find that he discovered human-constructed hearths 10-20 million years old in South America; that is, evidence of human activity in the Middle and Early Pliocene. No wonder Ameghino is no longer mentioned in connection with the peopling of the New World. Hominids did not evolve until 5 million years ago in Africa according to current thinking. Ameghino must have been very wrong.

Be that as it may, Ameghino was able to publish extensively in Spanish journals. M.A. Cremo and R.L. Thompson have resurrected some of the observations he claimed at Monte Hermoso.

> Among the most significant examples of human work reported by Florentino Ameghino are those he discovered in 1887 at Monte Hermoso, on the coast of Argentina about 60 kilometers (37 miles) northeast of Bahia Blanca. Here is how F. Ameghino recounted the circumstances of his first discoveries at Monte Hermoso, which were made in a formation he regarded as Miocene. "During an exploratory visit, which lasted from the end of February to the beginning of March 1887, we had the good fortune to find remains that demonstrated the existence of an intelligent being contemporary with...extinct fauna at this site. These vestiges consisted of fragments of tierra cocida (burned earth), fogones (hearths), escoria (glassy, melted earth), bones that had been split and burned, and worked stone. These discoveries caused me such surprise and appeared so important that I immediately wrote up my impressions and sent them to the journal La Nacion, which published them on March 10, 1887." (R14)

A human presence 10-20 million years ago obviously concords well with Ameghino's assertion that humanity began in South America, but it is far out of step with current mainstream thinking.

Incidentally, Ameghino also figures in our catalog Biological Anomalies: Mammals II in connection with the possible late survival of the giant ground sloth in South America. MMB4-X4.

X3. Europe.

Britain. In 1855, a human jaw was extracted from the Late Pliocene Red Crag formation at Foxhall, England. Stone tools and signs of fire were also associated with this remarkable discovery: "remarkable" because the age of this formation is about 2.5 million years. (R14)

The date of 2.5 million years for hominid activity in Europe, if verifiable, is far older than the accepted date for hominid dispersal out of Africa of about 1 million years B.P.

However, across the Channel, this variety of anomaly deepens.

France.

Thenay. During the late 1800s, impassioned were the debates about the purported stone tools extracted from Early Miocene beds at Thenay in north central France, near Orleans. The cause of the furor was the date of the Miocene beds of 20-25 million years. The claims concerning the Thenay tools will be reintroduced in Chapter MMS. It suffices here to register the observation that some of the stones from which the supposed tools were created seem to have been split by fire, which implies an

ability of "something" to control fire. We say "something" because hominids are believed to have split off from the ape lineage only 5 million years ago in Africa. In this context of the human evolutionary timetable, Cremo and Thompson wrote:

> In any case, the evidence that an intelligent being of the human type produced the flints of Thenay around 20 million years ago in the Early Miocene seems overwhelming. But some authorities believed the being was not that of the modern human type, but rather a more primitive ancestor, as required by evolutionary history. (R14)

At 20 million years, this "intelligent being" could not have been any of the hominids identified so far by the anthropologists!

Menez-Dregan, Brittany. Far more acceptable to the anthropologists is this more recent discovery in France.

> A team led by Jean-Laurent Monnier of the University of Rennes has tentatively dated material from what appears to be an ancient fireplace back to 465,000 years, with an estimated error of ±65,000 years. Such an early date would fall well within the domain of H. erectus. (R15)

Evidently, these hominids at Menez-Dregan had clustered about a barbecuing rhino. (R16) No anomaly here.

X4. Africa. In 1986, H. Barbetti asserted that the earliest incontrovertible evidence for the controlled use of fire by humans did not exceed 1 million years---and he included the entire planet in his declaration. However, he admitted, some Lower Pleistocene sites in Africa were threatening his 1-million-year dictum. (R12)

Kenya. One of these exceptional African locations is Chesowanja, Kenya. At an archeological dig there:

> ..."burnt clay found at one artefact locality dated to greater than 1.42 ±0.07 My [million years] is the earliest known evidence of fire associated with a hominid occupation site" and that "the new find, along with the more tentative evidence from other sites greatly strengthens the hypothesis that by 1.4 My hominids were using and controlling fire." (R11)

For Africa, a 1-million-year-old hearth cannot be considered anomalous in view of the accepted origin of the hominid line about 4 million years earlier. "Precocious" might be a better adjective than "anomalous" here. One can easily believe that 4 million years are sufficient to observe the properties of fire and learn to harness it.

X5. Asia

China. For many years, the textbooks have proclaimed that 500,000 years ago hominids, namely Peking Man(H. erectus), sat around campfires roasting deer at a cave at Zhoukoudian (formerly Choukoutien), not far from Beijing. This foundation stone in anthropological theory recently came under scrutiny. The deep deposits of ash, tools, bones, and other human debris have now been analyzed more thoroughly. A better date for the first fires at Zhoukoudian now seems to be about 300,000 years. (R17-R19) Furthermore, these more recent fires were apparently not lit by H. erectus!

Actually, in what has been set down above, 300,000 years of human-controlled fire at Zhoukoudian cave, do not seem particularly anomalous in view of the Kenyan date of 1.42 million years established in X4 above. Rather, it is merely the unseating of still another revered, mainstream "age-limit" that interests the anomalist in this instance.

A much more interesting Chinese site is at Xihoudu in Shanxi Province, where hominids may have employed fire between 1.0 and 1.8 million years ago. Besides signs of fire, stone tools and animal remains are in the immediate vicinity, thus adding validity to the claim of hominid presence. (R19)

This upper 1.8-million-year figure trumps the 1.42-million-year number from Africa. Now this is highly anomalous if verified. Perhaps Africa was not the only Eden of our genus!

X6, Australia. All of the forgoing archeological inquiries into the use of fire by hominids have depended upon archeologists poking around the detritus of suspected terrestrial campgounds. In the case of Australia, though, the hunt for hints about the early human use of fire come from cores extracted from the ocean floor off Australia. From the pollen, bits of charcoal, and other debris blown out to sea and recovered from these cores, scientists can tell much about the climate of the nearby land mass over the last few hundred thousand years. In the case of Australia, the cores suggest an anomalously early appearance of humans on this island continent.

> The study of the charcoal levels found in the various samples taken from the cores revealed an equally dramatic increase [in the amount of pollen], suggesting that fire was the major cause of changes in the pattern of vegetation. [A.P.] Kershaw believes that the large-scale burning of the landscape could best be explained by the presence of humans in Australia at 140,000 BP. (R19)

This is 100,000 years earlier than the 40,000-year date allowed for human diffusion to Australia from Asia. In support of the evidence from the ocean-floor cores are the controversial sites at Jinmium and Site 820, where dates of 100,000 years are claimed. It now seems that Australia's 40,000-year limit, like the New World's Clovis-first barrier may be shaky.

It must be added here that Australian natives have for millennia deliberately set fires to burn off vegetation so that the land may be rejuvenated.

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MMM METAL ARTIFACTS

Key to Phenomena

MMM0 Introduction

Metal artifacts may be anomalous if found in one of four situations:

(1) They are in the wrong place at the wrong time, suggesting cultural diffusion contrary to prevailing paradigms, such as the presence of ancient Egyptians in Australia;

(2) They demonstrate the knowledge and use of copper and iron earlier than accepted historical time lines;

(3) They appear to be firmly embedded in rocks hundreds of thousands, even millions, of years old; and

(4) They are heavily mineralized in concretions along with fossils of great age, implying that they, like those of (3) above, are unacceptably ancient.

MMM1 Low-Tech Metal Artifacts

Description. Metal pins, daggers, axes, and other simple tools and adornments that are inconsistent in terms of time and place with the current world view of human global diffusion and technological capabilities. Only copper, bronze, and iron artifacts are considered here.

Data Evaluation. Metal artifacts cannot be radiometrically dated and stratigraphic dating is often suspect, so a crucial element affecting the anomalousness of a specimen is sometimes in doubt. Also, artifacts are too often "salted" or accidently dropped in places where their presence seems paradigm-wise anomalous. Added to these uncertainties are the sources employed, which here are often very old or are published outside the science literature. The data evaluations are the first figures in the ratings listed below.

Anomaly Evaluations. We list five potential anomalies associated with metal antifacts. The anomaly evaluations are the second figures in the ratings.

- The artifacts suggest a Norse presence in North America far beyond Newfoundland (X1). Ratings 2/2.
- The artifacts suggest pre-Norse contacts of the Old World with the New World---even in pre-Christian times (X1). Ratings: 3/1.
- The artifacts suggest ancient Egyptian contacts with Australia (X9). Ratings: 2/2.
- The artifacts suggest precocious knowledge and use of copper in North America, specifically, the so-called Old Copper Culture (X1). Ratings: 2/1.
- The artifacts suggest precocious knowledge of and the use of iron in Egypt, which is usually assumed to have been familiar with only copper and bronze (X6). Ratings: 3/1.

Possible Explanations. An unrecognized worldwide commerce in copper and bronze existed prior to the Christian era. The Norse actually did penetrate far into the North American high Arctic and the lands around Hudson Bay. Some subject artifacts, claimed to be anomalous, were accidentally or intentionally deposited in anomalous places.

Similar and Related Phenomena. The rest of this chapter (MMM); Norse cloth in the high North American Arctic (MMC1); wooden artifacts suggesting anomalous cultural diffusion (MMW4); high-tech metal artifacts (MMT); metal coins (MGC) in a future volume; ancient Lake Superior copper mines (MSE6 in Ancient Infrastructure); other remarkable ancient mines (MSE5 in Ancient Infrastructure).

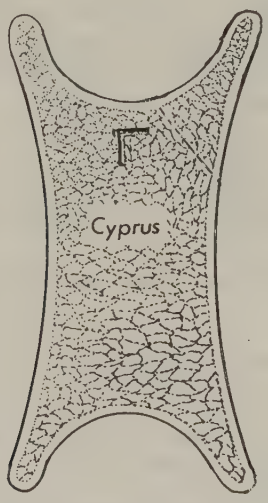
Entries.

X1. North America. Our collection of potentially anomalous metal artifacts comes predominantly from North America. This is due to the ever-smouldering diffusion issue as it relates to Old World-New World contacts.

Before recording selected specific artifacts, some generalities are in order concerning the several potential sources of the major metals used in antiquity: copper, bronze, and iron.

Copper. Just as there was an Iron Age, there was a Copper Age. Despite its softness, copper was used in immense quantities by the ancients; first, in pure form and later alloyed with tin to make bronze. Copper ingots of various sizes

were actually a form of currency 2,000-500 B.C. Distinctively shaped ingots called "oxhydes" were molded in various sizes and used like money. They were so-named because they looked like ox hides. (See figure.) Although oxhydes are common artifacts in the regions around the Mediterranean, some have also been found in Indian mounds in Ohio, West Virginia, Indiana, Kentucky, and doubtless elsewhere in North America. (R33)



Typical copper oxhyde circa 1200 B.C. from Cyprus. This one is about 60 centimeters wide. Smaller, similarly shaped copper ingots have been found in North America dated about 100 A.D.

The existence of the North American oxhydes may signal an anomaly because smelting was needed to form the ingots. Smelting was apparently not known in Precolumbian North America---at least according the accepted history. One radical explanation for the errant North American oxhydes is Precolumbian contacts by Europeans. (R35) However, skeptics can always postulate that these copper ingots were planted in the mounds in Postcolumbian time by hoaxers or even the Native Americans themselves for religious or other reasons.

It should be mentioned here that some believe North America, particularly the Great Lakes region, was possibly once a major world source of copper in ancient times, perhaps beginning as far back as 7,500 B.C. (R26) The North American mines of the so-called Old Copper Culture are described in MSE6 in the catalog volume Ancient Infrastructure. It is there that the question: "Where did all the Great Lakes copper go?" is broached.

In addition to the copper oxhydes, tens of thousands of small copper artifacts in great variety have been found all over North America. Most of these were hammered and otherwise fashioned from so-called "float" copper; i.e., natural copper nuggets that were once rather common in the northern states and provinces.

A smaller, additional source of North American copper, some of it smelted, may have been salvaged from Precolumbian shipwrecks---mostly Japanese---along the northwest coast of North America. (R48)

Iron. Iron does not resist the elements as well as copper. Nevertheless, a few iron artifacts have turned up at North American archeological sites. Some of these may betoken Precolumbian visits from the Old World. Others, however, perhaps most, were hammered out of iron meteorites by the indigenous peoples. We shall also see below that there is some evidence of Precolumbian iron mining in North America.

Bronze. Bronze is an alloy of copper and tin. We have found no evidence that either tin or alloying were in the metallurgical repertoire of Precolumbian North Americans. Yet, North American bronze artifacts do grace the archeological museum collections. These could constitute proof of early Old World visits to North America, or, like so many out-of-place coins (MGC in another volume), they could have been lost by modern collectors or "salted" by hoaxers.

We have collected many examples of potentially anomalous, North American metal artifacts during our decades-long literature search. We now take a state-by-state journey alphabetically, including Canadian provinces.

Arizona. As alphabetical fate would have it, we commence with two metals omitted from the preceding paragraphs: silver and lead.

Small bells cast from silver have been attributed to Arizona's Hohokam culture.

Since, silver has a melting temperature of 2066°F, which is thought to be beyond the capabilities of Hohokam furnaces, an alien source is suspected. Similar bells of copper or bronze have also been found in Arizona. (R26)

The second unusual metal artifacts from Arizona were fashioned from lead. These are the famous Tucson artifacts: lead crosses engraved in Latin. Widely regarded as hoaxes, some see these crosses as evidence of a Jewish colony established in Arizona in Roman times. (R38)

The Tucson lead crosses, because of their inscriptions, really belong in our Category MGW in a future volume of the Catalog of Anomalies. We simply cross-reference them here.

Connecticut. Copper or bronze ax (Essex), and a pin (Pleasantville). B. Fell compares these favorably to Iberian artifacts, implying Precolumbian diffusion. (R25)

Illinois. Whiteside County, 1851. Two copper items were brought up by a well-driller from 120 feet. One resembled a boathook, the other was a ring. (R26)

Kansas. The recovery of European chain mail from archeological sites would seem to represent anomalies of the first order. Not so in this instance! These finds were summarized in W.R. Wedel's 1975 paper in a 1975 number of the Plains Anthropologist.

> Beginning in the 1880s, chain mail fragments have been found subsurface at five archeological sites in the Central Plains. All were in association with native Indian materials assignable to the Great Bend aspect and datable to the earliest period of European contacts with Central Plains Village Indian communities in the mid-sixteenth century. Among the several types of mail fabric represented, none is inconsistent with a 16th century provenience. (R24)

Preliminary reports appeared in the same journal in 1940 and 1961. (R20, R23)

The "16th century provenience" assigned by Wedel almost certainly refers to Coronado's expedition of 1541, which he mounted to find the rumored, gold-rich city of Quivera. Coronado and his men marched north through New Mexico and into central Kansas. There, they found no gold, only Indian villages. When the expedition turned back, some of the soldiers discarded their heavy, useless armor, much to the delight of the Indians who prized the metal. (R30) See MSS1 in Ancient Structures for more on the "lost" city of Quivera.

Fragment of European chain mail about 3 inches wide. This was probably discarded by Coronado's expedition of 1841 into the western states. (R24)

Kentucky. Copper oxhydes were found in Kentucky mounds. (R39) But Kentucky also yielded metal artifacts even more enigmatic.

Citing C.M. Boland's book The All Discovered America, E. von Fange wrote:

> At the Falls of the Ohio near Louisville, Kentucky, skeletons and brass-plated shields were uncovered. The shields bore a Welsh coat of arms, and there are traditions and stories in that area of white Indians who spoke Welsh. Some scholars attribute these finds and other evidence to a Welsh expedition to America in the twelfth century A.D. (R26)

The supposed Welsh expedition was led by "Prince" Madoc in 1170. The Madoc tale has been told many times, as

have other stories about blue-eyed, light-skinned Indians speaking a language resembling Welsh; e.g.; the Mandans of North Dakota.

Maine. In 1924, at Madison, a hoard of bronze daggers was dug up. (R25) Age of the burial unknown.

In 1905, during archeological excavations at Pemaquid, an unusual burial was found. It was unusual because the skeleton's head was resting upon a sheet of copper. A second sheet of copper, measuring 12 x 18 inches, covered the chest area. Also present were five copper tubes strung on a leather strip. The radiocarbon date of the bones was 1585 A.D. (R43)

Given this late date, the copper was probably of European provenance. Obviously, there is nothing anomalous here. However, this burial underlines the importance of getting dates for metal artifacts. The early European traders, explorers, and settlers transferred thousands of metal objects to the Native Americans. Some of these were probably inserted into Precolumbian mounds for religious reasons.

Massachusetts. Copper and/or bronze points (Millbury and Pepperell). (R25) Bronze knives (Andover and Merrimackport). (R25, R26, R35) Bronze or copper ax (Gill). (R25)

Norse-type battle-ax at Rocky Neck, on the coast near Gloucester. It bears a North African Tifinag inscription. (R31)

The famous "Skeleton in Armor," which received much publicity in its day, was excavated at Fall River in 1831. This burial resembled that at Pemaquid, as described above. The breast plate and tubes were of brass in this case, an alloy undoubtedly from Europe and Postcolumbian. (R43)

Michigan. A Norse-type battle-ax, presumably iron, unearthed at Marquette. (R33)

At the Bear Bluff Archaic Period site, northern Michigan, a 27-pound copper ingot. This specimen contained porosities indicative of casting. (R46) This artifact probably belongs to the Old Copper Culture which, according to some writers, dates back to several millennia B.C. The indications of casting could signify either precocious native technology or anomalously early cultural diffusion from the Old World.

Medieval Norwegian ax recovered near Marquette, Michigan. (R18)

A copper artifact (#R666 in the Milwaukee Public Museum), found at the Riverside archeological site revealed signs of melting (suggesting casting). Age estimated at 1,000 B.C. (R46)

See also R44 on this matter.

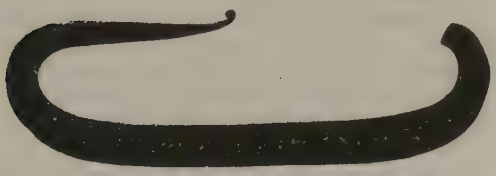
Minnesota. Norse-type axes [presumed to be iron] (Thief River Falls, Crookston, Brandon) Two of these axes bore runic dates: 1140 and 1131, (R33) Artifacts such as these gave rise to claims that the Norse somehow penetrated into the north-central states, perhaps via the St. Lawrence or Hudson Bay.

The great champion of a Precolumbian Norse presence in Minnesota was H. Holand (R18). He insisted the controversial Kensington Stone was Norse, as were the so-called "mooring stones" found in Minnesota and many other states. (See MSO1 in Ancient Infrastructure.) Holand tracked down many iron artifacts, mostly Norse-type weapons, and published photos of them in a book, in which he wrote:

> Among these many finds there are a few iron weapons of strange and antique shape which have proved very interesting. A study of Norwegian and Swedish history and archeology shows that they are of Scandinavian origin of the late Middle Ages, that is, ca. 1200-1500. Another remarkable fact about these finds is that nearly all have been unearthed in northwestern Minnesota, in the region from Kensington, Douglas County, northward. (R18)

Among Holand's photographic record are: (1) Medieval Norwegian fire-steel (Climax); (2) A Medieval Swedish battle ax (Brandon); and (3) A sword (Ulen).

Holand's claims of Norse iron articles have been more or less brushed off by modern archeology. (R45) The same professional disdain has been accorded the



Medieval Norwegian fire-steel uncovered near Climax, Minnesota. (R18)

Kensington Stone and the claimed mooring stones.

(See MGW in another volume for the debate over the Kensington Stone.)

Missouri. Here follows a quotation from the American Antiquarian of 1887:

> Mr. Hannibal Fox, of Milton, Sullivan county, Mo., wrote us Dec. 5, 1879, in reference to the finding of a mask, made, he says, of silver and iron, and enclosed a photograph of the same. "Melting silver and iron in a crucible, and preparing a matrix by placing clay over the face after death, and pouring the metal so that the vessel tipped," &c., do not seem to be operations which are usual among the aborigines, or, as far as we know, even among the Mound Builders. The mask was plowed up in a field, and is now in the possession of Mr. Fox. (R5)

The above discovery is a staple in the fringe literature. The journal in which it appeared is respectable enough, but the report is, after all, just a letter from a person with unknown qualifications. A hoax cannot be ruled out here, for they were not uncommon in those times. As one might expect, little attention was paid to this metal mask by professional archeologists. It should be in some museum, but this has not been recorded in the literature searched.

New Hampshire. A bronze spearpoint (Brentwood); a bronze shield (Windham); unspecified bronze artifacts (Salem). (R26 citing as a source C.M. Boland's They All Discovered America, a popular book.) Again, one must ask where these remarkable artifacts are today.

New Jersey. Here, we quote directly from E.A. von Fange's survey:

> Copper, iron, and brass were found in the skeleton of an old ship uncovered from the sands at Manasquan, New Jersey. These remains appear to be from an old Viking ship. (R26)

von Fange does not cite a reference here, so caution is advised. We have seen nothing additional on this ship in our literature surveys.

At the Abbott Farm Site, near Trenton, a curious copper rod, 14 inches long, with an eye at one end, was excavated. Purpose unknown. (R26, citing F. Folsom's America's Ancient Treasures)

New York. In his book Ancient Man in America (R49), archeologist H.W. Wormington discusses at some length the so-called Old Copper Culture centered in the region of the Great Lakes. It is this native culture, it is supposed, that dug the multitudinous crude surface mines from which they extracted huge quantities of copper nuggets, some of which weighed tons. The Old Copper Culture metal artifacts are distinctive, and the radiocarbon dating of associated wood artifacts yields dates of 5,600-7,150 years. Wormington commented:

> It is difficult for archaeologists to believe that so well-developed a metal industry could be so very early; yet the discovery of a typical Old Copper gouge in an Archaic (Laurentian) site in New York, and the absence of Old Copper artifacts in sites of later periods, suggested that it must be fairly old. The deep acid erosion and dense patination which often characterized the specimens also suggested antiquity. (R49)

North Carolina. An iron celt was found in the Nelson Mound. (R35)

This discovery of the iron celt pales in importance beside the accounts of the following two North Carolina (apparently ancient) mining operations.

The North Carolina Native Americans

were well-known for their mica mines but, in 1875, near Guyer, one of their pits yielded some surprising artifacts. This particular pit was different from the usual crude surface excavations. Some digging proved that there was actually a shaft about 50 feet deep. At the 40-foot level, a short adit (horizontal tunnel) was uncovered. It was while clearing this deep shaft that workers discovered several iron immplements, including an ax head! Prehistoric American Indians normally had access to only small bits of meteoric iron.

We quote here from an 1881 article by F.W. Simonds in the American Naturalist.

Iron implements found in an old North Carolina mica mine. Although Native Americans quarried mica, they are not known to have used iron tools. (R4)

> The inference to be drawn from the discovery of these iron relics, is, that some of the "old diggings" are the work of Europeans, as the use of iron was unknown to the native American races. Is it not possible that there is a basis of truth in the old Cherokee tradition? That a party of Spanish explorers---and perhaps more than one---penetrated Western Carolina in search of gold, silver and other minerals, and, in some instances, finding the old mines of the Moundbuilders, caused preliminary investigations of their value, does not seem improbable. In Cherokee county are found "prospect holes" excavated with far greater skill than that of savage or barbaric miners. To what expedition these Europeans belonged is a mystery. (R4)

Actually, De Soto's expedition almost reached North Carolina.

Another report of iron artifacts from North Carolina was reported in Science in 1884. (R9) The site was actually a large Indian burial pit in the shape of a triangle 48 x 48 x 32 feet.

> On the north-west side of the triangle, ten or more bodies were found which appear to have been buried at one time; the old chief (?) with his head north-east, face down. Under his head was the larger seashell with hieroglyphics. Around his neck were the largest-sized beads. At or near each ear were the larger pieces of copper; there was also a piece of copper under his breast. His arms were extended, and his hands rested about one foot from each side of his head. Around each wrist was a bracelet composed of long, cylindrical, copper beads and shell beads alternated. At his right hand were found the implements of iron. Under his left hand was a sea-shell with hieroglyphics on the concave surface, and filled with beads of all size. (R9)

The underlining in the original report reflects the startling nature of the presence of iron artifacts when intrusive burial could be ruled out. The hieroglyphics, which included the figure of the "mystic serpent" suggested Central-American connection! (R9)

The "hieroglyphics" could be more significant that the iron artifacts, but they are not illustrated in the Science article. In 1884, "hieroglyphics" was widely applied to all sort of mysterious insciptions.

Northwest Territories. In the high Canadian Arctic, on Ellesmere Island, archeologists have recently found a spectrum of Norse artifacts: a knife, spear blades, Viking ship rivets, iron wedges, and Medieval chain mail. (R47) (See also MMC1 for probable Norse cloth artifacts.)

If the Norse could reach Ellesmere Island, they certainly could have entered

Hudson Bay and had access to the North American interior.

Ohio. In an Indian mound in Wayne County, in 1889, an iron ax and copper breastplate. (R10, R26) However, such finds of iron artifacts in North American mounds was loudly challenged by F.W. Putnam. (R6, R7, R8)

In another Ohio mound, at Marietta, large circular ornaments of copper overlaid with silver. (R26) It is not clear whether the silver was bonded to the copper in any way.

In 1891, according to an item in Nature, at an unspecified Ohio location, at a depth of 14 feet, workers found:

> ...the massive skeleton of a man incased in copper armour. The head was covered by an oval-shaped copper cap; the jaws had copper mouldings; the arms were dressed in copper, while copper plates covered the chest and stomach, and on each side of the head, on protruding sticks, were wooden antlers ornamented with copper. The mouth was stuffed with genuine pearls of immense size, but much decayed. Around the neck was a necklace of bears' teeth, set with pearls. At the side of this skeleton was a female skeleton. (R12, R32)

In 1896, W.K. Moorehead reported in the American Antiquarian on the excavation of mounds at Paint Creek. This dig is so interesting that a longer-than-usual quotation is in order.

> In cut No. 3 a number of bodies were found surrounded by large ocean shells (Busycon and Pyrula), plates of mica, lumps of galena, stone pipes, spear-heads, and beads. In the centre of the cut upon the base line a deposit of two hundred copper objects and implements was laid. The deposit covered a space 6 x 10 feet. Among the objects found were an enormous copper ax 22½ inches long and weighing 38 pounds, and copper plates or square sheets of copper used for ornamental purposes. With the deposit were 25,000 pearl and shell beads. Accompanying the copper implements of the more ordinary form were anklets, bracelets, combs, saucers, several fish and suastika [sic] and crosses. The discovery of four crosses, which are peculiarly oriental in character, marks a new epoch in American archaeology. (R14)

In reference to the Ohio mounds-builders, Moorehead continued:

> That they should have made copper fish, combs, anklets, etc., strangely like the Etruscan and Phoenican designs, and crosses the duplicate of those used so extensively in India is hardly possible. (R14)

And, further, in a footnote:

> There are among the relics in the Field Museum at Chicago, not only these oriental symbols, which may be called Phoenican, Etruscan, Trojan, or East Indian, but there are also among them symbols similar to those common in medieval Europe and still common in cathedrals. Crosses in the form of the letter X combine with figures resembling the leaf of clover, as well as fish, which are Christian symbols. (R14)

An editorial following Moorehead's paper questioned its soundness based upon the apparent mixing of medieval and modern symbols.

Copper ingots in the distinctive ox-hyde geometry have also been dug from some of Ohio's Indian mounds. (R39)

Oklahoma. Small wooden masks overlaid with copper were buried in the well-known Spiro Mound on the Arkansas River. (R26)

Ontario. In 1931, near Thunder Bay, T.L. Tanton discovered a copper spear point lying on a deposit of blue clay beneath 40 feet of cross-bedded sand. Associated bones of bison and horses appeared to be modern, even though the depth of the artifact and bones suggest great age. (R49) Note that Thunder Bay is close to the extensive prehistoric copper mines on Isle Royale and northern Michigan; that is, the mines of the Old Copper Culture.

By far the most contentious Canadian metal artifacts are the Beardmore Relics. No one denies that these are of genuine Norse origin circa 900-1,000 A.D. The question is how they got to Beardmore, about 100 miles northeast of Thunder Bay and only about 50 miles from Lake

Superior and the ancient copper mines on Isle Royale.

The relics consist of a broken sword, an ax head, some fragments of iron mail, and either a horse rattle or shield handle. These artifacts were originally claimed to have been "discovered" in 1931 by a gold prospector, J. Dodds. When submitted to scientists, they were declared genuine.

History-wise, if the Beardmore Relics were dropped or buried by Vikings, one might easily surmise that the Vikings had found a route to Lake Superior via Hudson Bay and Lake Nipigon. (R15-R17, R19) Vikings on Lake Superior would have access to Minnesota and Wisconsin where many additional Viking artifacts are claimed.

Predictably, much controversy enveloped artifacts that implied a Norse presence in the center of the continent. Skeptics, such as M. McKusick and E. Wahlgren, claimed fraud. The Beardmore Relics may be authentic, they admitted, but deeper investigations revealed that they were actually brought to North America in 1923 by a J. Bloch and then "planted" at the Beardmore site for J. Dodds to "discover." (R28, R45)

There are some inconsistencies in the cited literature. It should be mentioned that M. McKusick also asserts that the famed Kensington Stone, which bears a Norse insceription, is also a fraud.

Worth repeating here is the recent discovery of Norse artifacts on Ellesmere Island in the high Canadian Arctic ---a much more challenging destination than Hudson Bay. (See Northwest Territories above.)

Oregon. The following quotation comes from the distinguished, but long defunct, English Mechanic and World of Science:

> In one of the ancient Indian mounds in Oregon, examined by H.A. Chase, he found, among a great variety of stone tools and implements, a hatchet or adze of brass, 4 in. long, 3 in. wide at the cutting edge, and 2 in. wide at the head. The aperture for the handle was through the side--- like a hoe. It may have been obtained from the wreck of some ancient Japanese or Chinese junk; or, possibly, have been made from copper and zinc. (R3)

Tennessee. Some of the most intriguing evidence for Old-World incursions into North America about the time of Christ turned up at Bat Creek, Tennessee. G.F. Carter has described these finds:

> In North America a whole complex of this period appears at Bat Creek, Tennessee, where a burial is accompanied by an inscription, brass bracelets, and a bit of wood from an ear spool. The brass in this burial is of an eastern Mediterranean composition used only in the early centuries A.D. and not for 1000 years thereafter. The inscription is in Hebrew, and the letters are those of coinage dating to the early centuries A.D. The inscription, brass bracelets, and C14 date all agree in placing the finds in the opening centuries of the Christian era. (R36, citing J.H. McCulloch, Tennessee Anthropologist, 13:79, 1988)

The inscription on the Bat Creek Stone is highly controversial and has been translated several ways. See MGW in another volume for more.

Vermont. Copper or bronze point (Swanton; ax (Milton); pin (Swanton). (R27) Obviously, these artifacts sans dates could have been lost from modern collections or have some prosaic explanation.

Washington. In 1889, the American Antiquarian reported that J.H. Hungate had recovered some metal artifacts from a grave in Washington Territory.

> He discovered in Almota, in Walla Walla valley, on the Snake River, a group of eight or ten mounds, and among the mounds a grave which contained some interesting relics. The relics seem to have constituted the coat of mail and war implements of some Indian chief, a chief who had contact with the early Spanish settlers or discoverers. There was in the grave a long, rusty steel sword, the head of a lance or dirk, and the coat of the chief...The coat was made of a vast number of copper tubes which were strung on twine cords and woven into the shape of a coat. (R11)

Wisconsin. Viking-style swords, axes, and halberds reported from Wisconsin are, like those from Minnesota, dismissed

by mainstream archeologists as the lumbering tools of early American colonists. (R45) [Swords and halberds are lumbering tools?]

H.R. Holand, in his book (R18), focussed on his claims for an early Viking presence in Minnesota, but he also provided a photograph of a Scandinavian-style spearhead that had been plowed up in a field near Whitehall, Wisconsin.

Looking much farther back in time, before the Viking sagas, the state of Wisconsin, like Michigan, contains considerable evidence of the so-called Old Copper Culture. In this regard E.A. von Fange wrote:

> [J.E.] Fitting reports two C14 dates of 2700 B.C. and 5500 B.C. for the Oconto site in Wisconsin where stone and copper artifacts were found. Both seem too old for what is believed about this culture. At another Wisconsin site, two dates from the same source were 5600 and 7510 B.C. On this basis these people are considered the oldest metal users in the world. The dates are embarrassing and perplexing. Perhaps some day a tie will be found with the Old Copper Culture and world-wide navigation before the time of Abraham, rather than somehow attributing all the copper culture to early American Indians. (R26)

Some prehistoric copper artifacts made from float copper (natural nuggets) by Native Americans in Wisconsin.

Another remarkable feature (besides age) of the artifacts of the Old Copper Culture is evidence that some of their copper artifacts seem to have been cast ---a process requiring temperatures over the melting point of copper of 1083°C. Forced-air furnaces are required to attain such temperatures. E.J. Neiberger has researched American prehistoric metallurgy and wrote:

> I have identified approximately twenty-five surface-find copper artifacts from Wisconsin: they display casting porosities in Xeroradiograph, but have not been affiliated with a specific site. No reliable evidence supports casting techniques imported from the Old World or other outside locations. (R42)

Neiberger prefers the "independent-invention" theory for this precocious casting technology. Whereas von Fange implies (above) pre-Christian-era diffusion.

It would indeed by anomalous if the Old Copper Culture of North America was indigenous and led the Old World in copper metallurgy. It would be equally anomalous if the Old Copper Culture was a product of Old-World visitors.

X2. Mesoamerica. Anomalous metal artifacts are rare in Mexico and elsewhere in Central America. Not that there are no metal artifacts, it is rather that most do not imply Precolumbian contacts or demonstrate a precocious knowledge of metal-working. A few artifacts that may be anomalous are now presented.

Mexico. Copper implements illustrating skilled craftsmanship have turned up in western Mexico, but they date later than 1,000 A.D. Further, it is suspected that this technology was derived from South America where metal-working was much farther advanced. (R48)

In his book The Great White Gods, R.F. Marx presents photos of bronze a bell, suspected to be of Roman origin and a bronze sword blade. Both found near Merida, Yucatan. Another bronze sword comes from Cozumel, an island off the coast of Yucatan. (R34) These two bronze artifacts might indicate Precolumbian European contacts.

Nicaragua. A copper mask from Ometepec Island in Lake Nicaragua was probably fashioned late in the first millennium A.D. (R48) The mask is stylistically interesting and potentially anomalous, as are the strange statues on this island (See MGP in another volume for these statues.)

X3. South America. In Chapter MMT, the remarkable metallurgical accomplishments in Precolumbian South America are brought to the fore. As for metal artifacts suggestive of Precolumbian European contacts, they are few.

Brazil. R.F. Marx has provided a photo of a bronze Roman fibula (a sort of pin) found in a claimed Roman shipwreck. (R34)

Peru. The first of the Spanish invaders of Peru are said to have found an iron nail---a metal not widely used in South America, although certainly available in small quantities from meteorites. Also, there are vague tales of ancient iron mining on the western shore of Lake Titicaca. (R26) Further details have not yet been found.

X4. Europe. In Europe, metal artifacts can be considered anomalous if they seem to be more ancient than the oldest accepted dates for the use of the metals in question for the various cultures.

The Alps. When the body of Otzi was found in an Alpine Glacier in 1997, a copper ax lay nearby. Otzi and the ax are dated at about 3,000 B.C.. In a 1998 issue of Nature, A.J. van Loon states that 5,000 years ago copper tools were not yet in use. (R42) If this is so, the copper ax is anomalous.

However, as mentioned frequently in X1, the so-called Old Copper Culture in North America is apparently older than this European artifact by several millennia---the reverse of what one would expect.

Greece. In Macedonia, copper pins from an archeological site are dated at about 4,000 B.C. (R26) Of course, this conflicts with the assertion made above that Otzi's ax established a new age limit for copper use for Europe.

X5. Middle East. In Iran, at Tepe Yahya, bronze tools dated at about 3,500 B.C. have been claimed. This date is widely accepted as the beginning of the Bronze Age in the Old World. (R26)

X6. Africa.

Egypt. Archeologists have long maintained that the ancient Egyptians were restricted to copper tools when they raised the pyramids. To be sure, copper was employed very early in Egypt. Beads and pins of beaten copper date back to 4,000 B.C. (R26) If this date is sound, the Egyptians preceded the Iranians at Tepe Yahya by five centuries. As mentioned in X4, North America's Old Copper Culture seems to have preceded even the use of copper in ancient Egypt.

More important from the technological standpoint, though, is whether the ancient Egyptians might have employed iron in building the pyramids. It is very likely they had found iron meteorites, but did they somehow fashion native iron into tools?

In 1891, W.T. Haydon recorded two instances where iron tools reportedly appeared at ancient Egyptian sites. He wrote:

> It would be interesting to have upon record the instances of iron having been found in Egypt.
>
> From beneath one of the sphinxes at Karnak, Belzoni secured a scimitar-like blade, and from between the stones of the Great Pyramid a wedge-like piece of iron was rescued. (R13)

We have not found other mentions of of the scimitar, but the authenticity of the iron wedge from the Great Pyramid was much debated in the 19th. Century.

The wedge was discovered in 1837 when H. Vyse's team was removing some masonry prior to cleaning the southern air shaft of the King's Chamber. It was removed from an inner joint after blocks from two outer tiers had been blasted

off the pyramid's surface. The find was well-witnessed and attested to in writing. However, the Great Pyramid's age of 2,600 B.C. greatly preceded the officially accepted beginning of Egypt's Iron Age (about 1,300 B.C.) by so much that the wedge was discounted and is rarely mentioned anymore. (R41)

Actually, iron chisels and other tools were also found at Saqqara. No dates given. (R26)

X7. Asia

India. An intriguing but nonanomalous occurrence of copper artifacts has been noted in India.

> One of the interesting elements of the archaeology in India in the second millennium B.C. are the occurrences of copper hoards, suggesting that these were valuable ritual or prestige items which were hidden securely from the marauders of the time. Thirty-seven caches had been found up until the late 1980's, and thermolumine-scence dates yield a period between 2650-1180 B.C. (R48)

Siberia. More significant than the Indian copper hoards is the appearance of deeply buried metal artifacts in Siberia. T.W. Atkinson described the discovery in two 1860 papers.

> During the author's stay at the gold-mine on the River Shargan, in Siberia (Lat. 59°30' N. and Long. 96°10' E.) in August 1851, some fragments of worked bronze were dug up by the workmen, at a depth of 14 feet 8 inches below the surface, from a bed of sand in which gold nuggets occur. This sand rests on the rock and is covered by beds of gravel and sand, overlain by 2 feet of vegetable soil. The fragments appear to have belonged to either a bracelet or to some horse trappings. (R1, R2)

The depth of 14 feet implies great age, but recent floodings could also have buried the artifacts. In 1851, stratigraphic dating had not been developed.

It is tempting to associate the Siberian gold mines and gravels with the Californian auriferous gravels in which Many ancient stone artifacts have been found. (MSS1/CA)

X8. Oceania. This entry has all the earmarks of a hoax. Nevertheless, it is a delightful tale. Its source is the old American Mercury, which is hardly part of the science literature.

It seems that in early March of 1882, the 1495-ton steamship Jesmond was plying the waves about 200 miles south of the Azores when it encountered dark, muddy waters. A day later, an island was discerned on the horizon where the charts claimed a depth of 2,000 fathoms. The Jesmond anchored in 42 feet about 12 miles from the shore. D. Robson, the captain, went ashore in a small boat with a number of his crew. They landed on "a vast plain of volcanic debris." Among the debris Robson asserted there were signs of a destroyed civilization.

> For the rest of that day and part of the next, they dug out and ferried to the Jesmond a most remarkable collection of artifacts. Included were bronze swords, hammers, rings, two large clay vases with birds and animals carved thereon, stone implements, and a quantity of bone fragments---including a nearly intact cranium. (R22)

The Jesmond had to steam on to maintain its schedule, making port in New Orleans on April 1. [A suspicious date!] There, Dobson reported the discovery of the new island. His story was supposedly printed in a local paper on April 28. Robson stated then that he planned to turn the wondrous artifacts over to the British Museum when he reached London. The Jesmond is said to have docked in London May 19, but the British Museum never received the artifacts. Nor was the island ever seen again by mariners.

Note that several islands gracing old maps of the Atlantic, such as Hy Brazil, have never been found! (See W.H. Babcock's Legendary Islands of the Atlantic.)

X9. Australia. Amateur Aussie archeologists have reported many hints that the ancient Egyptians made contact with

their island continent millennia ago. We quote D.H. Childress on this matter of suspect metal artifacts.

> In 1965, at Ipswich, Queensland, workmen dug up a cache of hand-forged Egyptian bronze, copper and iron tools, pottery, and coins dating back more than 2,000 years.
>
> .....
>
> In the town of Geraldton in 1963 workmen excavating 28 feet below sea-level brought up an Egyptian bronze plate from an ancient beach level. (R40)

Of course, mainstream archeologists usually disdain such uncontrolled discoveries. Actually, the above two are merely samples from a rather broad spectrum of Egyptian-style artifacts and inscriptions that have surfaced in Australia over the years. All are suspect.

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MMM2 Familiar Metal Artifacts Claimed to Have Been Found Embedded in Geologically Old Rocks

Description. The claimed discovery in ancient rocks, especially coal, of commonly used metallic artifacts. Often these objects are in cavities the size and shape of the enclosed object, giving the impression that they were present when the rock solidified.

Data Evaluation. The claimed phenomenon is surprisingly common, but it is almost invariably reported in newspapers or the fringe literature. Almost always, too, the discoveries were made by miners or quarrymen under uncontrolled conditions. No scientific investigations of any of these "finds" have been undertaken or reported. We are left, then, mostly with vague reports in popular publications. Rating: 4.

Anomaly Evaluation. The discovery of human-made metallic artifacts encased in rocks many millions of years old would be an anomaly of the highest order. Rating: 1.

Possible Explanations. Metallic objects of recent manufacture were mistakenly associated with mining operations or with mined products. Hoaxes are possible, too, particularly in the older newspapers.

Similar and Related Phenomena. Heavily mineralized objects of recent manufacture (MMM3); petrifying springs (ESC7 in Anomalies in Geology); totally enigmatic metallic objects found solid rock (MMM4); living animals claimed to have been found entombed in solid rock (ESB8 in Anomalies in Geology).

Entries

X1. North America

Massachusetts. The following story of a metal bell blasted out of solid rock is a Fortean staple and is often referenced in the fringe literature. We quote from R2, in which the primary source is identified as the Boston Transcript.

> A few days ago a powerful blast was made in the rock at Meeting House Hill, in Dorchester, a few rods south of Rev. Mr. Hall's meeting house. The blast threw out an immense mass of rock, some of the pieces weighing several tons and scattered small fragments in all directions. Among them was picked up a metallic vessel in two parts, rent asunder by the explosion. On putting the two parts together it formed a bell-shaped vessel, 4½ inches high, 6½ inches at the base, 2½ inches at the top, and about an eighth of an inch in thickness. The body of this vessel resembles zinc in color, or a composition of metal, in which there is a considerable portion of silver. On the sides there are six figures of a flower, or bouquet, beautifully inlaid with pure silver, and around the lower part of the vessel a vine or wreath, inlaid also with silver. The chasing, carving, and inlaying are exquisitely done by the art of some cunning workman. This curious and unknown vessel was blown out of the solid pudding stone, fifteen feet below the surface. (R2, also mentioned in R5, R9, and R10)

Illinois. Almost as renowned as the Massachusetts bell-like vessel is the gold chain said to have been found in coal. The original source here is also a newspaper, the Morrisonville (Illinois) Times, June 11, 1891.

> A curious find was brought to light by Mrs. S.W. Culp last Tuesday morning. As she was breaking a lump of coal preparatory to putting it in the scuttle, she discovered, as the lump fell apart, embedded in a circular shape, a small gold chain about ten inches in length of antique and quaint workmanship. At first Mrs.

> Culp thought the chain had been dropped accidently in the coal, but as she undertook to lift the chain up, the idea of its having been recently dropped was at once made falacious, for as the lump of coal broke it separated almost in the middle, and the circular position of the chain placed the two ends near to each other, and as the lump separated, the middle of the chain became loosened while each end remained fastened to the coal. This is a study for the students of archaeology who love to puzzle their brains over the geological construction of the earth from whose ancient depth the curious is always dropping out. The lump of coal from which this chain was taken is supposed to come from the Taylorville or Pana mines and almost hushes one's breath with mystery when it is thought for how many long ages the earth has been forming strata after strata which hid the golden links from view. The chain was eight-carat gold and weighed eight penny-weights. (R6, also mentioned in R9, R10)

Compare the foregoing for content and flamboyant style with some of the discoveries of living toads in solid rock in ESB8 in Anomalies in Geology. A flowery writing style often betokens a hoax.

Oklahoma. The affidavit quoted below in part was printed in R10 and R11 and mentioned briefly in R9. It was sworn to by F.J. Kenwood, November 27, 1948.

> While I was working in the Municipal Electric Plant in Thomas, Okla., in 1912, I came upon a solid chunk of coal which was too large to use. I broke it with a sledge hammer. This iron pot fell from the center, leaving the impression or mold of the pot in the piece of coal. Jim Stall (an employee of the company) witnessed the breaking of the coal, and saw the pot fall out. I traced the source of the coal, and found that it came from the Wilburton, Oklahoma, Mines. (R10)

The age of the coal was estimated by a geologist to be 312 million years. The pot was once in the private museum of R. Nordling. When this gentleman died, his museum was scattered and the pot lost. Only a photograph remains.

Colorado. According to a letter sent to the American Antiquarian in 1883, a thimble was found in the Marshall coal bed near Boulder.

> A "drift" had been run 150 ft. into the side of the bluff, the farther end being about 300 feet from the surface. From this point the coal was taken. Upon my friend's return home he placed some large chunks of coal in the stove, but upon its not burning well, he broke them and in the middle of one, imbedded in a hollow place, but completely surrounded by the coal, the thimble was found. These coal beds are classed by Prof. Hayden as lignitic and lying between the Tertiary and the Cretaceous. Much of the coal is "fresh," some of it too "green" to burn well. My informant says the chunk in which the thimble was found "showed the grain of the wood." For some time he kept it, but it is now lost. The thimble was full of coal and sand and retained its shape well. (R3)

Wyoming. In 1937, Mrs. M.R. Burdick, of Casper, Wyoming, discovered a 6-inch-long spoon in a large chunk of Pennsylvania soft coal. (R8)

The composition of the spoon was not specified in our source. From the photograph of the object printed in R8, it might be polished stone or molded ceramic rather than metal. The spoon was sent to the Smithsonian, but the Institution replied that human artifacts could never be found in coal. Such may be the case, but it is, nevertheless, an assumption.

Idaho. E. Booth of Boise, Idaho, reported a pin in a lump of coal. No date or details beyond this statement. (R9)

California. When a fist-sized piece of auriferous quartz from California was dropped accidentally and upon impact split open, a 6-penny nail appeared. It was slightly corroded but straight with a perfect head. (R9) No further information given here.

X2. Europe

Britain. A very old claim of a metal object embedded in solid rock was submitted to a scientific journal (R1) by a respected scientist of the early 19th. Century. However, the information was provided by a Mr. Buist as based upon interviews with miners at a quarry in North Britain. One cannot, therefore, characterize it as a product of scientific investigation.

We quote the part of the report entitled: The Circumstance of the Discovery of the nail in the block of stone.

> The stone in Kingoodie quarry consists of hard stone and a soft clayey substance called "till;" the courses of stone varying from six inches to upwards of six feet in thickness. The particular block in which the nail was found, was nine inches thick, and in proceeding to clear the rough rock for dressing, the point of the nail was found projecting about half an inch (quite eaten with rust) into the "till," the rest of nail laying along the surface of the stone to within an inch of the head, which went right down into the body of the stone. The nail was not discovered while the stone remained in the quarry, but when the rough block (measuring two feet in length, one in breadth, and nine inches in thickness) was being cleared of the superficial "till." There is no evidence beyond the condition of the stone to prove what part of the quarry this block may have come from. (R1)

The above quotation is another classic of the genre.

England. In 1901, the popular English Strand Magazine reported that R.C. Hardman of Meadhurst, Uppingham, found a coin dated 1397 embedded in a lump of coal. (R4)

As in North America, coal seems to be the most common matrix for these potentially anomalous metal artifacts.

England. C. Fort collected the following example from Notes and Queries, a well-known venue for public discussion of a wide range of subjects.

> That in Notes and Queries, 11-1-408, there is an account of an ancient copper seal, about the size of a penny, found in chalk, at a depth of from five to six feet, near Bredenstone, England. The design upon it is said to be of a monk kneeling before a virgin and child: legend upon the margin is said to be: "St. Jordanis Monachi Spaldingie." (R5)

Obviously, a highly suspect find! The date of the Fort's source is circa 1880.

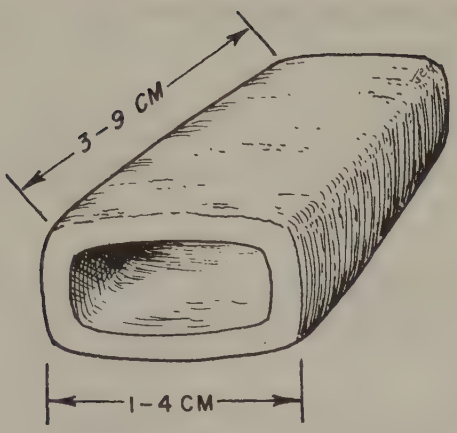
Fort also collected an interesting account from the London Times of June 22, 1844. In this instance, men working in a quarry near Tweed discovered a gold thread embedded in stone at a depth of eight feet. (R5, also R9)

Scotland. Again, we rely upon C. Fort's library research. His source for the following is the Society of Antiquarians of Scotland, Proceedings, 1-1-121. No date.

> That, in a lump of coal, from a mine in Scotland, an iron instrument has been found---
>
> "The interest attaching to this singular relic arises from the fact of its having been found in the heart of a piece of coal, seven feet under the surface." (R5, also R9)

France. The ultimate source of this item is the translation of a letter sent to L. Pauwels and J. Bergier, noted French investigators of the paranormal. That the writers of the letter draw a most radical conclusion is obvious. To our knowledge, no scientist followed up on this discovery.

> Caen, France, 30, Sept. 1968. We would like to bring to your attention the following facts, and hope you will give our discovery some consideration. As speleologists and investigators, we have studied for several years the Pays d'Auge region of Calvados. During the year 1968, we discovered some metallic nodules in a hollow in an Aptian chalk bed in a quarry being worked in Saint-Jean de Livet. These metallic nodules have a reddish brown color, a form absolutely identical (semi-ovoid, but are of different size. A central section has a form corresponding with the exterior form.)
>
> These nodules at first seemed to be fossils, but having examined them carefully we became conscious of their



Curious metallic nodules embedded in a French chalk bed. (X2)

entirely metallic nature. Experiments at the forge showed that the carbon content was higher than castings of today. We were led to consider the hypothesis that they were meteorites, but five pieces were found all of the same nature, which lead us to reject this hypothesis. There remains only an intelligent intervention in the Secondary Era (the end of the Cretaceous) of beings who could cast such objects. These objects, then, prove the presence of intelligent life on earth long before the limits given today by prehistoric archeology. (Signed: Y. Druet and H. Salfati) (R7)

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MMM3 Heavily Mineralized, Familiar Metal Artifacts Not Embedded in Bedrock

Description. Commonplace metal artifacts found in concretions or other heavily mineralized masses that are not embedded in solid rock. Such masses may give an erroneous impression of great age.

Data Evaluation. Except for a single debunking article, all potentially anomalous artifacts were reported in fringe publications. In all cases, the discoveries were made by amateurs under uncontrolled conditions. The dating of these concretions and mineralized masses is always suspect. No scientific inquiries were ever mounted. Rating: 4.

Anomaly Evaluation. The two controversial metal artifacts cataloged here (the "Coso artifact" and the so-called "Ordovician hammer") were found encased in concretion-like masses with ancient fossil shells incorporated in the matrix. If the artifact ages are based upon the associated fossils, they are hundreds of thousands, even hundreds of million years old. The metal objects, ostensibly of recent manufacture, would then be highly anomalous. Rating: 1.

Possible Explanations. Most likely, these artifacts are really of recent manufacture and were incorporated with fossil shells in concretionary masses, which are known to form in time spans measured in decades. The radical, alternative explanations would have: (1) ancient astronauts leaving the artifacts in ages past; or (2) a greatly compressed geological time scale consistent with Biblical statements.

Similar and Related Phenomena. Familiar metallic objects embedded in ancient strata (MMM2); totally enigmatic metal objects in solid rock (MMM4); petrifying springs (ESC7 in Anomalies in Geology); concretions and geodes (ESA3 and ESA5 in Neglected Geological Anomalies); living animals found apparently entombed in solid rock (ESB8 in Anomalies in Geology).

Entries

X1. The Coso artifact. On February 13, 1961, M. Mikesell and two companions were collecting mineral specimens about 6 miles northeast Olancha, California. In particular, they searched for geodes to sell in their rock shop in Olancha. One of the objects they picked up is, in fact, often called the "Coso Geode" after nearby Coso Junction. The "Geode" part of this object's name, however, is not accurate because the object does not contain the hollow center lined with crystals, which is a defining characteristic of geodes. The Coso object was a merely a lump of "something" encrusted with hardened clay. The external clay contained pebbles, fossil shells, a nail, and a washer. All this was cemented together. It is the "something" inside that has attracted great interest.

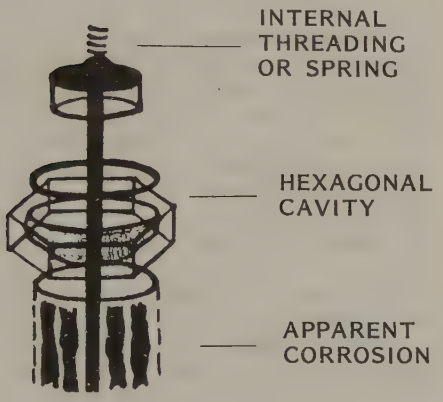
Genuine geodes are usually sawn in half for sale to collectors who prize the colorful crystals within. Consequently, a diamond saw was duly applied to the Coso object. But there was something unexpectedly hard inside because the diamond saw blade was ruined in the operation. The halves, when finally separated, revealed the following:

> The central object in the rock is a 2 mm. shaft of bright metal. This was cut in two in 1961 but five years afterward had no tarnishing visible. Surrounding this is about 3/4 inch of some ceramic material. And visible around the outside of this seems to be some copper material, which is partially decomposed. (R1)

The hard ceramic was the part that damaged the saw. Obviously, the interior of the Coso object was much more intriguing than a run-of-the-mill geode. X-

rays seemed in order, about which R.J. Willis wrote:

> In looking at the X-ray photos, it appears that the shaft goes through all the components shown in the [ordinary] photos and seems to be corroded at the end. However, the shaft unmistakenly ends in what appears to be a spring or helix of metal. There are three segments of the object on the shaft, and the central one of ceramics with some corroded copper, is the visible one that has been sliced in two. (R1)



Assumed structure of the Coso artifact based upon X-ray studies. (X1)

From the X-rays and ordinary photos, P.J. Willis, R.J.'s brother, attempted to reconstruct the whole object in a sketch. The result looked amazingly like a modern spark plug! This interpretation is actually consistent with the nail and washer present in the soft clayey external material; that is, all the metal debris is of recent manufacture.

This "spark-plug" identification is, of course, only an interpretation; but it is reasonable and consistent with the formation of "concretions." Concretions often form rapidly when minerals in ground water come out of solution and form various shapes, often encrusting objects in the vicinity. The presence of old mines in the areas where the Coso artifact was found enhances the view that it is merely a recent production of a natural geological phenomenon that happened to cement some miners' debris together into a nodule.

The popular radical interpretation evolves from the speculation of a geologist who viewed the Coso artifact. He opined that it could be 500,000 years old, based upon the fossil shells he saw in the clay. The possibility of a spark-plug-like object 500,000 years old drew the attention of Forteans and, especially, the ancient-astronaut believers. The latter hold that the earth was visited by aliens in ages past and left evidence of their landings in age-anomalous items like the Coso artifact. (R5, R7)

To our knowledge, no scientist has ever seriously inquired into the nature of the Coso artifact.

Finally, it should be recorded that this whole business seems to have begun when the Coso artifact was written up in the February 1961 issue of the Desert Magazine.

X2. The "Ordovician hammer." Whereas the Coso artifact has been a staple of the Forteans and believers in ancient astronauts, the so-called "Ordovician hammer" has been advanced by creationists as proof that the earth is really very young geologically speaking. (Anything from the Ordovician period is 438-505 million years old or thereabouts.)

The first mentions of this supposedly ancient metal hammer in our files occur in the 1983-1985 issues of Ex Nihilo, an Australian creationist magazine (Now named: Creation.) (R2-R4)

It was in 1983 that Ex Nihilo printed a notice that a metal hammer had been found in a concretion inside a limestone bed near London, Texas, not far from the famed Paluxy human tracks. (MME5) Additional information followed in a 1984 issue, as now quoted:

- The hammer was discovered on the Llano uplift, southwest of the Paluxy River, Texas, U.S.A.. The Llano uplift is a granite intrusion covered by Ordovician sandstone.
- The hammer was discovered within a shell-bearing sandstone (Initial re-

The so-called "Ordovician hammer" partially encased in a concretion found in a limestone stratum. (X2)

ports incorrectly labelled it as limestone).

- The hammer handle is probably of spruce wood.
- The interior of the handle is partially coalified.
- The handle contains pockets of fluid.
- The wood in the handle was hard and fibrously intact when discovered.
- When the stone surface was first removed the iron (alloy?) head was shiny and began to corrode only several months later. (R3)

A 1985 number of Ex Nihilo added to the existing dossier. The hammer was found in June 1934 [50 years earlier!] by E. Hahn. The fossil shells adhering to the concretion were dated as at least 400 million years old. However, the concretion containing the hammer was laying loose upon a ledge and not within a rock stratum. The fossils in the concretion and nearby limestone, however, were similar. (R4)

Given these facts, the "Ordovician" hammer could well be recent---like the Coso artifact, where the encrusted fossil shells are not necessarily indicators of the artifact's age. The hammer itself had to be dated somehow. A chemical analysis of the hammer's metal was in order.

The chemical analysis published in creationist magazines is widely attributed to Batelle Laboratories in the United States, but one investigator states that private, anonymous individuals actually did the chemistry. In any case, the results do seem anomalous:

> They are surprising because the hammer head, which is made of iron, appears to contain none of the minor quantities of substances, such as silicon or carbon, which are normally incorporated in modern iron and steel production. According to the [denied] Batelle report, the hammer head contains no silicon, no nickel and no carbon whatsoever. (R5)

Creationists maintain that this anomalous composition indicates that the hammer is not of modern manufacture and must, therefore, have been manufactured by humans living in Ordovician times, who were familiar with a different sort of iron metallurgy! Therefore, we have creationists denying a modern origin for the hammer. Rather, they maintain that advanced humans were present in Ordovician times---the age suggested by the shells attached to the concretion. (R8)

This is quite a leap. We have seen no Batelle report nor formal presentation of results by any other chemists.

In the view of creationists, the earth is actually only a few thousand years old, and the geological age of hundreds of millions of years mainstream geologists attach to the Ordovician period is incorrect. To most creationists, the discovery of an Ordovician-age hammer is actually consistent with their position that humans were contemporary with the dinosaurs---as suggested by the apparent comingling of human-like and dinosaur footprints along the Paluxy River nearby. (MME5) The whole geological time scale is greatly compressed according to creationists.

The mainstream view of the Ordovician hammer was voiced by L.R. Godfrey and J.R. Cole in the August 1986 issue of Natural History.

> The hammer, dated stylistically, is a nineteenth-century relic probably dropped by a miner into a crack in the Ordovician rock and subsequently washed over with sedimentary slush that then hardened. (R6)

Godfrey and Cole point out that World-War-II artifacts have been found in the Pacific already encased in stone. The claim of unusual iron metallurgy is not mentioned in the Natural History piece.

The similarity between the cases of the Coso artifact and the Ordovician hammer should be noted.

References

R1. Willis, Ronald J.; "the Coso Artifact," INFO Journal, p. 4, no. 4, 1964. (X1) INFO = International Fortean Organization.
R2. Anonymous; "Fossil Hammer," Ex Nihilo, 1:5, April 1983. (X2)
R3. Anonymous; "Ordovician Hammer Report," Ex Nihilo, 6:16, no. 3, 1984. (X2)
R4. Anonymous; "Pre-Flood (?) Hammer," Ex Nihilo, 8:14, no. 1, 1985. (X2)
R5. Reader's Digest, Editors; Mysteries of the Unexplained, Pleasantville, 1982, p. 47. 1982. (X1)
R6. Godfrey, Laurie R., and Cole, John R.; "Blunder in Their Footsteps," Natural History, 95:4, August 1986. (X2)
R6. Childress, David Hatcher; Lost Cities of North & Central America, Stelle, 1992, p. 511. (X1)
R7. Helfinstine, Robert; "Texas Artifact: Facts and Philosophy," Ancient American, p. 8, no. 43, 2002. (X2)

MMM4 Enigmatic, Artificial-Appearing Metallic Objects Found in Ancient Rocks

Description. Metal cubes and spheroids, strongly artificial in appearance, but found in geological formations hundreds of thousands and even hundreds of millions of years old.

Data Evaluation. Some of our information comes from reputable science journals, but most descriptions and speculations were found in publications far off science's mainstream. Furthermore, the objects in question have not been studied by scientists, rather they have been sloughed off. Our data are very soft. Rating: 3.

Anomaly Evaluation. If the objects cataloged below are truly artifacts and of the ages accorded them by their geological locations, we have first-class anomalies. If the objects are actually created by nature, being, say, concretions, they are still difficult-to-explain, but not as difficult if they were artificial! We assume natural origins. Rating: 2.

Possible Explanations. Geological concretions are the most probable explanation.

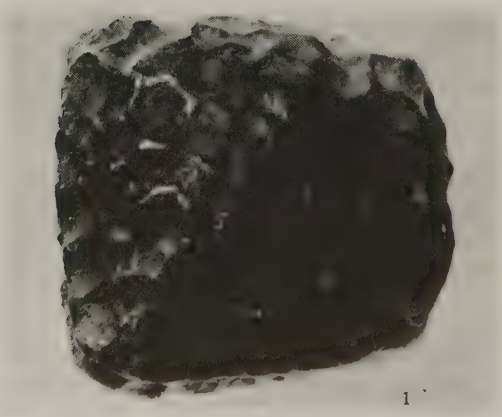
Similar and Related Phenomena. The other entries in this section (MMM1-MMM3); concretions (ESA3 in Neglected Geological Anomalies).

Entries

X1. Dr. Gurlt's cube. In 1885, a workman at the Wolfsegg coalpit, near Schoendorf, Austria, came across a squarish lump of metal amidst the blocks of coal detached from a Tertiary seam. This unusually shaped object attracted the attention of F.A. Gurlt, a mining engineer. Gurlt subsequently described the cube-like object and his thoughts concerning its origin to a German technical society. Nature and a few other science journals of the time published notices of this curious discovery. The Nature item follows in part.

At a recent meeting of the Nieder-

rheinische Gesellschaft fur Natur- und Heilkunde at Bonn, Dr. Gurlt described a fossil meteorite found in a block of Tertiary coal, and now in the Salzburg Museum. He said it belonged to the group of meteoric irons, and was taken from a block of coal about to be used in a manufactory in Lower Austria. It was examined by various specialists, who assigned different origins to it. Some believed it to be a meteorite; others an artificial production; others, again, thought it was a meteorite modified by the hand of man. Dr. Gurlt, however, came to the conclusion, after careful examination, that there is no ground for believing in the intervention of any human agency. In form, the mass is almost a cube, two opposite faces being rounded, and the four others being made smaller by the roundings. A deep incision runs all around the cube. The faces and the incision bear such characteristic traces of meteoric iron as to exclude the notion of the mass being the work of man. The iron is covered with a thin layer of oxide; it is 67 mm. high, 67 mm. broad, and 47 mm. at the thickest part. It weighs 785 grammes, and its specific gravity is 7.75; it is as hard as steel, and it contains, as is generally the case, besides carbon, a small quantity of nickel. A quantitative analysis has not yet been made. (R1)



Dr. Gurlt's "cube" was picked up in an Austrian coal mine. Superficially, it resembles a meteorite. Dimensions: 6.7x 6.7x4.7 centimeters. (X1)

Despite its enigmatic nature, "Dr. Gurlt's cube," as it is often called, soon faded from the scientific scene, perhaps because it had no easy explanation.

It was C. Fort who resurrected the object is his 1919 The Book of the Damned. It is not surprising that the cube caught Fort's eye, for the impression one gets from the 1886 reports is that of a smooth-sided cube, with a peculiar incision etched around it. What was a metal cube of steel doing in Tertiary coal tens of millions of years old?

Today, Dr. Gurlt's cube remains mysterious, even though we know much more about it. As the accompanying photo illustrates, it is far from being a mathematical cube. Its sides are not smooth but covered with many indentations. These give it the appearance of a meteorite, but the lack of Widmanstatten patterns in an excised sample dispute that origin. So do modern chemical analyses which also tell us that the cube is not steel after all, and that no nickel, chromium, or cobalt are present. Rather, the cube seems to be merely cast iron.

Further, it is doubted by some that the cube was actually embedded in the coal. No cavity was mentioned that might have enclosed the cube. It might actually have been just mixed in among the fragments on the floor of the coalpit. It is conceivable that someone might just dropped or even planted a modern chunk of cast iron in the coal pit. The cube's claimed Tertiary age can thus been challenged. (R4)

Assuming Dr. Gurlt's cube-like chunk of iron is of Tertiary origin, what might its origin have been? It could, of course, be a product of nature, although one is pressed to explain how it might have been forged. It is improbable that any ancient astronauts would have fabricated anything so peculiar and useless. Nor would anyone from 1885 have been very likely to forge this curious object and drop it into a coal pit. In the end, we do not really know when Dr. Gurlt's "cube" came from.

X2. Billion-year-old metal spheroids from a South African mine. The South African, triple-grooved, metal spheroids (see photo) certainly appear to have been manufactured by some intelligent entity. The three, neat, circumferential grooves in particular suggest artifacts rather than some mischievous productions of nature. The problem for archeologists is that the spheroids come from a geological formation that is about 2.8 billion years old! Instead of something for the archeologists to ponder, we may have a geological conundrum here.

One of the triple-grooved metal spheroids from South Africa's Wonderstone Mine. Measuring between 1 and 4 inches, they may be 2.8 billion years old. (X2)

In size, the metal spheroids range from ½ inch to 4 inches. The metallic-appearing surfaces are blue with a reddish tinge and said to be harder than steel. Some of the spheres are solid; others hollow with a metallic skin ¼-inch thick. These are filled with a spongy material. Hundreds of these enigmatic objects have been found over the years.

All of the spheroids come from the Wonderstone Mine near Ottosdal, Transvaal, Republic of South Africa. Wonderstone is a popular name for pyrophyllite, which is $AlSi_2O_5(OH)$. This is a soft, talc-like substance sometimes called pencil stone. Pyrophyllite is used as a filler in paints, for electrical insulation, and other mundane applications. This mineral occurs in quartz veins, granite, and some metamorphic rocks.

The great ages of the spheroids (2.8-billion years) and their artificial appearance constitute a major enigma to scientists, although no one seems interested in finding an explanation.

> "It's a mystery. I have absolutely no idea what they could be," declared J.R. McIver, professor of geology at the University of Witwatersrand in Johannesburg. (R6)

Unfortunately, our sources are of the genre that are willing to ascribe the spheroids to debris left behind by ancient astronauts. To our knowledge, no scientist has seriously studied these perplexing objects. We do not even know the kind of metal involved, or if it is truly a metal rather than being merely metallic in appearance.

It is quite possible that the spheroids could be concretions, albeit very strange ones. However, we observe that some bona fide concretions are very strange, such as Nevada's "crazyballs," Long Island's "rattlestones," and the "popstones" around Chesapeake Bay. Even so, the metallic appearance of the South African spheroids and especially their three circumferential grooves are difficult to account for by known natural, geological processes.

References

R1. Anonymous; Nature, 35:36, 1886. (X1)

R2. Gurlt, M.; "Meteorite Trouvée dans un Lignite Tertiaire," Comptes Rendus, 103:702, 1886. Cr. C. Marecaille. (X1)

R3. Cade, C.M.; "Communicating with Life in Space," Discovery, 24:36, May 1963. (X1)

R4. Malthaner, Hubert; "Not the Salzburg Steel Cube, but an Iron Object from Wolfsegg," Pursuit, 6:90, 1973. (X1)

R5. Sullivan, Brenda J.; "Metal Spheres Manufactured 2.8 Billion Years Ago," Ancient Skies, 6:5, November-December 1979. (X2)

R6. Barritt, David; "Find New Evidence of Intelligent Life on Earth Billions of Years Ago," National Enquirer, October 2, 1979. (X2)

R7. Jimison, Susan; "Scientists Baffled by Space Spheres," Weekly World News, July 27, 1982. Cr. R. Calais. (X2)
R8. Rubtsov, Vladimir V.; "The Search for Extraterrestrial Artifacts," Ancient Skies, 16:1, November-December 1989. (X1)
R9. Cremo, Michael A., and Thompson, Richard L.; Forbidden Archeology, San Diego, 1993, p. 795. (X1)

MMP POTTERY ANOMALIES

Key to Phenomena

MMP0 Introduction

The major thrust of this chapter is evidence in the form of pottery that suggests the anomalous diffusion of human cultures across the globe. Most of the potentially anomalous pottery implies early contacts with the New World from Europe and Asia. However, pre-European contacts with Australia are also included. Of particular interest are the far-flung traces of pottery from the Jomon period in Japan.

As so often the case in archeology, we add a sprinkling of artifacts of debatable purpose.

MMP1 Pottery That is Anomalous in Geographical Location and/or Age

Description. The existence of pottery in locations and/or with dates that challenge prevailing views of human dispersal throughout the world.

Data Evaluation. The literature in our files regarding anomalous pottery is a mixed bag; part from acceptable science publications, part from popular sources. Two additional difficulties intrude: (1) Pottery is eminently portable and can be easily moved, accidentally or intentionally, to anomalous locations; (2) Cultural indentifications via similarities in pottery style, motifs, methods of manufacture, etc., are always subject to claims of independent invention.

In the eight potentially anomalous situations listed below, the data evaluations are the first figures in the ratings.

Anomaly Evaluation. Anomaly evaluations are the second in the ratings below.

- European pottery in Precolumbian North America (X1). Ratings: 3/1.
- Japanese pottery in Precolumbian North America (X1). Ratings: 2/2.
- European pottery in Precolumbian Mesoamerica (X2). Ratings: 3/1.
- Japanese pottery (Jomon culture) in South America (X3). Ratings: 2/2.
- European pottery (Roman period) in South America (X3). Ratings: 3/1.
- Mediterranean pottery (circa 1,000 B.C.) in Australia (X4). Ratings: 4/1.
- Chinese pottery in pre-European-contact Australia (X4). Ratings: 3/2.
- Japanese pottery (Jomon culture) in Melanesia (X5). Ratings: 1/3.

Possible Explanations. Anomalous pottery may be the consequence of misidentification or accidental transport. Long sea voyages in ancient times, intentional and accidental, were more common than generally accepted.

Similar and Related Phenomena. Low-tech metal artifacts (MMM1); stone artifacts with anomalous ages (MMS1); stone artifacts in unexpected locations (MMS3); ancient coins in anomalous places (MGC in another volume).

Entries

X0. Introduction. Although ancient pottery is not as portable and not as widely collected as old coins and arrowheads, the same caveats apply here. That is, all of these bona fide ancient artifacts may have been accidentally or ~~pruposely~~ dropped, lost, buried, and otherwise deposited in the wrong places---wrong for their ages and cultural affiliations. Just because an ancient Greek lamp is found shallowly buried in a New England farmer's field or picked up at a quaint antique store in Maine is hardly proof that the Greeks reached North America in Precolumbian times. Such artifacts must be obtained and carefully studied under controlled conditions, if they are ever to have scientific significance.

X1. North America. A general and rather diffuse cultural link between old Japan and the natives of North America was posited by Smithsonian Institution scien-

tists in 1951 solely on the basis of pottery similarities.

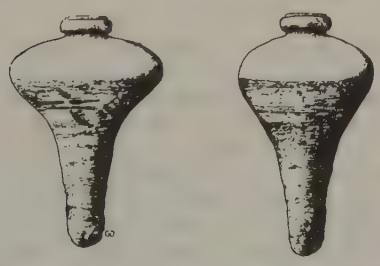
> The tie is in a large collection of New Stone Age pottery found by Major Howard MacCord in a recent tour of Army duty on the Japanese island of Honshu. Designs, surface treatments and shapes of these pottery remains have a marked similarity to those of early American Indians in the eastern United States and Canada. (R4)

The Smithsonian scientists also discerned some striking differences. They concluded from these that the similarities were due to independent developments by culturally related peoples.

We will encounter below many analogous situations where diffusionists infer physical contacts by virtue of pottery similarities only to be countered by the irrefutable possibility of independent inventions of manufacturing techniques, styles, and motifs by geographically separated peoples.

Maine

> While skindiving in the Bay of Castine in 1971, Norman Bakeman discovered two peculiar ceramic storage jars in 12 meters of water. These jars were recovered and have since been compared to Portugese "anforetas" used during the Roman period for the storage of wine, oil, honey, etc. A similar anforeta has also been recovered in Jonesboro, Maine. The clay paste and grit of the Maine jars closely resemble those used in Iberia almost 2,000 years ago. The possibility that these containers might be Spanish olive jars circa 1800 is also discussed. (R7, R8)



Portugese-style anforetas (storage jars) discovered by skindivers in Maine's Bay of Castine in 1971. (X1)

In X3 below, a claim is made that more Roman-style wine jars were recovered in Brazilian waters. Anforetas are rather large pieces of distinctive pottery. Their presumed presence off New World shores certainly brings to one's mind the picture of Roman shipwrecks along American coasts two millennia ago. However, see the sobering comments below under Massachusetts.

New Hampshire. In 1980, N. Totten, a collector of old pottery lamps from the eastern Mediterranean, added an unusual one to his collection at a dealer's in Portsmouth, New Hampshire. He inquired about its provenance from the dealer.

> Much to my surprise, he said that an acquaintance of his had dug it up many years earlier at an Indian site within Manchester, New Hampshire... The man had excavated it with some Indian artifacts one weekend, about 1848. The dealer admitted that he had never seen any colonial lamps like it, but thought that it must have been traded by English colonists. (R15)

Totten's research suggested that, typologically, the wheel-type lamp dated to the late 6th. century, B.C. and was probably of Greek manufacture.

A Greek-style lamp said to have been excavated in 1848 from a Native American site in New Hampshire. (X1)

Obviously, this is very tenuous evidence of a Precolumbian contact with the New World. As the dealer suspected, it could have been a trade item.

Massachusetts. Proponents of European contacts with the New World two millennia ago seize readily upon reports of ancient amphorae (ancient wine jars)

being rescued off the Atlantic shores of the Americas. But R.F. Marx warns about potential misidentifications.

> In 1955 the press announced that fishermen off Boston had made a sensational find, the remains of a Roman shipwreck and had brought up seven amphorae from the site. The National Geographic Society asked me to investigate the wreck site. I took six Navy UDT divers along to assist me. We never got into the water. One look at the so-called Roman amphorae convinced me that they were Spanish olive jars, similar in appearance to the amphorae used in the classical world, but used as storage jars throughout the Spanish colonial period. Since then more of these olive jars have occasionally been recovered from that site and from other sites in the United States. Each discovery prompts erroneous headlines about Romans or other ancient mariners reaching America. (R28)

Connecticut.

> In the Fall of 1954, a young fellow from Clinton, Connecticut, brought to archaeologist Frank Glynn, a boxful of Indian artifacts he had found in the Clinton harbor shell-midden, after plowing in 1952. In looking over the various Indian pieces, Frank noticed one which wasn't Indian. The boy who found it described it as an "Indian Pipe." However, Frank recognized it as an ancient oil lamp, typical of the Mediterranean area and totally out of place in the collection of material brought in. (R14)

Glynn sent the lamp to the noted English archaeologist T.C. Lethbridge for further study. Lethbridge and his colleagues agreed that the lamp was from the eastern Mediterranean and made in late Roman or Byzantine times (circa 750-800 A.D.).

Ohio. In the early 20th. century, two porcelain batons were plowed up along with Indian relics near Garrettsville, Ohio. Superficially, anything porcelain would seem anomalous in an assemblage of Indian artifacts, but here there is an easy explanation. In the 17th. and 18th. centuries, such batons or "porcelain sticks" were given as gifts or traded to the Indians who used them as credentials or symbols of authority. (R2)

Precolumbian contacts were not involved.

California. Over the years, hundreds of fragments of Chinese pottery dating to the 15th. and 16th. centuries have been collected around the shores of Drake's Bay, in Marin County, north of San Francisco. The pottery dates assure us that we are not dealing with Chinese Precolumbian contacts, but were the Chinese exploring or even setting up small colonies along the California coast in this period?

As in the case of the Ohio porcelain batons, the answer is easy and mundane. In 1595, the galleon San Agustin was caught in an explosed position by a storm that hit the Drake's Bay region. The vessel broke up, as did the chests of Ming porcelain among its cargo. (R23, R27)

Oregon. Farther to the north, along a tributary of the Columbia River, archeologist A. Stenger has excavated some 200 pieces of pottery that have a better chance of being truly anomalous.

> The ceramic figures date to a pre-[European] contact period (A.D. 1250-1550) and appear to incorporate Japanese manufacturing techniques, including formal kiln firing. Nothing like them has been found among the Indians now living in the area; they do not have a tradition of pottery making. (R27, citing A.T. Stenger in The New World Figurine Project, Provo, 1991, p. 111)

X2. Mesoamerica.

The Yucatan. A Chinese soapstone lamp turned up in one of a group of Maya mounds amidst genuine, although unusually curious, Maya pottery along with odd-shaped objects of obsidian. Unfortunately for the diffusionists, the lamp is of recent manufacture in Canton. Apparently, it was deliberately introduced into the mounds long after they were raised. (R3)

Honduras. In one of his "Lost Cities" books, D.H. Childress asserts:

Other amphorae, of Carthaginian origin, were found off the coast of Honduras in 1972. (R17, no primary source provided)

Circa 1982, the media announced that an ancient Greek shipwreck had been located off the coast of Roatan, an island off the north coast of Honduras. Jars claimed to be "Greek" amphorae had been retrieved. However, R.F. Marx quickly identified them as more 18th.-Century Spanish olive jars. (R28)

X3. South America. South America, even though more distant than North America from Europe and Asia---the most likely sources of adventurous sea voyagers---appears to have more-convincing pottery-based evidence of Precolumbian contacts. Naturally, the antidiffusionists demur in this matter.

We commence with a case that has gone the proper science route, been thoroughly debated in the mainstream literature, and yet today remains shy of a scientific consensus.

Ecuador. The Valdivia story began in 1962 with the publication in Science of a paper bearing the following abstract.

> The earliest pottery-producing culture on the coast of Ecuador, the Valdivia culture, shows many striking similarities in decoration and vessel shape to pottery of eastern Asia. In Japan, resemblances are closest to the Middle Jomon period. Both early Valdivia and Middle Jomon are dated between 2000 and 3000 B.C. A transpacific contact from Asia to Ecuador during this time is postulated. (R5)

The first author of this paper, E. Estrada, a local businessman turned archeologist had come across the subject Valdivia pottery in 1956. His two co-authors and co-investigators, B.J. Meggers and C. Evans, were from the Smithsonian Institution. So, the Valdivia affair had a proper scientific beginning, with professionals in from the start.

However, the best sea route from Japan to Ecuador, following the favorable currents, is almost 15,000 miles long. An archeologist's gut reaction almost has to be that this long a voyage 4,000

(Top) Valdivia pottery from Ecuador compared with Japanese Jomon-style pottery (bottom) made in the period 2000-3000 B.C. (X2)

years ago was most unlikely. For example, G.F. Ewan and D.B. Dickson, estimated that an accidental [?] voyage by Japanese fishermen, even under ideal conditions, would have taken 566 days. Further, they doubted that a few exhausted foreign fishermen, not even speaking the local language and probably short of pottery-making experience, could have introduced new pottery-making techniques to Valdivia natives. (R9)

Meggers, who has long staunchly defended the claimed Jomon contact at Valdivia, was aided immensely in 1980 by the successful voyage of the Yasei-go III, a ship sponsored by the Tokyo-based Ancient Pacific Cultures Research Project.

> This craft, a double canoe of the kind likely to have been in use by 5000

BP, was equipped with sails, a rudder, and a centerboard and was propelled solely by currents and winds. (R22)

The Yasei-go III departed Japan on May 8, 1980, landed at San Francisco June 28, 9285 miles later, continued down the coast, arriving at Ecuador on October 12 (coincidentally Columbus Day in the States!). The trip took only 3½ months.

The speedy, successful voyage of the Yasei-go III effectively silenced quibbles about the technical improbability of the Japan-to-Valdivia passage.

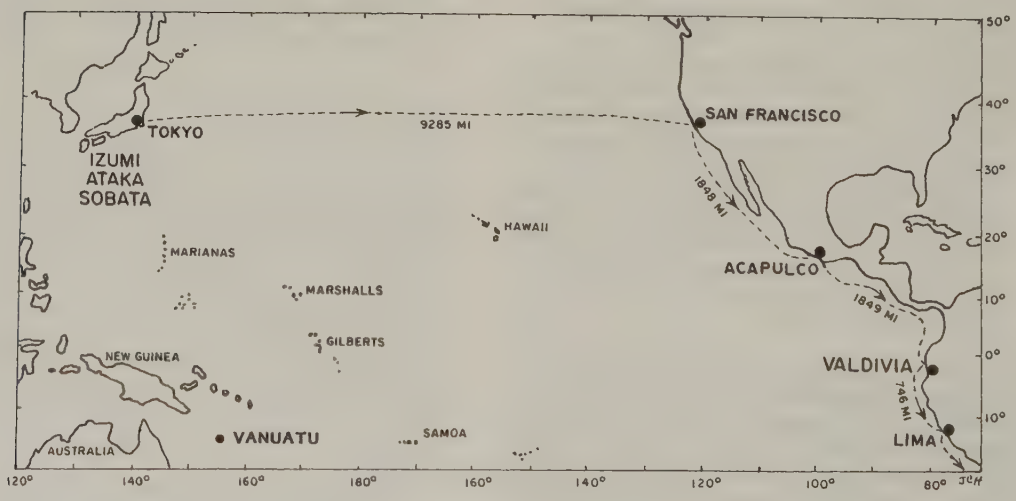
Critics of the claimed Valdivia contact then focussed on the claimed similarities of Jomon and Valdivia pottery. Were they strong enough?

In a 1980 paper in Early Man, Meggers listed 28 pottery treatments and decorations found at Valdivia that were duplicated in Jomon pottery recovered from Japanese middens of the same time period. Most of these characteristics did not appear in other indigenous South American pottery of the period. Meggers commented:

> If an ocean did not separate Japan and Ecuador, no archeologist would hesitate to infer the common origin of 5,000-year-old pottery from sites in these two countries. (R10)

A common fall-back position of anti-diffusionists is "idependent invention." The indigenous pottery-makers of South America just happened to invent techniques and decorations similar to those of the Jomon people half-a-world away in Japan. F.J. Frost rationalized this stance in this way:

> Art historians can testify to the universal human impulse for decoration and have noted the astounding number of coincidental designs on ceramics, textiles, or wall paintings all over the world that could not have had each other as a source. (R23)



Route of the vessel Yasei-go III in 1980. The Japan-Ecuador voyage took only 3½ months. (X3) Japanese Jomon-style pottery occurs not only in Ecuador but also on Vanuatu 3,700 miles south of Japan. (X5)

No accumulation of similarities can destroy this independent-invention argument, whether the artifacts be pottery, pyramids, weapons, etc.

Columbia. To the north of Valdivia, Ecuador, but in Columbian waters, lies the island of Gorgona, upon which has been found what G. Kearsley calls trans-Pacific pottery. His photograph of said pottery bears the following caption.

> The island of Gorgona lies off the Pacific coast of Columbia---the Northwest Coast of South America. These sherds are similar in form and ornamentation to those on the opposite side of the Pacific, but appear culturally connected directly by the Equatorial Counter Current from South-East Asia, Melanesia, and Polynesia to the South American coast. The Gorgona fragments are also closely similar to the pottery of early Ecuador, Columbia, 1st. millennium B.C./A.D. (R28)

Roman-style amphoras (storage jars) purportedly recovered from Guanabara Bay near Rio de Janiero, Brazil. (X3)

Brazil. In Brazil, a potentially significant archeological discovery never had the opportunity to follow the scientific route. Rather, politics reportedly intervened. Lacking hard science sources, we must contend with much vagueness and with purported facts that cannot be confirmed by appealing to peer-reviewed literature.

The first reference to the Brazilian find actually did appear in a science publication: Early Man.

> Six tall jars resembling Roman amphoras made on the Atlantic coast of Morocco in the second and third centuries A.D. have been found in the muddy waters of Guanabara Bay, 15 miles from Rio de Janeiro. Robert Marx of Phoenician Explorations, a private firm based in Florida that conducts underwater expeditions, is currently searching for further evidence to verify the finds as Roman. (R12)

The supposed Roman jars have handles that distinguish them from those Spanish olive jars found along the North American coast that Marx dismissed above (X1) as of recent vintage. The Roman amphoras were commonly used to transport wine.

The Brazilian amphoras, eight of them, were retrieved from the bottom of Guanabara Bay by R. Teixiera, who had been spearfishing around a huge rock in the middle of the bay. Teixiera asserted that the floor of the Bay around the huge rock was strewn with thousands of pottery sherds.

The rest of the story seems to be mostly political in nature. Marx was stymied in his attempts to investigate the amphora site by official roadblocks. Marx attributes these to the Brazilian government's desire to maintain the historical status quo; namely, that the first European to reach the shores of Brazil (in 1500) was the Portuguese navigator Cabral. Evidence of prior visitors was frowned upon. (R20)

Eventually, Marx managed to locate the rock Teixiera had described and make a dive there. He was able to fill a bag with pottery sherds found embedded in crevices in the huge rock, but the bottom around the rock was now covered with spoil from dredging operations. The large strewn field of sherds and, possibly a few additional complete amphora, had been obliterated. Marx states that he was never permitted to mount a scientific investigation of the site. We will probably never know if a Roman shipwreck actually does reside below that layer of mud and debris. (R20)

Bolivia. Roman-style amphoras have also been found at San Juan de Josario in the Bolivian mountains---an unlikely spot for a Roman shipwreck! Could they have been transported inland from the Atlantic coast? (R17, no source cited)

Chile. We quote now from a famous old volume on American antiquities. Make of it what you will.

> In the month of December, 1827, a planter discovered in a field, a short distance from Mont-Video, a sort of tomb stone, upon which strange, and to him unknown signs, or characters, were engraved. He caused this stone, which covered a small excavation, formed with masonry, to be raised, in which he found two exceedingly ancient swords, a helmet, and shield, which had suffered much from rust, also an earthen vessel of large capacity.
>
> The planter caused the swords, the helmet, and earthen amphora, together with the stone slab, which covered the whole, to be removed to Mont-Video, where, in spite of the effect of time, GREEK words were easily made out, which, when translated, read as follows: "During the dominion of Alexander the son of Philip, King of Macedon, in the sixty-third Olympiad, Ptolemais,"---it was impossible to decipher the rest, on account of the ravages of time, on the engraving of the stone. (R1)

The fate of these reported artifacts is not known.

X4. Australia. Over the years, Australians---usually farmers and construction workers---have come across a wide spectrum of purported ancient artifacts from Egypt, Mediterranean countries, and, in particular, China. Among these controversial artifacts have been a few pottery items, mostly suspect sherds. Most mainstream archeologists have taken scant notices of these potential anomalies. In consequence, our sources here are of the popular genre and caution is advised.

New South Wales. Newcastle Harbour, 1953. H. Robinson, a dredge operator brought up a large jar that had been buried about 60 feet below the floor of the modern harbor. It was identified by an unidentified archeologist as being of Palestinian origin and at least 3,000 years old. (R24, no source cited)

Northern Territory. With no wide oceans to cross, an early Chinese contact with Australia is hardly surprising. The Chinese probably made landfalls around the Australian continent centuries before the Europeans. R. Gilroy is convinced of this and has collected many suggestive artifacts.

> Ancient relics are further proof of Chinese visits to our shores. In 1948 fragments of Ming pottery (14th Century) blue and white porcelain were dug up of Winchelsea Island, northwest of Groote Eylandt; and a large Chinese copper urn of this age was unearthed in Arnhem Land some years ago. (R16)

X5. Oceania

Vanuatu. In X3, the surmise was advanced that, based upon pottery similarities, the Jomon people of Japan had made contact at Valdivia, Ecuador. It appears that these Jomon voyagers also drifted or sailed south into Melanesia during the same period---some 5,000 years ago.

> Fragments of ancient earthenware a French archeologist uncovered on a tiny southern Pacific island have been found to be cord-marked Japanese pottery dating back 5,000 years to the Jomon period.
>
> The fragments apparently are from pottery brought to the island by ancient Japanese wanderers.
>
> Six Japanese, U.S. and French archeologists say the cord marks on the fragments, their manufacturing techniques and ingredients were the same as those unearthed at the Sannai Maruyama ruins in Aomori Prefecture and other parts of northern Honshu. (R25)

The specific island in Vanuatu is Efate Island, which is located about 6,000 kilometers [3,700 miles] south of

Japan---much shorter than the sea route to Ecuador (about 15,000 miles). The dates of contacts are also consistent.

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MMP2 Enigmatic Ceramic Artifacts

Description. Ceramic objects with puzzling shapes and of uncertain purpose. Some are found in peculiar geological settings.

Data Evaluation. Except for the entry on the Mohenjo-daro "black stones" (X5) our sources are science journals and magazines. For the four potential anomalies recognized below, the data evaluations are the first figures in the ratings.

Anomaly Evaluation. Four anomalies seem worth recording here. The anomaly evaluations are the second figures in the ratings.

- The peculiar provenance of India's ochre color ware and its apparent association with copper hoards (X1). Ratings: 1/3.
- Uncertain purpose(s) of the Poverty Point objects (X2). Ratings: 1/3.
- Uncertain purpose(s) of the European loess balls (X3). Ratings: 1/2.
- Uncertain origin of Mohenjo-daro's "black stones" (X5). Ratings: 3/1.

Similar and Related Phenomena. Copper hoards (MMM1); Mohenjo-daro (MSS5 in Ancient Structures); Poverty Point (MSM7-X1 in Ancient Infrastructure); tokens (MGQ and MGW in other M-series volumes); the nature and origin of loess (ESD3-X11 in Neglected Geological Anomalies).

Entries

X1. Ochre color ware. Ochre color ware is so-named because after handling the sherds, one's hands are covered with a strong ochre tinge. Examples of ochre color ware occur over a wide area of central India under the curious circumstances outlined below in the quotation. Ochre color ware dates earlier than 1,200 B.C. There exists an unexplained similarity in the modes of occurrence between the deposits of ochre color ware and the equally mysterious copper hoards of India mentioned in MMM1-X7.

> ...at almost all the sites [of ochre color ware] the potsherds occur sporadically, in a deposit of neat [pure] earth bereft of any signs of habitation like ash, flooring material, or the like, and with the deposit itself imperceptibly merging into the natural soil. How did the sherds find their way into the places where they are found? Could the deposits have been waterlogged? If so, it would mean that an area of over 60,000 square kilometers had gone under water at some time. Was this waterlogging due to incessant rain over a long period, or to the diversion of the waters of the Ghaggar, a tributary of the Indus, in the Ganga system, or to the bundling up of the latter at some stage? The matter is far from clear and requires detailed investigation. (R4)

The puzzle here is the total lack of other signs of human activity. Ochre color ware occurs in strange isolation as do the strange copper hoards. (MMM1)

X2. Poverty Point objects. The Poverty Point site is located on the Arkansas River 15 miles west of the Mississippi. This very old (1,500-800 B.C.), structurally complex site is described in more detail in MSM7-X1 in Ancient Infrastructure.

Poverty Point comes to the fore here by virtue of its estimated 20 million "Poverty Point objects," all of which are ceramic. These fist-sized masses of baked clay are ubiquitous and concen-

Four of some 20 million "Poverty Point Objects" estimated to exist at their namesake-site in Louisiana. (X2)

trated in fire areas. Many Poverty Point objects are roughly spherical but others were hand-molded into distinctive shapes. Possibly each sculptor had his or her private design for purposes of identification. If this is true, they transmitted information and could be considered to be tokens. (See X4.)

The sculptors of these curious objects were probably the women and children of Poverty Point. This assumption is based upon the reasonable consensus that the fire-hardened clay objects were employed in cooking food---in the same way hot stones were used in many primitive cultures. Why weren't stones used? They are very scarce in the Poverty Point region. Fire-heated Poverty Point objects were probably dropped into wooden or stone bowls for the cooking process. Fire-resistant pottery bowls had not yet been developed. (R2, R5)

Of course, the Poverty Point objects should not be classified as anomalous, but they are interesting nevertheless. And one can always wonder if their strange and varied shapes might have carried information of some kind---like the tokens mentioned in X4.

X3. Loess balls. Loess is a fine-grained sediment that is present over wide areas of China, North America, Europe, and elsewhere. Some geologists claim loess is of aeolian origin; others prefer a fluvial origin. These Pleistocene blankets of loess often contain fossil shells, concretions, and once in a while a few artifacts left behind by Paleolithic humans.

The enigmatic loess balls occur in the layers of European loess. Generally, their diameters are in the 1-2-inch range. It has been widely conjectured that loess balls are only naturally formed concretions and not human artifacts at all. However, the structure of the loess balls differs markedly from loess concretions. They possess smooth surfaces as if they were packed and smoothed by hands---like snowballs. They also tend to occur in groups.

After a thorough study of the loess balls, including carefully sectioning them for internal analysis, F.E. Zeuner concluded that they are genuine Middle Paleolithic (Mousterian) artifacts. (R3)

The salient enigma is, of course, the questionable utility of loess balls to humans living 50,000 or so years ago. Zeuner's guess was that they were missiles---perhaps for slings. But most of Europe has no shortage of suitable (and more effective) stones for combat and hunting. Could the loess balls have been used in cooking---like the Poverty Point objects? (X2) This is very unlikely considering the poorly consolidated nature of loess. Loess balls would disintegrate in hot water. Also, stones were readily available for culinary use. A third possibility is that the loess balls were tokens, like those mentioned below in X4. Ostensibly, however, most loess balls are simple spheres with no obvious information impressed upon them.

X4. Ceramic tokens. In actuality, tokens do not belong in this Catalog volume since they transmit information, which the Poverty Point objects and loess balls probably do not. However, the simplest clay tokens are basic geometrical shapes and virtually indistinguishable from, say, loess balls. We must, therefore, at least mention them. For more details on tokens, see MGQ and MGW in other volumes in this series.

In Mesopotamia, clay tokens can be traced back to at least 8,000 B.C. Thus, they are far older than the Poverty Point objects and much younger than

the loess balls. The only connection between bona fide tokens and the loess balls and Poverty Point objects is geometrical.

The more sophisticated ancient clay tokens had symbols impressed upon them and were, in fact, steps in the development of writing. The simplest tokens, though, were plain clay spheres. In ancient times, one spherical token symbolized one large measure of grain. Tokens representing small measures of grain were conical. Continuing in this way, one jar of oil was signified by an ovoid token. And so on to more complex shapes and eventually symbol-inscribed tokens. (R7)

X5. Mohenjo-Daro's "black stones". Vitrified structures are mentioned several times in Ancient Infrastructure and Ancient Structures. We again encounter signs of extreme heat at ancient Mohenjo-Daro in Pakistan. Some 4,500 years ago, Mohenjo-Daro was a great city. Uniquely for ancient cities, it was rigorously planned and incorporated architectural features novel for its time.

Mohenjo-daro's precociousness and social regimentation are remarkable but probably no more so than that we see in ancient Egypt and Mesopotamia. However, two other discoveries said to have been made at Mohenjo-daro, are, if verified, highly anomalous. D.H. Childress has mentioned these in one of his "Lost Cities" books. He cites as his sources some popular books from the fringes of science. So, caveat emptor!

Childress writes:

> Thousands of lumps, christened "black stones," have been found at Mohenjo-daro. These are, apparently, fragments of clay vessels that melted together in extreme heat and fused. (R6)

Childress and others speculate that the skeletons and fused objects indicate that Mohenjo-daro was the target of advanced weapons of some sort 4,000 years before our modern lasers and nuclear weapons. Unfortunately, we do not know the primary sources for these astounding claims or the rationale behind them.

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MMS STONE ARTIFACTS

Key to Phenomena

MMS0 Introduction

Stone is the most durable of the materials employed by ancient humans. Those artifacts fashioned from wood, plant fibers, and animal skins have not been preserved well down the millennia. Even Bronze Age and Iron Age artifacts do not age well. Therefore, stone's survivability provides us with an unusually large bonanza of artifacts to sift through for anomalies.

Although stone artifacts cannot be directly dated radiometrically, their ages can often be approximated by known dates of associated materials and the stratum in which they are found. The major "age" anomalies supported by stone artifacts include pre-Clovis (12,000 B.P.) contacts with the new World and hominid presence in Eurasia prior to the supposed 1.0-million-year-old hominid "break-out" from Africa. A small number of controversial stone artifacts seem older than 5 million years, thus preceding the first appearance of the hominid line.

Adding flames to the diffusion debate, there is lithic evidence that both Asians and Europeans made landfalls in the Americas long before the Norse and Columbus.

Finally, some stone artifacts, such as the so-called microflints, are manifestly nonutilitarian. Past cultures made objects for use in games, ceremonies, and just for art's sake. There also exist large numbers of stone objects that fit into no easy category; they are simply enigmatic.

MMS1 Stone Artifacts with Anomalous Ages

Description. Small stone artifacts, such as projectile points, scrapers, and mortars, discovered among rock debris and in sediments that can be reliably dated or in close proximity to bones, charcoal, or other materials that can be dated with confidence. Of course, most such artifacts thus found are non-anomalous. Here, we are concerned only with those with ages that challenge those paradigms that have been accepted as describing and limiting the dates of origin and diffusion of hominids, especially modern man, Homo sapiens.

Data Evaluation. The relevant literature is absolutely immense. It runs the gamut from professional papers in world-class journals to old newspaper accounts. Of course, we attempt to use only the soundest material available. Unfortunately, opinion varies widely concerning the validity of the various dating methods and the artificiality of many of the specimens; that is, are they true artifacts or merely "geofacts" shaped by nature?

We have identified six potential "age" anomalies arising from the untold thousands of small stone artifacts that have been collected all over the planet. These are listed below. The first figures in the ratings are the data evaluations.

Anomaly Evaluation. In the following descriptions of six potential anomalies, the second figures in the ratings are the anomaly evaluations.

- The existence anywhere of stone artifacts older than roughly 5 million years, the generally accepted time of hominid origin (X1, X3, X4, X5, X6). Ratings: 1/3.

- New-World artifacts older than 12,000 years, the so-called Clovis-Limit. (X1-X3). Evaluations: 2/1.

- Eurasian stone artifacts older than 1.0 million years; that is, older than the supposed first emergence of hominids from Africa (X4, X6). Evaluations: 2/1.

- Sophisticated stone artifacts anywhere older than 40,000 years, the date of the postulated European cultural explosion associated with the arrival there of modern humans (X4-X6). Evaluations: 2/1.

- Stone artifacts anywhere older than 2 million years, suggesting that Homo erectus was a tool-maker (X1-X7). Evaluations: 1/2.

- Australian stone artifacts older than 40,000 years, the oldest widely accepted date for the hominid occupation of that continent (X7). Evaluations: 3/1.

Possible Explanations. Hominids traveled ("diffused") faster and farther than generally accepted by mainstream science.

Similar and Related Phenomena. All volumes in the M-Series deal with the hominid diffusion question. Subjects such as bone artifacts, exotic plants, language families, DNA, etc., are all pertinent and treated similarly. See the Subject Indexes in the other Series-M catalog volumes.

Entries

X1. North America.

One of the most important and contentious subjects in North American archeology has been the date the first humans arrived in the New World. For many decades, the earliest accepted date, the so-called Clovis Limit has been about 12,000 B.P. But there are now many North American sites that seem to be just a few thousand years older than the Clovis Limit. We catalog these modest challenges (12,000-25,000 B.P.) to this long-held paradigm in Part A below.

In Part B, we tackle the more controversial sites: those producing stone artifacts that may be older than 25,000 B.P., perhaps even 100,000 or 1 million years old! It is in Part B that we see the radical and highly anomalous finds that suggest that the New World might have been reached by the predecessors of modern man, such as Homo erectus. Equally controversial is the proposal that modern man, H. sapiens, appeared on this planet long before the accepted date and place of about 40,000 B.P. in Europe.

Section C deals with North American stone specimens, abundant in some localities, that look artificial and look ancient but cannot be shown convincingly to be either. Note that stone tools are usually dated by their association with artifacts, bones, or strata that can be objectively dated.

A. Stone artifacts slightly older than the Clovis Limit (12,000-25,000 B.P.)

California

Yuha Desert. This desolate yet somehow beautiful land makes up the southwest corner of the Imperial Valley. It is blazing hot in the summer but in winter it is a pleasant land. (R83)

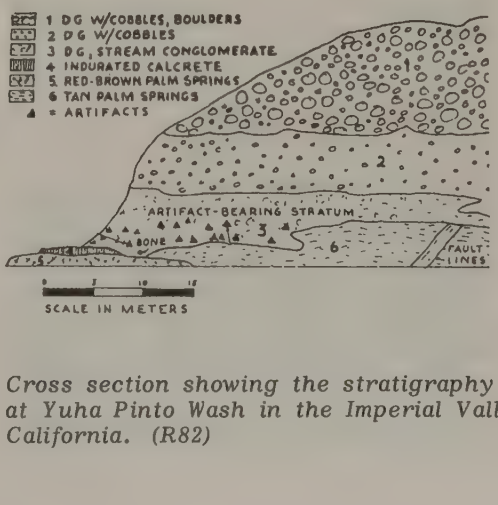
Signs of ancient human occupation are strewn widely: stone circles, rows of cairns, and, of course, abandoned stone tools. Some of the tools are heavily coated with desert varnish and doubtless thousands of years old. Just how old is the question. We have two data points so far---both controversial.

The first is a date of 21,500 B.P. assigned to a skeleton found near El Centro. Stone tools associated with the skeleton (denoted as "Yuha Man") are claimed to be of the same pre-Clovis age. (R65, R66)

Thick blades from the Yuha Desert site. (R83)

In September 1976, tropical storm Kathleen lashed the Yuha Desert with gales and heavy rains. The deluge cut a shelf on the north bank of the Yuha Pinto Wash just north of the Mexican border. Some 80 stone tools were exposed, still solidly emplaced near the base of the cut. These tools had been overlain by 21 meters (70 feet) of sediment before the storm.

> Time of deposition of the artifacts is considered to be more than 50,000 B.P. by some unknown amount, based on pedological and geomorphic observations and radiocarbon dating of related features. (R82)



Cross section showing the stratigraphy at Yuha Pinto Wash in the Imperial Valley, California. (R82)

Here, we have an example of stratigraphic dating. Note that the 50,000-year date will be mentioned again in Part B.

Idaho

Wilson Butte Cave. In 1965, R. Gruhn, University of Alberta, excavated a stone blade, a projectile point, and an engraving tool from a soil layer dated at 14,500 B.P. (R118)

Minnesota

Aurora. In 1935, roadbuilders came across numerous obsidian arrowheads. C.E. Hagie, Aurora's Superintendent of Schools, rushed to the site and saw that the artifacts were being extracted from sands that were deposited beneath a solid layer of glacial clay. The strata of undisturbed glacial till overlying the glacial clay measured about 8-9 feet in thickness. The artifacts were recovered from beneath the shelf of undisturbed clay and till and, therefore, were almost certainly not intentional burials.

After Professor A.E. Jenks, an anthropologist from the University of Minnesota and a leading authority in ancient man in America, visited the Aurora site, he remarked, "It looks too good to be true." The artifacts were thought to be about 20,000 years old by virtue of the overlying strata.

Nevada

McGee's Point. A large obsidian projectile point shaped like a laurel leaf was found poking out of Pleistocene strata in Walker River Canyon by W.J. McGee in 1892. These strata are estimated to be 22,000 years old. (R118)

Tule Springs. This Pleistocene site in southwestern Nevada has been studied for many years. Simple stone tools, such as worked flakes and scrapers were associated with the bones of extinct animals. A radiocarbon date of 23,800 years was obtained for what was deemed the remains of a human-built fire. (R40) However, some later investigators declared that this carbonized wood was more likely the product of natural decay. (R47) These tools, therefore, represent questionable evidence for pre-Clovis activity.

It should be recognized that all pre-Clovis dates are challenged in one way or another and, therefore, all are questionable. If the carbonized wood had been 10,000 years old, a challenge would have been unlikely and the suggested age of the artfacts would have been accepted, even though natural decay might actually have been involved!

Pennsylvania

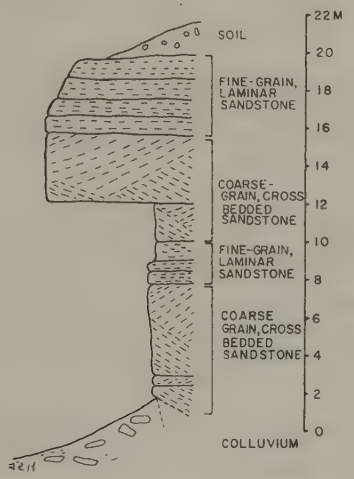
Meadowcroft Rockshelter. Just 48 miles southwest of Pittsburgh, the Meadowcroft Rockshelter has long been the most widely accepted North American archeological site producing pre-Clovis stone artifacts. There is little debate about the artifacts extracted from the upper levels of the dig. They are within the Clovis-Limit being pegged at 9,000 B.P. The lower levels, however, yield radiocarbon dates several millennia older, perhaps as old as 31,000 B.P. (R215) For example, a fragment of a basket has been carbon-dated at 17,650 ± 2400 B.C.; (i.e., possibly almost 20,000 B.P.). (R84, R114, R118)

For some 30 years, the principal investigator at Meadowcroft has been J.M. Adovasio, assisted by many students and other researchers. Adovasio provided a thumbnail sketch of the general characteristics of the Meadowcroft Rockshelter in the abstract for his 1978 paper in American Antiquity.

> Meadowcroft Rockshelter is a deeply stratified multicomponent site in Washington County, southwestern Pennsylvania. The 11 well-defined stratigraphic units identified at the site span at least 16,000 years and perhaps 19,000 years of intermittent occupation by groups representing all of the major cultural stages/periods now recognized in northeastern North America. Throughout the extant sequence, the site served as a locus for hunting, collecting, and food-processing activities, which involved the seasonal exploitation of the immediately adjacent Cross Creek Valley and contiguous uplands. Meadowcroft Rockshelter represents one of the earliest well-dated evidences of man in the New World as well as the longest occupational sequence in the Western Hemisphere. (R80)

The excavations at this sandstone

shelter have resulted in an outstanding collection of cultural artifacts. Adovasio's team has collected some 20,000 stone flakes and objects plus 1,000,000 animal remains. Over 150 fire pits have been identified. They have 72 radiocarbon dates in sequence from 1,000 B.P. to 31,000 B.P. at the very bottom. (R215) No one doubts that the site has seen a very long succession of human occupants.



Geology of the Meadowcroft Rockshelter site, Pennsylvania. (R74 in R76)

The radiocarbon dates have been the major obstacle in obtaining a general consensus on the pre-Clovis age of this site. Critics claim that the charcoal samples employed in the carbon dating may have been transported to lower levels by ground water and/or soil disturbances. Adovasio contends that his research has satisfactorily answered all such criticisms. (R80, R84, R115, R116, R128)

South Carolina

Topper Site. Powerful paradigms, such as the Clovis-Limit, can stifle scientific research. The truth of this became apparent at the Topper archeological site near Allendale, South Carolina. The dig was discovered in 1981 when a local man, named Topper, led A. Goodyear (from the University of South Carolina) to a deposit of side-notched chert points. These artifacts are similar to 10,000-year-old points found elsewhere in the region. Nothing anomalous so far! But at depths of 80-100 centimeters, Goodyear came across fluted blanks from which the classic and distinctive Clovis points could have been manufactured. This discovery actually terminated the dig. The archeologists picked up their trowels and headed for other sites. Why? Simply because everyone knew that there were no North American artifacts older than Clovis points. Dated at 10,800-11,200 radiocarbon years, Clovis points are generally assumed to mark the earliest arrival of humans in the Americas. Digging deeper at the Topper site would thus have been a waste of time.

In 1998, however, Goodyear had second thoughts. This was the time when the nothing-older-than-Clovis paradigm was being challenged by finds at Monte Verde, Chile. (MMS1-X3) Goodyear decided to take his trowels back to the Topper site and dig deeper.

> After some 40 cm of essentially barren deposits, the excavators began finding small flakes and microtools. The lower level, exposed over 28 square meters, has yielded some 1,000 waste flakes, 15 microtools (mostly microblades), and a pile of 20 chert pebbles plus four possible quartz hammerstones. (R170)

Goodyear thinks that chert pebbles were being processed at Topper 12,000-20,000 years ago. This age range has been confirmed by S. Forman (University of Illinois), who employed optically stimulated luminescence to date the sand just above Goodyear's presumed microliths. His result: 13,000 B.P. (R215, R216) Apparently, North America may have its own Monte Verdes!

Virginia

Cactus Hill. On a sandy rise, called Cactus Hill, some 45 miles south of Richmond, archeologists have uncovered an apparently pre-Clovis site. An upper level at Cactus Hill, dated at 10,920 B.P. does contain typical Clovis artifacts. These are warmly received by mainstream archeologists for they support their staunchly defended paradigm.

But only 6 inches below the Clovis level, the diggers gingerly brushed the

dirt off crude projectile points that were clearly not of Clovis manufacture. This level seems to be about 5,000 years older than the Clovis level according to radiometric dating of associated charcoal at 15,000 B.P. (R215)

Skeptics suggest that there has been vertical mixing of the sandy soil and that these early dates are suspect. But thermoluminescent dating has supported the 5,000-year time gap. Thorough analyses of the soil with its plant and animal remains indicated that little if any mixing occurred over the years. (R178)

D. Stanford, from the Smithsonian Institution, asserts that these purported pre-Clovis projectile points resemble those common in Europe in the same time period; i.e. those manufactured by the Solutrean culture. (R175) (See MMS3 for more on the Solutreans.)

Doubters of the antiquity of Cactus Hill, such as A.C. Roosevelt, worry (with reason) about the inconsistent dates, the vague stratigraphy, and the questionable artifacts. The latter could merely be geofacts. (R182)

Great Lakes area

Introduction. We introduce here a remarkable theory of terrestrial catastrophism that seems to be supported by evidence that is equally remarkable. One of the authors of this theory (RBF) is identified as a nuclear scientist at the Lawrence Berkeley Nuclear Laboratory. The second author (WT) is a consultant. The authors' credentials seem so good that we must take a close look at their extraordinary claims concerning a natural phenomeon that they believe reset radiocarbon clocks in north-central North America and---potentially---elsewhere on the planet. We will be most interested in the reception accorded these claims by the scientific community. All of this is, of course, pertinent to all of the North American radiocarbon dates mentioned in this section.

The claims. In the authors' words:

> Our research indicates that the entire Great Lakes region (and beyond) was subjected to particle bombardment and a catastrophic nuclear irradiation that produced secondary thermal neutrons from cosmic ray interactions. The neutrons produced unusually large quantities of ^{239}Pu and substantially altered the natural uranium abundances ($^{235}U/^{238}U$) in artifacts and in other exposed materials including cherts, sediments, and the entire landscape. These neutrons necessarily transmuted residual nitrogen (^{14}N) in the dated charcoals to radiocarbon, thus explaining anomalous dates.

Some North American dates may in consequence be as much as 10,000 years too young. So, we are not dealing with a trivial phenomenon!

Supporting evidence. Four main categories of supporting evidence are claimed and presented in varying degrees of detail.

- Anomalously young radiocarbon dates in north-central North America. Example: the Gainey site in Michigan.

- Physical evidence of particle bombardment. Example: chert artifacts with high densities of particle-entrance wounds.

- Anomalous uranium and plutonium abundance ratios in the affected area.

- Tree-ring and marine sediment data.

The authors claim that the burst of radiation from a nearby supernova, circa 12,500 years ago, not only reset radiocarbon clocks but also heated the planet's atmosphere, melted ice sheets, and led to biological extinctions.

If verified, the claimed phenomenon would also "reset" archeological models of the settlement of North and South America. To illustrate, we may have to add as many as 10,000 years to site dates in much of North America! (R218)

Needless to say, this hypothesis has been challenged. But the anomalous dates in Michigan and elsewhere demand that we include possible errors in our archeological dating methodology.

B. Stone artifacts more than 25,000 years old

Ontario

Sheguiandah, Manitoulin Island. Compared to the California sites of Calico, and Texas Street, Sheguiandah has been essentially ignored by mainstream arche-

ology even though it apparently yields an abundance of stone artifacts 30,000, perhaps even 70,000 years old. Such dates are anathema to those holding on to the Clovis-First paradigm. Below, we shall see the potential consequences of challenging this paradigm.

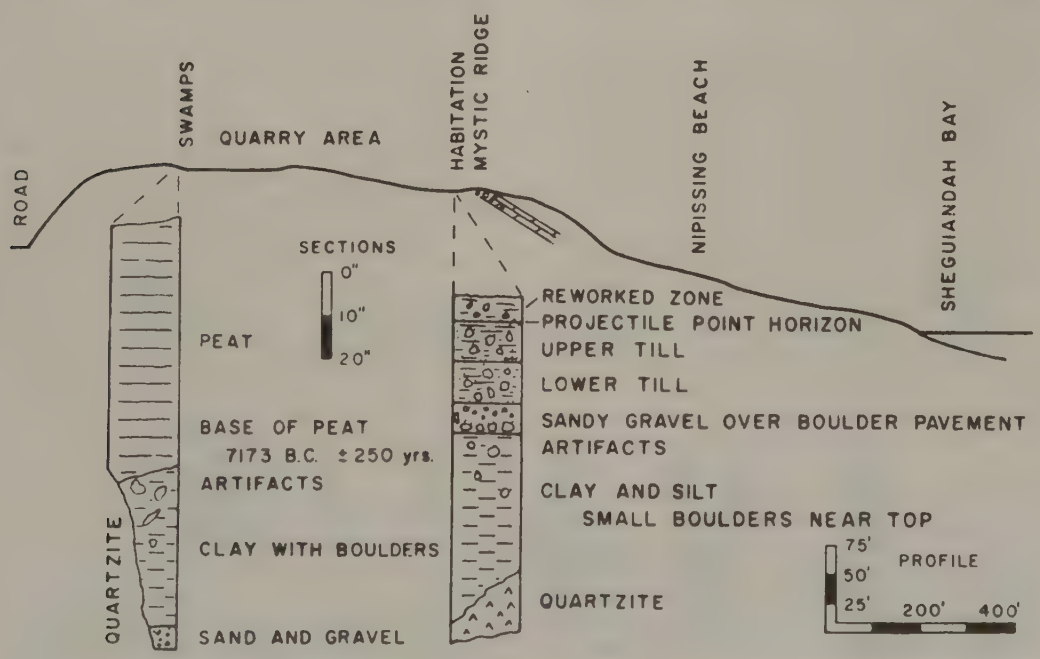
The Sheguiandah site was first worked by T.E. Lee from 1951-1955 under the auspices of the National Museum of Canada. Thus, at first, the site received mainstream support, but this disappeared when Lee claimed to have found pre-Clovis artifacts.

Lee was forced to describe the general character of Sheguiandah and its artifacts in a 1964 article in the Anthropological Journal of Canada (a journal Lee himself had to found in order to put Sheguiandah on record).

> At the northern end of Lake Huron and Georgian Bay, Ontario, lies the world's largest freshwater island, Manitoulin. Taking its name from the Indian Great Spirit, Manitou, this remarkable island has given us the richest preceramic site and the oldest traces of man ever found in Canada.
>
> Although the island is predominantly made up of dolomite, limestone and shale formations, thinly covered glacial drift but often outcropping, one small area at the northeast corner contains several partly exposed knobs and ridges of high-grade quartzite. Early Man found them and tested them. One of the smallest ridges evidently offered a more favorable environment as well as good exposures of quartzite. What Early Man did on this ridge continues to amaze the thoughtful few who know the site well. (R42)

The Sheguiandah site was excellent for the manufacture of simple stone tools. Some 26 acres of Manitoulin are strewn with blocks, chips, and worked fragments of quartzite---yards deep in some places. The top layers of this rocky debris are noncontroversial for they are clearly post-Clovis. But Lee dug more deeply and came up with stone implements from deposits that seemed preglacial and, therefore, far older than 12,000 years. (R118)

Lacking carbon-datable material, Lee was at first indefinite about the ages of the deepest artifacts. Stratigraphic dating---always suspect---had to be



Generalized profile of the quartzite hill at the Sheguiandah site on Manitoulin Island, Ontario. (R56)

used. Four mainstream geologists (J. Sanford, B. Liberty, J. Terasmae, E. Antevs) inspected the Sheguiandah site. Their opinions concerning the lowest levels ranged from 30,000 to 100,000 years. Even the most conservative estimate was far too old for the Clovis-Firsters.

> From this point on the story becomes murky. Lee's discovery was obviously controversial, pointing to a human presence in North America far earlier than most scientists thought possible. John Sanford [from Wayne State University] nevertheless continued to support Lee's position. He provided geological evidence and arguments suggesting the Sheguiandah site was quite old. But the view advocated by Lee and Sanford did not receive serious consideration from other scientists. Instead, political maneuvers and ridicule were employed to discredit Lee. (R129)

In fact, the suppression of Lee's archeological claims was more severe than indicated in the paragraph quoted above. In 1974, some 20 years after he began digging at Sheguiandah, Lee wrote bitterly:

> Twenty-three years have passed since the discovery of Sheguiandah, the most important prehistoric site ever found in Canada. It was ridiculed, scorned and rejected by most of a know-it-all and jealous profession, and its discoverer [Lee] was driven from his government post into eight years of unemployment---blacklisted and unemployable in his own country. Despite the firm opinions of four prominent geologists who had studied it in depth and pronounced it to have a minimum age of 30,000 years, the archaeologists of America knew better, and a conspiracy of silence descended on the subject. (R63)

To promulgate his views of the true nature of Sheguiandah, Lee continued publishing his Anthropological Journal of Canada. Of course, most mainstream archeologists ignored the upstart publication, and it is now defunct (due to Lee's death) and difficult to find anywhere. During its brief existence, Lee's Journal also became a vehicle for the exposure of many other archeological anomalies in addition to Sheguiandah.

One reader and contributor to the Anthropological Journal of Canada was G.F. Carter, a recognized mainstream geographer but a "maverick" archeologist. Carter was even more controversial in archeological circles than Lee. Naturally, Carter was drawn to Sheguiandah. It was in many ways analogous to the Texas Street and Scripps Canyon sites Carter had spent years excavating in California (see below). It was inevitable that Carter visited Lee in order to examine the Sheguiandah evidence firsthand and its artifacts housed at the national museum in Ottawa. He subsequently wrote:

> The quartzite at Sheguiandah, on Manitoulin Island on the north side of Lake Huron, is some of the finest I have ever seen. The blades were as regular as those struck in the flints in northern Europe, and the cores were fine, fluted examples of this craft. The problem with the site is that the lower levels are clearly beneath the glacial deposits. They are preglacial. This has been attested by Sanford, a geologist who has made a special study of the site, but he is

Typical small tools from the Sheguiandah site, Manitoulin Island, Ontario. (R42)

generally ignored. Lee's reports are clear enough and beautifully illustrated, but the opposition says that the site is just a Point Peninsula workshop. This is the old quarry and pro forma argument in a slightly new dress. If there is any Point Peninsula material at the site, it surely has nothing to do with the blade and core work. (R83)

Now, more than 20 years after Carter wrote the forgoing paragraph, Sheguiandah is still a forbidden topic in the mainstream journals.

The anomalist, though attracted to the Sheguiandah story, must recognize that the stratigraphic dating of glaciated regions is hazardous work. It is unfortunate that the lowest levels of Sheguiandah have never given up human bones or datable charcoal from the campfires of the artisans who apparently fabricated quartzite tools on the island for millennia.

Sheguiandah is the kind of story anomalists like to repeat, but objectively it does not provide iron-clad proof of pre-Clovis activities in North America. The claimed political suppression, though, seems undeniable and is well-supported by mainstream science's reactions to similar claims that have been made for some of the following sites.

Alberta

Calgary. Sheguiandah is not the only Canadian archeological site yielding controversial stone artifacts. Whereas the Sheguiandah tools are recognized as genuine human-manufactured artifacts but of debatable age, the age of the purported artifacts found near Calgary is not at issue. Rather, many archeologists believe they are merely "geofacts"; that is, products of nature. In this, they are in the same class at those claimed artifacts at the more famous Calico site in California.

The chipped quartzite cobbles at the Alberta site were described in 1996 by J. Chlachula. It is undeniable that these cobbles look artificially worked. In fact, they closely resemble the human-made "choppers" from Early Paleolithic sites in Asia and Europe. The Alberta "tools" could be over 100,000 years old, completely upsetting the accepted timetable for human activity in North America. Such antiquity in effect relegates them to geofact status. They are, therefore, largely ignored by mainstream science. (R217)

Arizona.

Flagstaff. Beginning in 1973, J. Goodman, aided by amateur archeologists, graduate students, and professionals A. Bryan and R. Gruhn, from the University of Alberta, began digging a shaft into a mountain side in the San Francisco Peaks. At a depth of 15 feet, which was radiocarbon dated at 25,000 years B.P., a stone chopper was discovered. Going still deeper, down to 27 feet, yielded still more crude stone tools. Geologists from the U.S. Geological Survey used stratigraphic dating to assign a figure of at least 125,000 years to this level.

As if these dates were not sufficently anomalous, Goodman provides in his book American Genesis a photograph of what he claims is an engraved stone found in the shaft at the 100,000 B.P. level. This engraving, he asserts is similar to that done by Cro-Magnons in Europe circa 30,000 B.P.! This stone is part of the evidence that he believes proves that modern man originated in North America, not the Old World! (R118)

Goodman's discoveries at Flagstaff have not been reported in any of the scientific literature we have examined. Indeed, Goodman's claims appear to have been ignored by mainstream science, possibly because his previous book is entitled Psychic Archeology. Anomalists, too, are advised to be wary here.

California. Four areas in California incorporate archeological sites of uncommon interest to searchers for pre-Clovis stone artifacts. These are:

- The Mohave Desert, where the Calico site's artifacts could be 100,000 years old---assuming they are not "geofacts" instead.

- The Yuha Desert. See Part A. Artifacts of mixed ages exist at this site.

- The Pacific shore in the San Diego area, especially Texas Street and the Scripps Campus, where sediments have produced more very ancient artifacts/geofacts.

- Santa Rosa Island, one of the Channel Islands, where humans may have

killed and roasted dwarf mammoths many millennia ago.

•The Sierras, particularly Table Mountain, where abundant artifacts occur deep in the so-called "auriferous gravels" which are capped by ancient lava flows.

Each of these areas has its own history of discovery, digging, finding, and intense debate. We will summarize each briefly, admitting beforehand that none is presently considered by mainstream archeology to provide satisfactory proof that humans lived in California prior to 12,000 B.P.

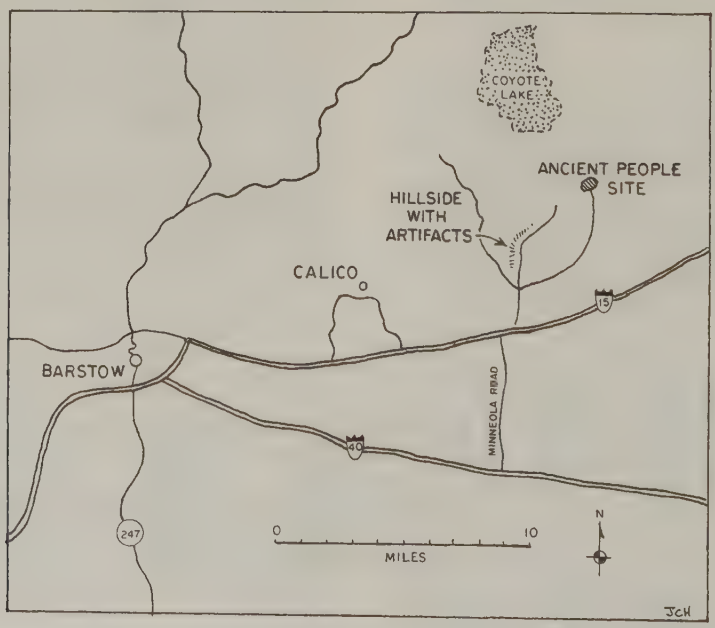
The Calico Mountains. In the Mohave Desert not far from Barstow, California, are several shafts and trenches carved with archeological care out of the hard desert pavement. Thousands of years ago, this region was once verdant. Water was then close by in the form of Lake Manix. The area probably teemed with life: horses, camels, mammoths, and, possibly, pre-Clovis peoples. Today, the Calico site, dismissed by mainstream archeology, is maintained by a group of believers called the Friends of the Calico Early Man Site.

How long ago did humans occupy this now-desolate place? Did humans really manufacture crude tools here 100,000 years ago, discarding them to be dug up and argued over in the late Twentieth Century?

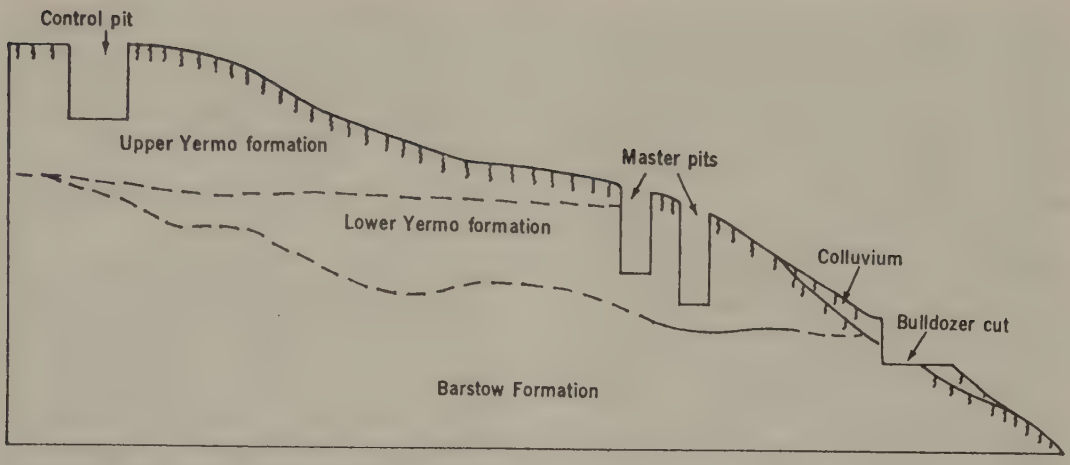
There are certainly many human artifacts on the desert surface at the Calico site. Of course, most are less than 12,000 years old and, therefore post-Clovis and acceptable to mainstream science. Superficially, Calico does not show much promise as a place to start digging.

In 1954, though, R.D. Simpson, then employed by the Southwest Museum of Los Angeles, was surveying the Calico area. Large, crude tools were at once obvious, but just below the surface she noted even more primitive tools. Some of them, in fact, looked a lot like the million-year-old tools being found in Africa at famed Olduvai Gorge. (R77, R153)

During the late 1950s and early 1960s, then working for the San Bernardino County Museum, Simpson assembled a substantial collection of Calico material. The Calico site would probably have never achieved its notoriety if L.S.B. Leakey, famous for his excavations at Olduvai Gorge in Africa, had not been lecturing at the University of California



Map of part of southern California showing the location of the controversial Calico site. (R153)



Geologic section of the Calico site. Leakey's artifact find occurred at the bulldozer cut at the right. (R57)

at Riverside in 1963. Simpson showed him her collection, which greatly intrigued him. He was taken to the desert site and immediately saw its promise. Based upon his 20 years of experience in recognizing signs of early human activity, he selected an area for excavation. Trading on his African fame, Leakey inspired the National Geographic Society and others to fund research at Calico.

Work at Calico began in earnest in 1964 under Leakey's guidance. Master Pit 1 was 25 x 25 feet broad and 20 feet deep. Another large pit (15 x 15 feet by 22 feet deep) and two long trenches were also dug. In 1968, Leakey reported some results and conclusions in Science.

> The principal excavation [25 by 25 feet (7.5 m) and extending downward to an average depth of 13 feet into the undisturbed fan] has yielded more than 170 specimens in these undisturbed deposits. We consider them to be unquestionably the result of human activity.
>
> .....
>
> Our view that the site has yielded very early humanly made artifacts is shared by a number of our colleagues who have visited the site and examined the material upon which we base our conclusions. Others, however have found themselves unable to accept these specimens as being the result of human activity and regard them instead as having been produced naturally.
>
> .....
>
> Geologists and geomorphologists who have examined the site are of the opinion that the age of the fan is over 40,000 years but probably less than 120,000 years, with a probable age of between 50,000 and 80,000 years. (R50)

If the Calico artifacts had been dated at 5,000-10,000 years, they might well have been accepted by the archeology establishment. But 50,000 years violated the Clovis 12,000-year barrier by a good bit. Either the dates were wrong or the artifacts were not artifacts at all but rather "geofacts"---products of rough-and-tumble natural phenomena.

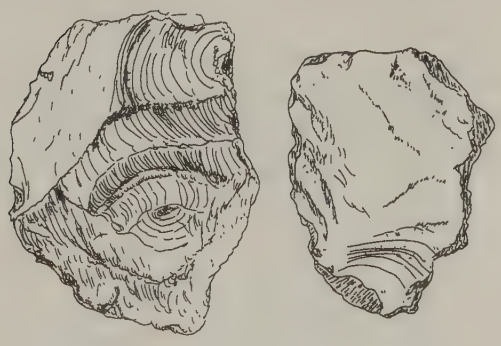
One suspects that it was Leakey's solid scientific reputation that coaxed Science into publishing the Calico results.

The general consensus regarding Calico that evolved in the Leakey days was that all of the deeply buried specimense were geofacts. In the decades that followed Leakey's involvement at Calico, this consensus has remained intact.

Leakey returned to Africa and the

lecture circuit. On October 1, 1972, in London enroute to America and the Calico Mountains, he died from a heart attack. Calico funding dried up, as did the notoriety he gave the site. Nevertheless, work continued at a low level, and new information has emerged that merits mention.

First of all, it must be acknowledged that the "geofacts" emerging from the two Master Shafts at Calico may look like only rocky desert debris to the uninitiated, but most field archeologists, if they were unswayed by knowledge of the artifacts' source, usually see ancient choppers, scrapers, handaxes, cutting tools, burins, gravers, piercing tools, and anvils. Calico has produced an impressive lithic assemblage---at least to some, but not to most archeologists. (R77)



Two problematic artifacts from the Calico site. They closely resemble recognized human tools excavated at Olduvai Gorge, Tanzania. The Calico specimens could be 40,000-200,000 years old. However, they are dismissed as "geofacts" by most archeologists. (R153)

Although the Calico artifact-geofact controversy is the more important, the age question cannot be ignored. Geologists and geomorphologists have not been of much help at Calico. These experts have in the past provided dates ranging from a few tens of thousands of years to 1 million years. (R83).

More recently, modern physical dating techniques have reduced the spread considerably; for example:

> Subsurface artifacts are recovered [at Calico] from an alluvial deposit capped by a 100,000-year-old relict soil and dated to 135,000 years B.P. by sediment thermoluminescence and 200,000 years B.P. by uranium-thorium. ((R180)

The uranium-thorium dating was reported by J.L. Bischoff et al in 1981. (R92)

Of course, the ages of the stone specimens brought up from the master pits at Calico mean little if they are merely rocks; that is, geofacts. Over the years, experts have weighed in on the geofact question pro and con. Certainly one of the most influential pro-geofact papers appeared in Science in 1973, written by V. Haynes, a professor of geology from Southern Methodist University and a staunch defender of the Clovis-First position. He concluded as follows:

> After examining, for the sixth time, the Calico site and the specimens recovered from the lower Yermo formation, I find no evidence to alter my previous views---that is, that the evidence for artifacts remains uncompelling and that a natural origin cannot be precluded. In fact, normal natural processes are adequate to explain the origin of all of the phenomena observed at the Calico site. This does not mean that I am convinced that all of the specimens are geofacts, even though I am inclined to suspect it; but more testing of this hypothesis should be done by uncommitted investigators who are well qualified in modern quantitative geological techniques. (R57)

While artifact dating can be quantified in many instances, there is no set scientific procedure for proving that an specimen is an artifact or geofact.

One indirect approach is to take a large number of lithic specimens and subject them to the wear and tear that might be expected during 100,000 years of exposure in the desert. Human trampling experiments using piles of stone specimens have been conducted. A 1998 report of a trampling experiment by S. McBrearty relates how trampling can indeed transform undistinguished stone flakes into pseudotools. (R158) Score one for the geofact side!

A second indirect method involves taking raw stone specimens from the

Calico site and experimentally knapping them; that is, trying to make them into tools typical of ancient man. This approach assumes that human knapping produces specimens morphologically different from natural actions. Such an experiment was tried by L.W. Peterson et al, resulting in the following assertion:

> A number of conclusions from this study support the concept that the Calico lithic collection contains man-made specimens. (R106)

Use-wear analysis represents still another way to separate artifacts from geofacts. C. Singer has conducted micro-analysis of some of the claimed Calico tools. He concluded:

> The alterations of surfaces and edges, clearly visible under the microscope, were of a nature impossible of achievement by other than repeated specialzed use. These laboratory examinations, coupled with the recognition of striking similarities to assemblages from other American early man sites, appeared in 1976 to confirm the presence of humans in the Mohave at a very early period. (R66)

In conclusion, most of today's archeologists and anthropologists would still echo Haynes' "uncompelling" description, despite the wear analysis, the knapping experiments, and better dating methodologies.

But with the Clovis-First paradigm now being steadily weakened by findings at Monte Verde, the Meadowcroft Rockshelter, and other American sites, Leakey's original intuition, forged by years at Olduvai Gorge, may be vindicated before too long.

Texas Street. Notwithstanding its name, the Texas Street site is about 5 miles from the Pacific Ocean in the San Diego River Valley. Driving inland up the road along the valley, one passes a 300-foot mesa on the right. Texas Street intersects this valley road on the right and climbs to the top of the mesa. The focal point of the present entry lies on the right just a few hundred yards before Texas Street. There one finds one of a series of terraces deposited during the Pleistocene.

In 1947, no one paid much attention to this stratified accumulation of soil and stones. In fact, its main value seems to have been as a borrow-pit. To an archeologist, the Texas Street terrace certainly appeared unpromising to anyone looking for traces of ancient human activity. Yet, it was here that G.F. Carter found many curious, elongated stones with polygonal cross sections. These odd stones began a new chapter in the pre-Clovis-Limit controversy.

Actually, Carter was in the area as a geographer working under a grant from Johns Hopkins University for the study of the Pleistocene terraces along the coast of southern California and Baja California. But Carter was also an avid archeologist, and he thought these long, polyhedral stones must be man-made. Given their shape and "flaked" appearance, they could hardly be natural. But they were unlike anything made by the La Jollan culture circa (7000 B.P.) or any of the other recognized Californian cultures that once inhabited the San Diego area.

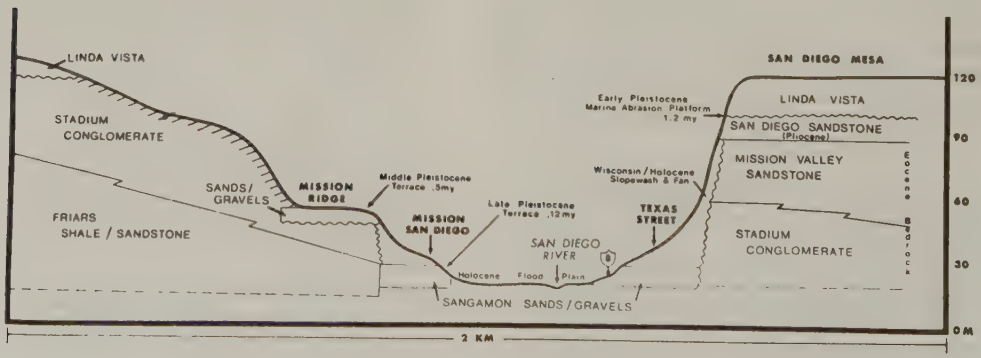
Thus began many trips over the years to Texas Street by Carter. Although Carter was native to San Diego, he was at the time a professor of geography at Johns Hopkins University on the East Coast. As often as possible, he made cross-country trips and collected many of the curious rock specimens in the Pleistocene debris at Texas Street. He was certain they were manufactured by humans, but all of the experts he brought to the site assured him they were merely the product of nature; that is, geofacts. In fact, due to Carter's enthusiastic certainty, they were widely denigrated as "cartifacts." (R39, R118)

In the view of mainstream archeologists, the Texas Street specimens had to be disparaged and because they came from Pleistocene deposits that were laid down 80,000 to 130,000 B.P. And everyone knew that humans did not enter the New World until about 12,000 years ago.

Nevertheless, Carter persisted. As noted in MME7-X1, he also found what he considered to be the remains of ancient hearths as he excavated the Texas Street terrace. These new discoveries produced only the standard mainstream, reflex response to charcoal that was too old to be accommodated within the Clovis-First paradigm. The "hearths" were only the remains of natural brush fires.

The exotic character of his "carti-

Aerial photograph of the San Diego River Valley, California, circa 1930. The arrow indicates the Texas Street site. The mesa on the right in 300 feet higher than the valley. (R83)



Geologic cross section of Mission Valley, California, showing the Texas Street site. (R96)

The Texas Street site circa 1950. The gravel at the level of the car is devoid of artifacts. These begin about one-third of the way up the cut where the texture changes. (R83)

facts," with their polyhedral shapes were at first a real barrier to Carter's understanding of what had happened tens of thousands of years ago at Texas Street. They were true enigmas as stone artifacts go. Suddenly, he experienced what might be called a "scientific epiphany."

> One day I picked up three cobbles in succession that had long, parallel flakes running down their sides from a flat platform at one end to a point at the other end. Two of the cobbles had not a bit of the original smooth and rounded surface that must have once characterized them. It was evident that force had been applied at one end of these rocks in such a way as to split long flakes off endwise. In a moment of desperation, I put one of these split cobbles on a boulder, with its pointed end down, and hit it a lick at the opposite end with my geological pick. To my utter amazement a long flake came off, detaching not from the top, where I struck the stone, but from the bottom, where the stone rested on the boulder, which was serving an an anvil. I set the core up again and hit it another lick, and this time the blow took a similar flake off, but detaching this time from the top, at the point struck by the hammer. Again the flake was flat on its underside, the side that detached from the core. On the core, the two flake scars intersected to give an obtuse angle. I had been looking at just such flake-scar intersections for five years. (R83)

It was obvious that the strange polyhedral specimens Carter had been collecting---the "cartifacts"---were cores from which several long, sharp blades

Texas Street blades made from a cobble by G. Carter. Cobble was placed on a rock anvil and struck with a geologic pick. (R83)

had been struck. It was then that Carter realized that the ancient inhabitants of the San Diego River Valley had been employing a knapping technique called "bipolar flaking." This technique had been used in Europe 20,000-30,000 years ago and more recently by the Aztecs in Mexico to make obsidian tools. Until Texas Street, this technique had never been observed in the United States, and certainly not at sites that were tens of thousands of years old.

Here, also, was an answer to all the critics of the Texas Street specimens who had pointed out that they lacked the percussion bulbs produced by the usual knapping technques and, therefore, could not be human-made. Bipolar flaking does not produce percussion bulbs!

Even with an explanation of how his Texas Street specimens could have been artificially manufactured, Carter remained stone-walled by the Clovis-First paradigm, which was not-so-subtly enforced by the so-called "Clovis Police" who controlled most science publication.

H.L. Minshall summarized mainstream science's opposition to Texas Street and other anomalous sites as follows:

> Skepticism of Carter's claims was not unreasonable, in fact it was perfectly expectable. In summary, the three principal bases for doubt were: the unfamiliar and therefore questionable stone specimens being offered as evidence of human activity, the identification of the concentrated zones of burned earth, red and broken rock and charcoal as "hearths" and not simply the result of brush fires; and finally, and to some the most compelling, attribution of the landform in which the evidence lay to an interglacial high sea level and not to a more recent elevation of the earth's surface there by tectonic activity, the Southern California region being supposedly highly prone to earth movement and faulting. In this latter controversy Carter was to be solidly supported in the following decade by California Institute of Technology geologist C.R. Allen and others, who agreed with him that no substantial deformation had occurred in the San Diego Block for over a million years, saying in effect "Carter was right." (R66)

To some archeologists at least, the true nature of the "cartifacts" of Texas Street was fully appreciated. J. Witthoft, an expert in lithic technology acknowledged in 1955:

> The bi-polar flakes of the Texas Street site are more properly called "blades"; blades of comparable quality, unique to fully modern man, don't appear in Europe until 35,000 years ago. (R118)

One would have expected Witthoft's opinion would have vindicated Carter, but the Clovis-First paradigm was still too powerful.

This paradigm did not stifle further research by Carter and others in the San Diego region. Below, we will mention briefly the findings at Mission Ridge, Scripps/La Jolla, and Buchanan Canyon.

Supported by additional research, Carter now recognized that the crude stone tools unearthed at Texas Street represented a culture that was followed by different cultural phases. The first prevailed between 55,000 and 80,000 years ago. This culture was also characterized by highly weathered manos and metates (stones used in grinding grains). And, later, in another phase, 30,000-55,000 B.P., a different culture left behind large, crude, percussively flaked, ovate knives. Thirdly, from 15,000-30,000 B.P., the inhabitants of the region fashioned more elegant tools, such as small, slender, leaf-shaped, double-convex knives. (R36, R129)

Despite all this evidence, these several, pre-Clovis cultural phases were not recognized by mainstream archeology for reasons as now enumerated by M.A. Cremo and R.L. Thompson.

> According to standard views, practically all of the variegated lithic forms in this list would have to be either (1) incorrectly dated, or (2) products of human imagination applied to naturally broken stone. The manos and metates are especially interesting, since these grinding tools are generally associated with Neolithic, or very late Stone Age, culture. The oldest accepted examples, from Egypt, are thought to be only 17,000 years old. (R129)

In other words, the purported pre-Clovis cultures in the San Diego area were in some ways more advanced than

those in contemporary Europe!

In his 1999 book The Lost Civilizations of the Stone Age, R. Rudgley mentions Texas Street only in the context that its claimed early dates remain unacceptable to mainstream archeology. Yet, Rudgley does insert the following illuminating sentences.

> The evidence for the use of such simple food-processing tools can be traced far back into prehistory. American archaeologist George Carter has claimed that grinding artefacts in the form of both manos and metates that are at least about 80,000 years old have been found in California, although this is widely rejected simply because most archaeologists do not consider that there is sufficient evidence for the populating of the New World until 12,000 BP or slightly earlier. (R169)

Mission Ridge. Ths Mission Ridge site is about 3 miles farther up the San Diego River Valley from Texas Street. Here, the principal investigator was B. Reeves from the University of Calgary. Reeves collected crude scrapers, choppers, and worked flakes. Based upon the stratigraphy, he estimated that the tools he found at Mission Ridge were in the neighborhood of 120,000 years old. (R118) In a lengthy paper presented at a symposium on early man in the New World, Reeves noted the strong similarity of Mission Ridge artifacts to those found at Texas Street. (R98)

Buchanan Canyon. Small canyons feed into the San Diego River Valley (also called Mission Valley). Buchanan Canyon Canyon is one of these. It is only about 1 mile southwest of Texas Street. It caught the attention of H.L. Minshall in 1970 when a cloudburst carved out a large gully, exposing a mass of rock debris. As at Mission Ridge, the purported stone artifacts closely resembled those at Texas Street. (R83)

Scripps Campus/La Jolla. Unlike Texas Street, Mission Ridge, and Buchanan Canyon, Scripps Institution and La Jolla are directly on the Pacific Ocean. Here, an alluvial fan provides ample signs of long human occupation by the presence of old hearths and animal bones. Strangely, stone artifacts, such as arrowheads and blades are practically nonexistent. (R40)

One unusual exception is a mano found by G.F. Carter 400 feet south of a midden at a depth of 5 feet. This grinding tool "looked" ancient but could not be directly dated. (R33) J. Goodman, however, ascribes a date of 22,000 years to it. (R118) Goodman may have been referring to a date of 21,500 ± 700 years reported in 1962 by A.D. Krieger. At the Scripps Campus, Krieger had found some tiny stone flakes, seemingly man-made, associated with charcoal that was radiocarbon-datable. (R41)

Santa Rosa Island. The geography of Santa Rosa and a description of its famous fire areas and roasted dwarf mammoths are presented in MME7-X1.

One might expect that with all of the hunting of and feasting on mammoths that supposedly occurred on Santa Rosa, the fire areas would include spearheads, scrapers, knives, etc. But these fire areas, dating back perhaps 40,000 years are practically devoid of stone tools. (R40, R48) This scarcity is admittedly a bit suspicious, implying that the fire areas are the product of nature not human culinary activity.

It should be added that the island does incorporate several hundred relatively recent (6,000-7,000 B.P.) burials that include well-made bone tools. (R39)

We have to look hard for reports of stone tools definitely associated with the more ancient fire areas and mammoth bones. In her 1959 book Ancient Man in North America, H.M. Wormington mentioned that a chipped stone had been located amid mammoth bones dated at 29,650 ± 2,500 B.P. (R39) In 1964, P.C. Orr, who carried out much of the early archeological work on Santa Rosa, also reported a well-made chipped stone among the mammoth bones (perhaps the same one in Wormington's book). (R43) Critics assert that a chipped stone or two could well have been thermally fractured in the fire areas and would not have required the hand of man.

Visiting Santa Rosa in 1955, G.F. Carter came across one of the polyhedral cores that characrterized the Texas Street site on the mainland. (R36) Of course, this isolated core could have been carried over from the mainland in recent times.

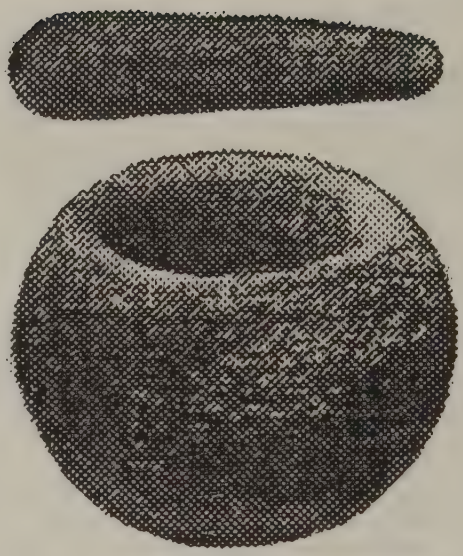
Finally, J. Goodman claims that many

choppers and scrapers---all cruder than Clovis implements---had been collected on Santa Rosa but only one was in direct association with the roasted mammoth bones. (R118) We have not seen any additional references to these particular tools mentioned by Goodman in the professional journals examined.

In sum, Santa Rosa is essentially devoid of convincing stone artifacts of ages comparable to the ages of the supposed hearths and mammoth bones.

Table Mountain, Tuolumne County. So far, California has rewarded the anomalist with some suggestive evidence that humans occupied this state long before 12,000 B.P., the so-called Clovis Limit, and perhaps as much as 100,000 years earlier. Mainstream archeologists have mostly rejected these purported pre-Clovis artifacts offered by G.F. Carter, J. Goodman, A.L. Bryan, H.L. Minshall, and others. The Clovis-First paradigm possesses considerable scientific inertia, and it is not surprising that challenges to it are fiercely debated.

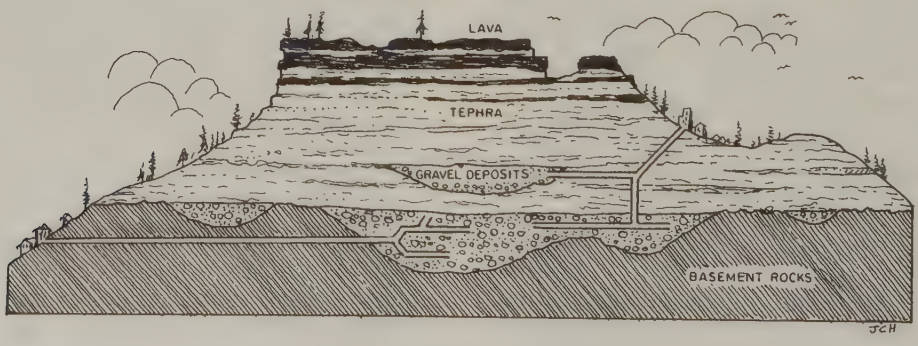
But at Table Mountain in the Sierras, paradigms that are even more fundamental come under fire. Table Mountain is capped by a thick layer of lava firmly dated as 9 million years old. Yet, tunnels deep into the auriferous gravels beneath this igneous lid have produced hundreds of stone objects (mortars, especially) that are obviously of human manufacture. The lava cap implies that these artifacts were buried and lava-capped more than 9 million years ago. So, something is awry either with the geological dating, the accepted scenario for human evolution, the scientific integrity of Table Mountain artifact discoveries, or possibly some other unrecognized factors.



Mortar and pestle extracted from Tertiary gravel deposits located under Table Mountain, California. Potential age: 33-55 million years. (R129)

The anomalies suggested by the artifacts in California's auriferous gravels are so profound that they either have to be ignored completely or deliberately and formally rejected as "bad science."

Interestingly, none of the maverick archeologists mentioned above in con-



Section through Table Mountain, California. The several shafts penetrate into the Tertiary gravels beneath the lava cap. (R129)

nection with other California archeological sites, and who have happily attacked the Clovis-First paradigm, deigns to mention the Table Mountain "problem." In fact, only two among our many references meet the Table Mountain challenge head-on; namely, M.A. Cremo and R.L. Thompson (R129) and R.E. Gentet (R120).

Cremo and Thompson are comfortable with Table Mountain's extreme implications because they believe and attempt to prove that the human race is much older than the 5 million years or so allowed by the anthropologists and evolutionists. Gentet, on the other hand, is a creationist, and would be pleased to trash both geological dating methodology and the evolution paradigm.

We will try to treat the Table Mountain conundrum objectively, but admit at the outset that something serious seems to be amiss in those immense deposits of auriferous gravels.

We begin by having R.E. Gentet set the stage historically.

> The 1849 gold rush to the state of California was the beginning of some of the most unusual reported finds of early man in North America. The gold-bearing gravels of California are recognized as being Tertiary in age, ranging from oldest to youngest Tertiary, depending upon the exact geological setting. At the time these gravels were deposited, volcanic eruptions also laid down lava beds, often tens or scores of feet thick. This occurred a number of times, and together with much erosion since then, have now resulted in table mountains, that is, lava-capped hills where the harder lava has better withstood erosion stresses while surrounding softer material has been swept away. It is under the hard lava beds, in the gold-bearing (auriferous) gravels, where the reported human bones and artifacts were found, not just once or twice, but hundreds of times by miners during the span of time from the 1850s through the 1890s while engaging in mining operations. Findings were spread over a wide geographical area. (R120)

During the late 1800s, several books and many papers recorded the discoveries in the auriferous gravels. Some of the finds were made by respected scientists of the day. Human skulls were found embedded over 130 feet below the surface underneath thick lava beds. Also retrieved were many mortars and pestles, stone sinkers, strange double-headed stones, and the doughnut-like object pictured here.

The so-called auriferous gravels are widespread along the Sierras and even reach farther north into Oregon. Although they are generally considered to

Doughnut-shaped, stone artifact found in California's auriferous gravels. (R120)

be of Tertiary age (older than about 1.6 million years), it is obvious that we cannot use them to date those artifacts picked up by the gold miners from surface deposits, or even in those gravels mined hydraulically. We can count only those human-made objects that were retrieved from the deep shafts and long tunnels that penetrated tens and hundreds of feet into Table Mountain and were well under the thick lava cap.

M.A. Cremo and R.L. Thompson have searched the geological journals and relate how Table Mountain came to be geologically speaking and how old the artifacts extracted from under the lava cap might be. They write:

> Tuolumne Table Mountain was created by a massive latite flow which moved down the Cataract Channel, a Miocene course of the Stanislaus River, forcing the river into a new channel.

> According to R.M. Norris, the latite lava cap is 9 million years old and is 300 feet thick in the vicinity of the town of Sonora. Slemmons gave dates for the latite cap and underlying strata. [9.0 million years for the lava cap; 9.0-33.2 million years for underlying tufts, breccias, and sediments; 33.2-55.0 million years for the auriferous gravels; 55.0+ million years for the bedrock]
>
> Discoveries from the auriferous gravels just above the bedrock are probably 33.2 to 55 million years old, but discoveries from auriferous gravels whose positions are not specified [as being beneath the lava] may be anywhere from 9 to 55 million years old. (R129)

Of course artifacts picked up from the gravel surface could have been dropped there at any time.

One sees easily why few researchers take the artifacts found in the lava-capped auriferous gravels seriously. The belief-gap is just too wide, even for the maverick archeologists who explored those Pleistocene strata along the Pacific coast.

There are many old reports in the science literature detailing the finds at Table Mountain. Two will suffice here.

The first is from an article on "Pliocene Man" from 1881.

> We are informed that in 1858 a stone mortar holding two quarts was taken at the depth of 300 ft. from the surface, from a mining tunnel in Table Mountain, Tuolumne County, California, lying in auriferous gravel under a thick stratum of lava. In 1862 another mortar was found at the depth of 340 ft. (104 of which were composed of lava), and 1,800 ft. from the mouth of the tunnel. (R3)

The second example comes from the Smithsonian's annual report for 1899. In it, W.H. Holmes, a noted geologist of the time, summarized the evidence for "auriferous-gravel man." We have room for only four of his twelve summary points.

> (1) During the three or four decades succeeding the discovery of gold in California, the miners of the auriferous belt reported many finds of implements and human remains from the mines. The formations most prominently involved are of Neocene age; that is to say, the middle and later portions of the Tertiary.
>
> (2) Most of the objects came from surface mines, but some were apparently derived from tunnels entering horizontally or obliquely and to great depths and distances beneath mountain summits capped with Tertiary lavas, leading to a belief in their great age.
>
> (3) The finds were very numerous and were reported by many persons, at various times, and from sites distributed over a vast area of country. They were made with one exception, by inexpert observers---by miners in pursuit of their ordinary calling---but the statements made by the finders are reasonably held and show no indications of intentional exaggeration or attempted deception.
>
> .....
>
> (12) The testimony for the antiquity is greatly weakened by the facts: (1) that the finds on which it is based were made almost wholly by inexpert observers, and (2) that all observations were recorded at second hand. Affidavits can not redeem it. Nothing short of abundant expert testimony will convince the critical mind that a Tertiary race of men using symmetrically shaped and beautiful implements, wearing necklaces of wampum and polished beads of marble or travertine bored accurately with revolving drills, and having a religious system so highly developed that at least two forms of ceremonial stones were specialized, could have occupied the American continent long enough to develop this marked degree of culture without having some really distinctive traces of its existence, something different from the ordinary belongings of our present Indian tribes. (R12)

Thus, over a century ago, the profound disconnect between our basic understanding of the history and geographical dispersion of humankind and the artifacts under Table Mountain was quite obvious.

Objectively, one or more of the following situations must prevail:

•The hundreds of artifact finders were all liars or, more charitably, incredibly inexpert;

•The artifacts were planted; i.e., hundreds of hoaxes were perpetrated;

•Recent artifacts were somehow introduced by nature into ancient sediments;

•The geological dating of the lava flow and the deposition of the auriferous gravels are far off the mark; or

•The scenario for the evolution and diffusion of the human race is grossly inaccurate.

Colorado

Near Fort Morgan. In 1980. outside Fort Morgan, Colorado, workmen digging pits for a landfill uncovered a prehistoric campsite 40 feet under the sandy bed of an ancient stream. The diggers found bones, worked flints, and burnt stones arranged in a ring. Excavations were stopped when the importance of the site became obvious. Estimates of the campsite's age were estimated as being between 17,000 and 30,000 years--- figures that would have been heresy a decade or two earlier. (R85)

If the site's age was determined by stratigraphic dating, as seems likely, caution must be advised here.

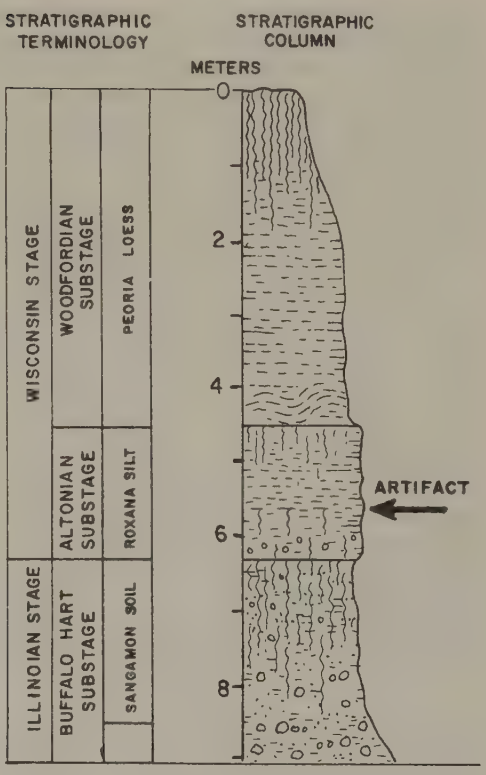
Illinois.

Fulton County. The abstract from an article in a 1965 issue of Science follows:

> Discovery of an artifact of human manufacture imbedded in Roxana loess, classed as Altonian substage of the Wisconsin stage of the Pleistocene, of an age of 35,000 to 40,000 years, contributed to the determination of the age of man in the New World. (R45)

It goes without saying that the estimated age is highly anomalous today and even more so in 1965's archeological climate. One wonders how it passed Science's peer review system.

The article does consider the possibility that the artifact somehow achieved its location through the action of burrowing animals and accidental transportation by road machinery.



Location of an artifact embedded in a fresh road-cut in Illinois. Its stratum is dated as 35,000-40,000 years old. (R45)

Green County. While a well was being dug by hand in 1879, the workmen found an ax head at a depth of 72 feet, the point where bedrock was reached. It was covered with hard clay when found. (R2)

No age estimates were offered in the article. All one can say is that the great depth implies great age, but such cannot be confirmed objectively.

New Jersey

Trenton. In the late 1880s, one of the most controversial archeological sites in the New World was located in the environs of Trenton. The deep and extensive Trenton Gravels had yielded many fine stone artifacts (arrowheads,, knives, pottery) plus a human femur from great depths. The contents of the Trenton

Gravels seemed to prove that Paleolithic (Stone Age) man lived in America as well as in Europe hundreds of thousands of years ago. (R29)

The Trenton Gravels are mentioned rarely today. The "book of science" has been closed on all those artifacts that were found so deeply emplaced in the glacial gravels. Perhaps the "book" was closed too quickly---and likely with a sigh of relief.

The Trenton Gravels were dug and sorted through mainly by C.C. Abbott. His work was made easier by the excavations of river floods, railroad builders, and construction workers in need of gravel. (R7)

When A.R. Wallace (codiscoverer of evolution with Darwin) visited North America in the 1880s, one of his main objectives was to determine whether Paleolithic humans had occupied the continent. Naturally, he was attracted to the Trenton Gravels and, even more so, to Table Mountain and California's auriferous gravels. Regarding Trenton he later wrote:

> We now come to the very interesting discoveries of Dr. Charles C. Abbott, of Trenton, New Jersey. In the extensive deposits of gravel in the valley of the Delaware, fresh surfaces of which are continually exposed on the cliffs on the river's banks, he has found large numbers of rude stone implements, almost identical in size and general form with the well-known Palaeolithic implements of the valley of the Somme [France]. These have been found at depths of from five to over twenty feet from the surface, in perfectly undisturbed soil, and that they are characteristic of this particular deposit is shown by the fact that they are found nowhere else in the same district. Large bowlders, some of very great size, are found throughout the deposit, and in one case Dr. Abbott found a well-chipped spear-shaped implement immediately beneath a stone weighing at least half a ton. (R5)

Wallace and other scientists of the times (late 1800s) were convinced that the Trenton Gravel artifacts were of glacial age, probably even of interglacial age. This implied a Middle Pleistocene origin of the artifacts, conferring possible ages of 50,000-100,000 years.

But such great ages ran counter to the developing strong anthropological current favoring a recent appearance of humans in the New World.

By the 1940s, archeologists and anthropologists had convinced themselves that Abbott's artifacts were actually of rather recent origin. Here we quote some conclusions of D. Cross of Hunter College.

> The Culture of the Abbott Farm was homogeneous and of no great antiquity, the artifacts falling into a normal frequency curve with the peak a few inches below the plow line and showing but little difference in typology and material from the lowermost surface.
>
> .....
>
> All of the above would seen to indicate that related cultures of the Eastern area are not very old, and that those identified with certain of the early aspects are separated from each other by little or no difference in time. (R31)

This recency claim hardly concords with artifacts 20 feet deep and under half-ton boulders! Likewise, the Meadowcroft Rockshelter, not very far west of Trenton, belies Cross' conclusions. Nevertheless, they were consistent with the "recent-arrival" (Clovis-First) paradigm taking monolithic shape in 1943.

Even M.A. Cremo and R.L. Thompson, who made much of the artifacts in California's auriferous gravels, basically ignored the stone artifacts in the Trenton Gravels. They did, however, mention the fossil human femur found in a railroad cut 91 inches under the gravels and other sediments. In 1987, the layer from which this femur was recovered was dated by R. Witte, of the New Jersey Geological Survey, as being of interglacial origin and about 107,000 years of age. (R129) This revelation has not revived interest in the artifacts that were found in similar situations.

So much for the possible antiquity of the Trenton Gravels and what evidence they contain about anomalously early appearances of humans in North America.

New Mexico

Sandia Cave. A classic Folsom point,

manufactured by the well-studied Folsom Culture (9 000-10,000 B.P.) has been discovered in Sandia Cave. Such would not be of interest to the anomalist if the point were not covered with a stalagmite ---that is, a layer of travertine, a type of concretionary limestone. Stalagmites, according to popular theory form very, very slowly; and this layer encasing the distinctive Folsom arrowhead is said to be 250,000 years old!

Of course, this is an intolerable situation for mainstream archeologists. V. Steen-McIntyre summarized the situation nicely:

> The geochemists are sure of their date, but archaeologists have convinced them the artifacts and charcoal lenses beneath the travertine are the result of rodent activity. The archaeologists who have seen the evidence are sure of the presence of artifacts beneath the crust, but believe the date is wrong! but what about the artifacts cemented in the crust? (R129)

It is necessary to be objective about this anomaly implied above. There are stalagmites that are known to grow very fast; e.g., Crystal Spring Dome in Carlsbad Caverns. (See ESC10-X1 in Anomalies in Geology.)

Orogrande. Pendejo Cave lies 14 miles east of Orogrande in the Tularosa Basin in southern New Mexico. "Pendejo" in Spanish means "silly" or "stupid." Perhaps that is why this hole in the side of a cliff is more often called "Orogrande Cave."

The lead excavator of Pendejo Cave has been R.S. MacNeish, the Research Director for the Foundation for Archaeological Research. MacNeish is a maverick in the archeological community---mainly for the pre-Clovis dates he claims for artifacts in Pendejo Cave. MacNeish and his colleagues have excavated this cave down to bedrock. They have discovered flaked stone artifacts and possible hearths with charcoal radio-carbon dates of 35,000 B.P. The flaked stones are said by critics (as is customary in such situations) to be merely geofacts; that is, productions of nature. (R114) If the stones are truly artifacts, as McNeish insists, the lithic scars on the artifacts arising, from the knapping process are atypical, according to other archeologists. (R126) Presumably, "atypical" really means here that the Orogrande artifacts were not made by known local cultures or, more likely, were the products of natural forces ("geofacts").

MacNeish and his crew have also come across a piece of pottery plus what seems to be a human handprint on the clay wall of a hearth. The carbon-dating of associated charcoal yields dates of 35,000 B.P. and 28,000 B.P. for the pottery and handprint, respectively. (MME6-X1)

New York

Cobleskill. In the spring of 1970, J. Timlin was fishing in the Catskills, when he noticed some flaked stones along the stream's banks. He collected a few and showed them to B.E. Raemsch, a professor of anthropology at Hardwick College. Raemsch was sufficiently impressed to spend two summers collecting more of the flaked stones at what is now referred to as the "Timlin SIte."

Raemsch collected stones that he interpreted to be projectile points, scrapers, and hand axes. He did not doubt that they were man-made. For Raemsch, the big question was their age. He believed they were Mid- to Late-Pleistocene. He based his estimate upon the following three features:

(1) The purported artifacts closely resembled European artifacts of that age;

(2) The objects were heavily patinated, suggesting great age; and

(3) The flaked stones seemed to be derived from Pleistocene deposits about 70,000 years old; i.e., he employed stratigraphic dating. (R60-R62)

Little technical discussion of Raemsch's claims arose until he and W.W. Vernon published a paper in a 1977 issue of Current Anthropology, a leading mainstream journal. This paper gave rise to intense, sometimes emotional, exchanges in later issues of the journal.

In their Current Anthropology paper, Raemsch and Vernon summarized six years of field research at Timlin. In addition to elaborating on the three points listed above, they presented a photograph of one of the hand axes they found (in situ) embedded in the radius bone of a bovid. They wrote:

The oldest of the artifacts closely resemble flake tools commonly referred to in Europe and Africa as Upper Acheulean, and they include cordiform points, type side- and end-scrapers resembling those of Mousterian assemblages, and core knives and other core tools having specialized functions judged by the presence of complex structural features. (R69)

Handax found in the legbone of a bovoid, Timlin site, New York. Estimated age: 70,000 years. (R69, B.E. Raemsch)

The age of these "tools" and their comparison with European artifacts must have waved a large red flag before most American archeologists and anthropologists. J.R. Cole and L.R. Godfrey responded in Current Anthropology that the Raemsch-Vernon paper was "an unverified assertion with serious flaws." Flaws that they then attacked vigorously, particularly those involving the dating and the claimed artificial nature of the flaked stones. Cole and Godfrey concluded:

> Raemsch and Vernon's research conclusion can only be interpreted as an example of extreme ignorance of Pleistocene stratigraphy and process in New York and in no way should be considered as representing the current status of either archaeology or glacial geology in New York. (R70)

Raemsch and Vernon responded to this biting criticism in a 1978 issue of the same journal. (R72) In a following comment, G.F. Carter joined in the debate, writing:

> I have at Raemsch's invitation inspected the artifacts. They are definitely the work of man, mostly debitage, but including tools. Bulbs of percussion, striking platforms, flakes and cores are abundantly present. There is one fluted core and the cordiform flakes can only have been produced by some form of blade-and-core work. Thomas Lee and Junius Bird concur in the artifactual status of the material. (R72)

Carter also wrote positively about the other claims made by Raemsch and Vernon.

The Editor of Current Anthropology allowed a rejoinder by J.R. Cole and others, and then closed the discussion.

Cole et al, interestingly enough, focused their rejoinder on Carter's comments rather than those of Raemsch and Vernon. (R73) Carter, of course, was virtually an outcast in archeology because of his seemingly outrageous claims for the antiquity of the purported artifacts collected at Texas Street, Calico, and other controversial sites. Carter, evidently, was a bigger and more important target than Raemsch!

The Timlin site is not mentioned in any of our recent literature acquisitions, except for the comprehensive literature survey of Cremo and Thompson. (R129)

Nowhere else are those flaked stones from that fishing stream in the Catskills mentioned. Nor is Raemsch's dating of the admittedly complex Pleistocene deposits along the stream's banks accepted by the archeological establishment---at least at this writing. There may be additional developments in New York State, which is not far from the equally unacceptable Ontario site at Sheguiandah.

Oklahoma

Frederick. One of the more perplexing archeological sites in North America is situated about a mile north of the town of Frederick in southwestern Oklahoma. The puzzle is embedded in a rather curious gravel deposit of unquestioned Pleistocene age. In this long nar-

row ridge of gravel, well-made, rather modern-looking, stone tools have been extracted at depths of 10-25 feet, where one also finds the bones of extinct animals. These bones are firmly dated as being about 750,000 years old! The apparent anomaly is, of course, in the artifacts' physical association with those very ancient bones. Are the artifacts equally old?

The Frederick site (sometimes referred to as the Holloman Pit) is not mentioned at all by the most avant garde archeologists; e.g., G.F. Carter, J. Goodman, M.A. Cremo, and R.L. Thompson. (R83, R118, and R129 respectively). Perhaps this site is too questionable for even them.

The geology of the gravel ridge is interesting in its own right, regardless of its artifactual content. The site consists of a long ridge 8-10 miles long by ½-mile wide. It is capped by a gravel deposit from a few to 25 feet deep. Incongruously, the ridge rises 80-100 feet above the surrounding plains, which are much older than the Pleistocene gravel deposit. The ridge rests on Permian red clays and shales a couple hundred million years old. Geologists believe that the ridge was actually once a riverbed that has somehow withstood the erosion that removed the river's banks that once contained it and also leveled the nearby plains. (R20, R22, R23)

The gravelly ridge has been a good source of construction material for years. The lower half of the gravels has been a source of bones of extinct animals and human artifacts, some of which are firmly cemented into the gravel. Some of the discoveries have been observed by scientists, but private collectors have taken a share. All agree that the artifacts are nicely crafted and appear to be of relatively recent vintage, a fact that makes them all the more anomalous. (R20, R22)

In any case, those accompanying animal bones are unalterably pegged at about 750,000 years B.P. (R32)

The incongruity of this situation was well understood by C.N. Gould, Director of the Oklahoma Geological Survey when he wrote the following.

> There can be no doubt that the artifacts occur in the pit near the basal portion, on the same level as the fossil remains. An examination of the undisturbed face of the pit, immediately above the position of the finds, showed unbroken, nearly horizontal strata above it. There is no evidence of gullying at this point, whatever may have been the case with regard to the other finds. As the case stands, it looks very much as though the artifacts are of the same antiquity as the fossil animals. At the same time it would be well to reserve final judgment until we are certain that the artifacts are not secondary inclusions. It must be borne in mind that the artifacts are of a distinctly modern type and their occurrence with an early Pleistocene fauna is incongruous when considered in the light of Old World finds. (R23)

The above was written in 1929. The only other reference to this "incongruity" was found in the November 25, 1950 issue of Science News Letter, where it was remarked that the Frederick gravel deposit, being 750,000 years old, was "by far the oldest known evidence of man in North America." (R32)

Location undisclosed. From the New York Times of March 28, 1989.

> A discovery of broken stone tools, charcoal and bison bones in Oklahoma may be evidence of the earliest known presence of humans in North America, archeologists reported last week. Analysis of the charcoal and some snails found in the same sediments has yielded dates going back to 40,000 years. (R110)

This discovery was made by a team from the Oklahoma Archaeological Survey poking around in the sediments of an ancient stream channel.

Oregon

Waldo. Waldo is in neither our 2001 road atlas nor Zip Code Finder. If the town still exists, it is in Josephine County just a few miles north of the California state line. Like California, Oregon was endowed by deep auriferous gravels courtesy of Pleistocene geological processes. Unfortunately, the Oregon gravels reported here are not capped by ancient, datable lava flows as at Table Mountain in California. Nevertheless, it is worth noting that in 1902, at the Deep Gravel Mining Company, a

granite mortar, 12 inches high and 9 inches across, was found embedded in "blue cement gravel" 58 feet below the surface. (R13)

Texas

Lewisville. Lewisville is about 20 miles northwest of Dallas, and best known for its many ancient hearths. (MME7-X1) The hearths, even though some of them are apparently pre-Clovis, are not as controversial as a Clovis point discovered on the site in physical association with charcoal dated at 37,000 B.P. Since the Clovis-First paradigm insists that the Clovis culture did not take root in North America until about 12,000 B.P., we have an obvious and troublesome temporal inconsistency.

E.H. Sellers has described the Lewisville site and what it yielded.

> During 1949 to 1951, in connection with the construction of a dam one mile north of Lewisville, Texas, United States Engineers removed earth to a depth of about twenty feet from the top of one of the terraces of Elm Creek, a tributary to Trinity River. At this depth a hearth was found. Around the hearth were burned deer bones, a charred horse vertebra, burned pack-rat bones, and charred hackberry seeds, affording evidence of a hearth and of human habitation. Subsequently, a total of twenty-one hearths were found, many of which were exposed by erosion subsequent by the removal of earth for the dam; the hearths contained an abundance of charcoal. A test and check test of the charcoal gave an age determination of more than 37,000 years B.P. Fossil bones, mostly in and around the hearths, indicate a large mammalian fauna at this site, including the following species now extinct: horse (two species), a large camel, elephant, peccary, and glyptodon; also a large tortoise and a large turtle. Both tortoise and turtle are of species now extinct.
>
> Following the removal of earth, the surface of the site, barren of vegetation, eroded rapidly, and a few artifacts were found on the eroded surface, having presumably been uncovered by erosion. The artifacts obtained in this way were one large crudely made chopper, a small hammerstone, a piece of a scraper and three small flakes. Additional to these artifacts, one reworked Clovis point was found in a hearth embedded to a depth of about four inches in the burned red clay. (R40)

As H.M. Wormington indicated in her book Ancient Man in North America, the Clovis point was about 27,000 years too early, according to the then-accepted model of human diffusion into the New World. However, she also pointed out that the Clovis point was not collected by trained people; that is, professional archeologists..

Actually, W.W. Crook, Jr., and R.K. Harris, and members of the Dallas Archaeological Society---all "nonprofessionals" ---had dug up the contentious Clovis point as well as a large piece of charred wood at the largest of the many hearths. When the wood was dated in excess of 37,000 B.P., perplexity reigned; so a second wood sample from the same hearth was tested. It produced the same age: over 37,000 B.P.

The charge of fraud arose early. It was claimed that someone had "planted" the Clovis point, or perhaps it had accidentally fallen into the test pit. But professional archeologist A. Krieger saw the hearth before it was excavated and decalared the the hard-packed clay surface was undisturbed. Furthermore, all concerned with the Lewisville site vouched for the competence and integrity of the excavators despite their amateur status. (R39)

Nevertheless, the embarrassing Clovis point has ever since been formally declared to be fraudulent.

H. Alexander, who was a graduate student at the University of Texas in 1958 when the Lewisville site was being excavated recalled how opinions changed when the dates were announced.

> On a number of occasions, I had the opportunity to listen to the faculty and visitors discuss their visits to the site. The opinions voiced at the time were that the hearths were man-made, and the faunal associations [animal bones] valid. Once the dates were announced, however, some opinions were changed and after the Clovis point was found, the process of picking and ignoring began in earnest. Those who had previously accepted the hearths and/or faunal associations

began to question their memories. (R118)

And, thus, the Lewisville site has been consigned to obscurity, not because of the data it yielded, but rather due to theoretical constraints.

Round Rock. Round Rock is about 20 miles north of Austin. According to the estimated age of the enclosing sediments, the artifacts described below are 20,000-30,000 years old. A 1935 number of Science Newsletter provided the details that follow.

> Scientists can add ten thousand years to the age of man in America. Man-made weapons, buried eighteen feet underground have been unearthed near Austin, Texas, by Prof. J.E. Pearch, anthropologist at the University of Texas. They have been hailed as convincing evidence that North America had inhabitants far earlier than archaeologists now concede.
>
> .....
>
> The objects consist of flint dart points and slivers from flint workshops scattered in quantities through various strata of old Bushy River terrace near Round Rock, Texas. At some levels old hearths and kitchen refuse have been found.
>
> .....
>
> The recent discovery at Round Rock by Mr. Pearce and similar discoveries elsewhere are tending to place the time of the appearance of man on this continent from 10,000 to 20,000 years earlier [than 12,000 B.P.]. (R26)

So far, our literature dragnet was found nothing to add to the above.

Wyoming

Black Fork River. Usually the tools of the ancients are dated by their physical association with materials that can be dated. Association with bones and charcoal can, for example, provide age estimates via radiocarbon measurements. Also, some strata are well dated by virtue of their fossil content or radiometry using various isotope ratios. We now describe a large area in southwestern Wyoming where thousands of relatively crude artifacts have been collected from the surface of ancient, high, river terraces. None of the usual dating methods is applicable here.

The subject artifacts were first noticed in 1932 by E. Lohr and H. Dunning, two amateur archeologists. They took some of their finds to E.B. Renaud, an anthropology professor at the University of Denver, who recognized their significance. In the years that followed, Renaud led several expeditions to the high terraces between Granger and Lyman, where he was able to collect thousands of specimens of these artifacts that were obviously old yet undatable by conventional techniques. (R128)

The Black Fork River tools seemed much like some of the Stone Age tools found in Europe. Could they also be many hundred-thousand years old; dating, say, from the Middle Paleolithic? In fact, morphologically, they nicely matched the tools made by Homo erectus, a predecessor of modern man. Of course, this suggestion was ridiculed by Renaud's colleagues. Not only was the Clovis-First paradigm (12,000 B.P. at the earliest) violated, but everyone knew that H. erectus could never have crossed any of the oceans to make landfall in the New World. Dating stone tools by their appearance was obviously very risky.

Great antiquity for the Black Fork River objects was also suggested by their strongly abraded surfaces. They appeared to have been water-worn. But the high river terraces from which they had been collected had not supported rivers for over 150,000 years. Inferring great age in this manner led critics to claim that the tools had instead been abraded by wind-blown dust and sand. (R39)

The Black Fork River artifacts looked old, emulated European Stone Age tools, came from ancient high terraces, and, in addition, boasted heavy coats of desert varnish. However, H.W. Wormington claimed that she had collected tools looking very similar in Canada which did not appear to be of great antiquity. (R39) Other experts were, in consequence, very happy to attribute the Black Fork River specimens to recent Native American manufacture. Renaud's thousands of artifacts seem to have dropped from view, as far as our library research goes. Was the Book of Science closed on them prematurely

and without sufficient reason?

C. Undatable pebble tools

It is appropriate to begin with G.F. Carter's definition of "pebble tools."

> The earliest tools show unskilled trimming that creates a steep edge, even in bifacial work. Men of this stage often used cobbles or pebbles, and this is sometimes called the pebble-tool stage. Where pebbles were not available any piece of stone would do. The unifying thread is the steepness of the edge flaking. Such work may appear in later stages, but there is always some better work present. (R83)

Pebble tools have been found over much of Eurasia, but are not generally believed to exist in North America. But in Alabama alone, they seem to be common. This restricted distribution is a puzzle in itself---even if they are actually geofacts; that is, simply products of nature.

A "pebble tool," designated a "nosed chopper" from Alabama. (R46)

Alabama

Many locations. Pebble tools have been collected at dozens of spots around Alabama. They occur by the thousands. Yellow jasper seems to have been a favorite material, but quartz and other materials were used, too. Most Alabama pebble tools have been picked up from the ground's surface, where they often are mixed with more sophisticated tools from more recent cultures due to centuries of plowing and other soil disturbances.

An unusual feature of the Alabama pebble tools is their number. Tons of them exist in museums and private collections. Along with their unusual geographical distribution, their abundance is suspect. Why so many?

The Alabama pebble tools were first recognized as potential artifacts by M. Lively, and they are collectively called the "Lively Complex." To our knowledge, these tools were first acknowledged in the literature by D.W. Josselyn in 1966, when he described the basic features of the Complex. (R46)

Josselyn recognized and named several types of Alabama pebble tools. The accompanying drawing represents just one of these distinct varieties.

Giving type names to these broken pebbles does not prove that they were manufactured by ancient humans. In fact, Josselyn never attached any dates to them, although he and others did compare them---with good reason---to those steep-edged tools found in Eurasia that are ascribed to Neanderthals and H. erectus. By analogy, these Alabama Eurasian look-alikes could be 100,000 to perhaps a million years old. (R83) It is anathema to even suggest that H.erectus or any other predecessors of modern man ever chipped rocks in North America!

Mainstream archeology's rejection of the Alabama pebble tools was therefore a certainty, as related by M.A. Cremo and R.L. Thompson.

> Pebble tools are usually associated with very primitive levels of culture not thought to have ever existed in America. Thus, when Josselyn tried to acquaint other American archeologists with his finds, he did not receive an encouraging reaction. "Rather," as he put it, "to my horror, I learned that Pavlov could have studied 'conditioned reflexes' about as well in archaeologists as in dogs.

Please, please, believe that I say this with no critical rancor. It was apparently "known" by some that no pebble tools were made in the New World.

Josselyn said that since the Alabama tools were not from stratified sites, they could not be dated, and he had no suggestion about their age. They could thus be quite recent, posing no threat to dominant views about the arrival of humans in the Americas. The problem here seems to be a fixation on the questionable idea that pebble tools must have been made by protohumans such as Homo habilis or Homo erectus. But human beings have used pebble tools in Asia and Africa in historic times. (R129)

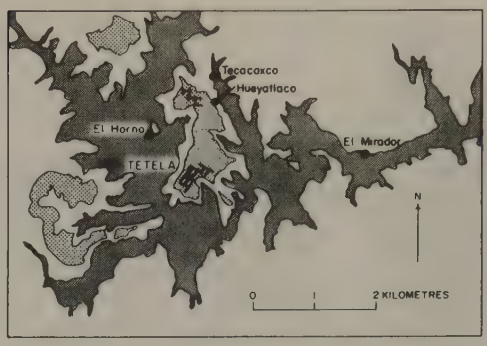
Actually, a great age and the artificiality of the Alabama pebble tools are supported by some test excavations. As already indicated, most appear on the surface; but, in 1966, Josselyn and a team excavated a high-level midden that had not been plowed to its bottom plus a shelter that had not been plowed at all. At both places, recent Native American tools gave way to pebble tools at the lowest levels. (R48)

Not all professional archeologists are antipathetic towards the Alabama pebble tools, but they do not deign to study them. In fact, these interesting objects seem to have disappeared from the literature---even the fringe literature ---for we have seen nothing about them later than 1968.

X2. Mesoamerica

Mexico

Valsequillo Reservoir. About 75 miles southeast of Mexico City, this body of water is surrounded by three of Mexico's most famous volcanos. Its shores have been a paleontologist's paradise for over a century. From amid the extensive Pleistocene gravels and layers of volcanic ash, they have collected great numbers of bones of now-extinct Pleistocene mammals: mammoths, mastodons, horses, camels, glyptodonts, saber-toothed cats, etc. This ancient concentration of food sources attracted humans, for their artifacts are found around



Map of the Valsequillo Reservoir and Tetela Peninsula showing sites where stone artifacts were found associated with vertebrate fossils. (R86)

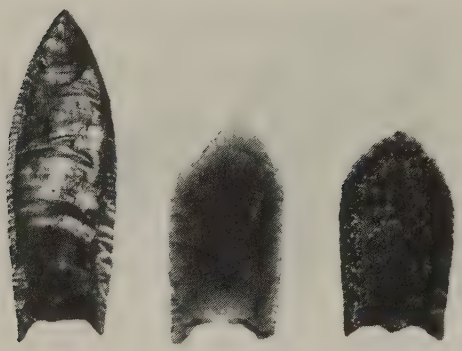
Valsequillo in abundance. The human artifacts were first noticed officially in 1959 by the Mexican prehistorian J. Armenta. The ages and manufacturers of these simple stone tools ignited intense scientific debate during the 1970s and 1980s. The controversy still simmers at a low level.

Unlike the debates that once swirled about Sheguiandah and Texas Street (X1), no one claims that the Valsequillo artifacts are merely geofacts. Their age is the issue. Even the youngest, most conservative age estimate of 22,000 B.P. casts doubt on the Clovis-First limit of 12,000 B.P. But other scientists, mostly geologists, insist that the strata from which the artifacts were extracted are at least 250,000 years old, possibly even 500,000. If these latter dates are even approximately correct, we have humans manufacturing rather sophisticated stone tools in America well before similar tools were being made in Europe. Anthroplogists assert vigorously that this is "impossible."

The Valsequillo tools are not only well-crafted projectile points but also hide-scrapers and leather-making tools. Indeed, Valsequillo comes across as a butchering and animal processing factory of surprising magnitude. (R49, R59)

An interesting aspect of the Valsequillo story is the intentional relegation of the very old, "impossible" dates to obscurity by a variety of scientific censorship.

The geologists, though confident of



Three artifacts from the Valsequillo Reservoir area. (R86)

their 250,000-year figure, had difficulty in getting their work published in front-line journals because the archeologists had tagged the dates as "impossible" from their branch of science. The phrase "pathological science" was even bandied about. The career of one scientist was negatively impacted. (R156) In this political sense, Valsequillo echoes the travails of T. Lee at Sheguiandah.

Despite the great promise exhibited by the Valsequillo site---bones of extinct mammals, signs of human activity---scientific interest was slow to develop, although fossil collectors had long been at work. Finally, in 1962, the Valsequillo Project was begun with funding from the American Philosophical Society, Harvard, and the National Science Foundation.

The scientists had their work cut out for them. The area around the Valsequillo Reservoir is draped with Pleistocene gravels, various layers of volcanic ash, and just plain mud.

Human artifacts appeared at several sites around the reservoir. One, El Horno, is now under water. The most important for our purposes is called Hueyatlaco. With the intermixing of gravels, bones, ash, and stone artifacts, dating was a major problem.

The Valsequillo dig was under the joint direction of C. Irwin-Williams (Harvard) and J.A. Camacho (University of Puebla). The workers found fossils and stone implements aplenty but could not directly date the strata containing the human tools. Some fossil shells were radiocarbon-dated at 35,000 B.P. and a date of 40,000 B.P. was obtained radiometrically from an ash layer, but obtaining dates for the artifact-containing strata was at an impasse. C, Irwin-Williams decided to call in some geological expertise.

At the head of the geological support group was H. Malde from the U.S. Geological Survey. He was assisted by C., Ray, D. Taylor, P.S. Martin, and V. Steen-McIntyre. Their objective was to pin down dates from the many bones, shells, pollen, and volcanic ash.

Some shells and bones associated with (that is, physically near) one of the stone artifacts; produced dates of 21,800 ± 850, 22,000 ± 2,000, and 20,000 ± 1,500 B.P. (R156) Though these dates substantially exceeded the Clovis Limit of 12,000 years, the really controversial anomalies came from the radiometric dating of the deposits enclosing the stone tools. In 1973, H. Malde announced to the Geological Society of America that the artifact-bearing deposits at Valsequillo were about 250,000 years old. This astounding figure was confirmed by several different radiometric techniques. One of Malde's team, R. Fryxell, from Washington State University, remarked:

> All of the archeological evidence in the New World and a good share in the Old World suggest that an age of 250,000 years for man in the New World is utterly absurd. (R59)

In other words, the geologists were well aware of the anomaly they had created. But how could so many different dating methods all be wrong by the same ammount?

C. Irwin-Williams, who headed the Valsequillo Project would not accept the 250,000-year figure. She decided to adopt as definitive of Valsequillo a date of 22,000 B.P. This was a radiocarbon date measured for a human-dismembered mammoth found 30-feet deep in the Valsequillo gravels. (R81) This date also became the "official" date for the tools unearthed at Valsequillo and is still so promulgated.

Malde and his group still wanted to see their "impossible" dates (circa 250,000 years) published, but Irwin-Williams refused on anthropological grounds. The geologists' dates were not only much older than human arrival in the Americas but even more ancient than the 50,000-year-old, sophisticated tools of modern man in Europe. As a

View of the Hueyatlaco site from the northwest in 1973. (Courtesy of V. Steen-McIntyre)

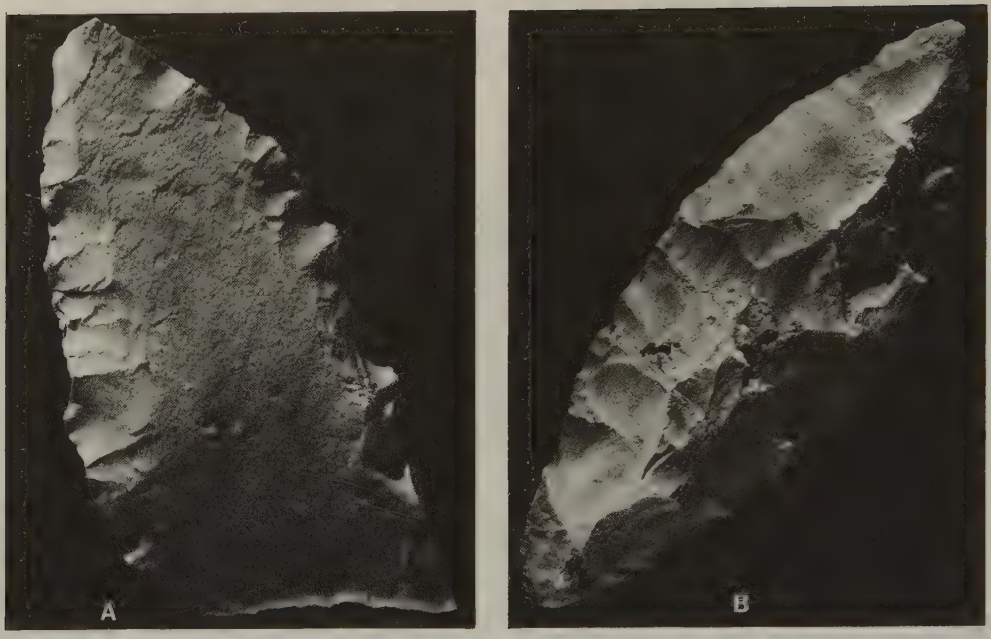
matter of fact, these European tools closely resembled those at Valsequillo.

Irwin-WIlliams relented to the extent that Malde et al were permitted to publish the 250,000-year results in Earth and Planetary Science Letters (1969), a small geological journal that archeologists and anthropologists would probably never see.

This was not enough for V. Steen-McIntyre, a member of the Malde team. She felt that the team's work at Hueyatlaco (one of the major Valsequillo sites) was sound and should be set before a wider audience. After many turn-downs at various science publications, Steen-McIntyre convinced S. Porter, editor of the Quaternary Review, to print the Hueyatlaco findings---"impossible" or not. The paper, authored by V. Steen-McIntyre, R. Fryxell, and H.E. Malde, passed peer review (by geologists) and appeared in 1981. (R86)

Irwin-Williams was impelled to reply to this heresy with a critique in Quaternary Review. She focussed upon the reliability of the dating methods used by Malde et al.

> (1) Uranium-series dates of this kind have been shown to be subject to serious problems related to precipitation and leaching from the geologic environment.
>
> (2) The fission-track dates related to the site, of 600,000-370,000 yr, are not exactly "comparable" to the



Stone artifacts from the Hueyatlaco site. (Photos by H.S. Rice. Courtesy of V. Steen-McIntyre)

uranium-series dates, and are more importantly in reverse stratigraphic order.

(3) In their tephrochronological studies, Steen-McIntyre et al. do not address the very real problem of the effect of chemical composition of the [volcanic] glass and environmental temperature on the hydration rates for volcanic glass and ash. Since these criticisms are in print, it is surprising that they are not addressed. (R87)

Malde and Steen-McIntyre responded to Irwin Williams quickly and in great technical detail. (R88)

It was anthropological and archeological opinion against geological opinion. In the forum of science-in-general, the former seem to have won out. In effect, the 250,000-year dates from Valsequillo-Hueyatlaco seem to have been relegated to the "lunatic fringe." The geologists' dates were just too far off the curve.

For her aggressive advocacy of the "impossible" 250,000-year dates, Steen-McIntyre's career in science was finished. Her university contract was not renewed. She ultimately had to leave the field of science.

The scientific and political significance of the confrontation over dates at Valsequillo was nicely summarized by M.A. Cremo and R.L. Thompson.

> Negative responses to the dating of the Valsequillo sites of Hueyatlaco and El Horno arise from acceptance of a theory of human evolution that was established by unwarranted elimination of extensive evidence for the extreme antiquity of humans in both the Old and New Worlds. In light of the total evidence, a date of 250,000 years B.P. for sophisticated stone tools in not greatly surprising. Ironically, in the treatment of the Valsequillo findings by the scientific community, we see the same tendency to suppress unwanted evidence that eliminated the earlier material and thereby rendered the Valsequillo dates unbelievable. (R129)

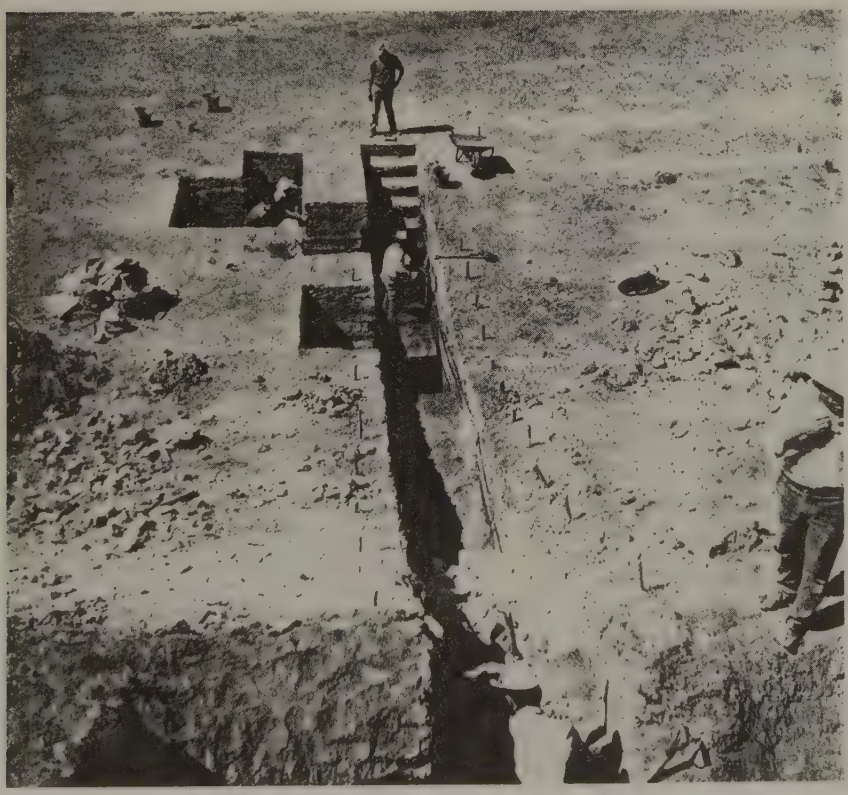
To be honest, we must add that Cremo and Thompson have their own

agenda that favors extreme antiquity for the human race. But, one can also understand why they seem to see an organized conspiracy to defend the Clovis Limit. Nevertheless, their comments do portray a common tendency in science (and many other human endeavors) when paradigms are challenged.

One almost must recognize that the archeological/anthropological community based their stand upon negative information; that is, they believed that the extreme Valsequillo dates for human culture were not seen anywhere else in the New World and, therefore, could not be correct. However, in this section, we do see that Valsequillo is not alone in yielding up "impossible" dates for the advent of modern humans in both the Old and New Worlds.

Tlapacoya. Only a few miles southeast of Mexico City, the Tlapacoya archeological site is named for Cerro de Tlapacoya, a nearby eroded andesite volcano. The excavations there were sponsored by the Instituto Nacional de Anthropologia e Historia. Two key researchers were J. Lorenzo and L. Mirambell. Digging began in 1965 and lasted eight seasons. A total of eighteen excavations were made around the shore of Lago de Chalco, a lake that was drained in the mid-1800s. (R188)

Many hearths were uncovered, around which were many bones of now-extinct mammals, plus many artifacts fashioned from andesite (a difficult material to shape), quartz, and obsidian. Most of the tools were datable from their association with the hearths and bones. Gene-



Excavations at the Tlapacoya-II site. (R88, R94)

rally, they were 15,000-22,000 years old. (R188)

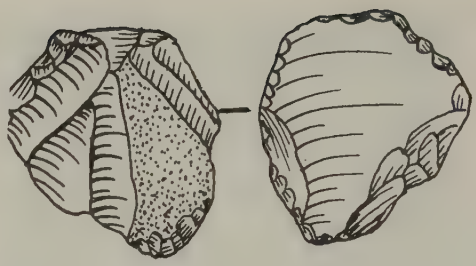
These Tlapacoya dates are manifestly pre-Clovis, but for some reason they seem to have been ignored by the archeological community as serious challenges to the Clovis-First Paradigm. There were no "impossible" dates (i.e., 250,000 B.P.) at Tlapacoya, such as were claimed at Valsequillo-Hueyatlaco.

Perhaps the most interesting find at Tlapacoya was described by L. Mirambell:

> Another important artifact was a blade from the Tlapacoya II site. It is a prismatic obsidian blade, but as the bulbar end is missing we are unable to obtain much technological information. However all features indicate that it was struck from a nucleus worked with a bipolar technique. This blade was dated indirectly since it was found beneath the trunk of the tree mentioned above for which an age of 23,150 ± 950 years was established. (R188)

Prismatic obsidian blade from Tlapacoya-II site. (R94) Note similarity to Texas Street blades and cores in X1.

The use of the bipolar-flaking technique at Tlapacoya is reminiscent of Texas Street (X1), where G.F. Carter found many examples of presumed tools thus fashioned. Regarding this Tlapacoya discovery, Carter wistfully observed:



Quartz scrapers from the Tlapacoya-II site. (R94)

> The results [at Tlapacoya] duplicate the work at Texas Street. Most impressive is the presence of many short sections of very thin blades, nearly quadrilateral in cross section. These were frequently found on the living floors we excavated at Texas Street. No one questions that these are evidence for man at Tlapacoya, and I fail to see why then they are not evidence for man at Texas Street. (R83)

Nicaragua

El Bosque. El Bosque (the "forest") is located in northwestern Nicaragua 10 kilometers southeast of Pueblo Nuevo. There the archeologist finds a rather typical mix of possible hearths, bones of extinct mammals, and debatable stone artifacts. The site was excavated in 1975 and 1976 by J. Espinosa aided by some Canadian archeologists. The supposed human-manufactured tools consisted of objects of flaked jasper and chert. (R189, R190) Based on the dating of associated bones and hearths, these possible tools could be older than 30,000 years. However, experts who have examined them are generally uncertain about their nature; i.e., they may just be geofacts! (R191)

X3. South America

Argentina

Monte Hermosa. F. Ameghino is introduced in MME7-X2 in connection with his reports on his discovery of apparent

man-made hearths at Monte Hermosa, which is situated 37 miles northeast of Bahia Blanca.

During his work at Monte Hermosa in 1887, Ameghino also came across what he maintained were human-made stone tools. M.A. Cremo and R.L. Thompson have quoted from Ameghino's 1911 paper in Anales del Museo Nacional de Historia Natural de Buenos Aires:

> I was occupied in extracting part of a skeleton of Macrauchenia antiqua when I was surprised to see a piece of yellow-red stone among the bones. I picked it up and immediately recognized it as an irregular fragment of quartzite, displaying positive and negative bulbs of percussion, a striking platform, and eraillure. These features indicated in an irrefutable manner that I had found a stone object worked by an intelligent being during the Miocene period. I continued my work and soon found several similar objects. Doubt was not possible, and on the same day, March 4, 1887, I communicated to La Nacion the discovery of objects evidently worked by an intelligent being in the Miocene formations of Argentina. (R129)

Like the Monte Hermosa hearths, the purported tools found by Ameghino would have been 10-20 million years old if dated by their enclosing rocks. Even the earliest representatives of the genus Homo are not believed to have evolved more than a million years ago---and then in Africa, not South America. But we must also remember that Ameghino was totally wedded to the idea that humanity did originate in South America rather than Africa!

Depending upon one's mindset, one finds artifacts and are either too old or too recent, usually the former.

Ameghino's claims could not have been more contrary to the belief of the Smithsonian's A. Hrdlicka, the influential champion of a late arrival of humans in the New World---12,000 years ago at the most. Hrdlicka was so concerned that he visited Ameghino in Argentina in 1910. (Both Ameghino and Hrdlicka were world-renowned scientists at the time.) Together they journeyed to Monte Hermosa. There, Hrdlicka actually observed the controversial artifacts in situ in the Miocene rocks. It was another "impossible" situation for the then-nascent Clovis-First theory.

At the time, Hrdlicka was in the process of writing his 1912 book Early Man in South America, and somehow he had to downplay Ameghino's findings.

He could not deny the reality of the Argentine artifacts nor their geological position, for he saw the artifacts himself. His tactic was, first, the trashing of work by Ameghino unconnected to Monte Hermosa. Second, he prevailed upon his friend, B. Willis, a geologist, and a fellow Smithsonian, W.H. Holmes, another geologist, to cast doubts upon the age of the Monte Hermosa artifact-bearing strata. According to Cremo and Thompson, it was a dirty business. (R129)

The demolition job must have worked for who ever hears of Ameghino's discoveries these days---at least in the mainstream literature. Of course, it has not helped that Ameghino published mainly in difficult-to-obtain Spanish-language journals. Nor must we forget in our reading of the literature that Cremo and Thompson are philosophical allies of Ameghino!

Miramar. Apparently stung by A. Hrdlicka's attacks upon his brother's work at Monte Hermosa, C. Ameghino launched a series of expeditions along the Argentine coast south of Buenos Aires. From 1912-1914, his teams discovered stone tools in the Pliocene strata at Miramar. Since the geological age of the strata in which the tools were found was about 2-3 million years, C. Ameghino was subjected to the same criticisms that had been directed against his brother. Therefore, a group of geologists was commissioned to verify his discoveries---which they did in the 1915 volume of Anales del Museo de Historica Natural de Buenos Aires. (R129)

Cremo and Thompson welcomed the Miramar findings as they did those from Monte Hermosa. As noted above, the data supported their hypothesis. But one cannot even whisper of New World artifact dates in the millions of years at cocktail parties. Even the 19,000 B.P. dates from Pennsylvania's Meadowcroft Rockshelter make risky conversation. Million-year, New World humans are out on the lunatic fringe.

But the history of science does record heresies that eventually became favored paradigms. Plate tectonics, nee continental drift, is the classic example.

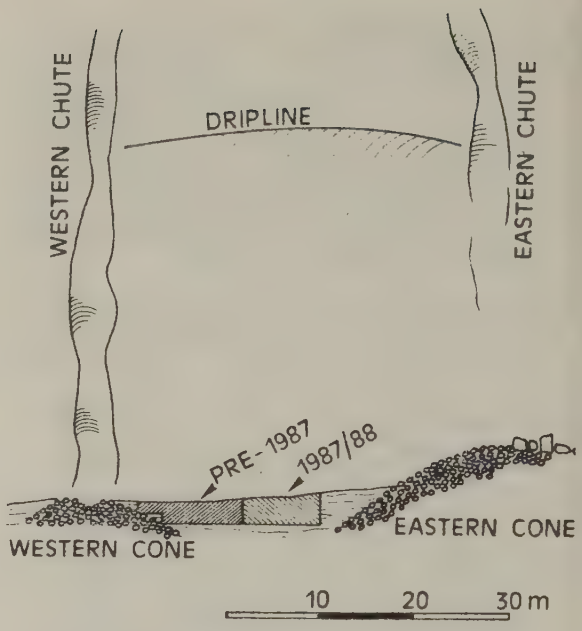
But the claims of the Ameghino brothers seem unlikely to follow such a route.

We might, though, ask what facts of great scientific import lie still hidden by the language barrier presented by obscure (to us) Spanish-language journals.

Brazil

Alice Boer Site. The Alice Boer archeological site is located in an unlikely area: the steaming jungle of east-central Brazil, at Rio Claro. It was explored in 1974 by R. Gruhn, from the University of Alberta. She and her associates came across blades and projectile points at a level that were carbon-dated at 14,000 B.P. Gruhn suggested that at deeper levels, there would likely be signs of human occupation at 20,000 B.P. (R118, R193). She was proven correct when deeper human-made chert objects were dated at 20,000 years using thermoluminescent methods. (R192)

Other archeologists, however, are wary about the dating of the Alice Boer site because there are signs of fluvial intermixing of the earth, which would make carbon-dating unreliable. (R183)

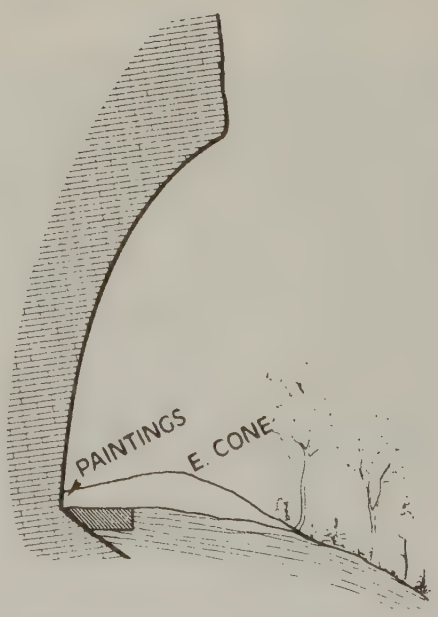


Frontal sketch of features of the Pedra Furada site. (R113)

Pedra Furada. Pedra Furada = "perforated rock." This site's full and official name is "Toca do Boqueirdo do Sitio da Pedra Furada." We will settle here for Pedra Furada.

Pedra Furada was discovered in 1973 by a French-Brazilian expedition. This controversial site is situated in the state of Piaui, in remote northeastern Brazil. Geologically, it is a sheltered area protected by an overhanging 100-meter-high sandstone cliff. There are more than a hundred similar sheltered spots in the region, and many, like Pedra Furada, are decorated with paintings and replete with artifacts of various ages.

Excavations began at Pedra Furada in 1978 under the direction of French archeologist N. Guidon. The potential significance of Pedra Furada to New World archeology is seen in the anomalous dates Guidon and G. Delibrias presented in a 1986 number of Nature. Here follows part of their abstract.



Side view of the Pedra Furada site. (R113)

> The view that man did not arrive on the American continent before the last glaciation has been supported by the fact that until now the known and

> dated archaeological sites have not been of very great antiquity. But now we report radiocarbon dates from a Brazilian site which establish that early man was living in South America at least 32,000 years ago. These new findings come from the large painted rock shelter of Boqueirao do Sitio da Pedra Furada, the walls and ceiling of which are decorated with a rich set of prehistoric paintings. We have excavated a sequence containing abundant lithic industry and well-structured hearths at all levels. Carbon-14 dates from charcoal establish a continuous chronology indicating human occupation from 6,160 ± 130 to 32, 160 ± 100 years BP. A date of 17,000 ± 400 BP, obtained from charcoal found in a level with fragments of a pictograph fallen from the walls, testifies to the antiquity of rupestral [rock] art in the region of Brazil. (R95)

While Pedra Furada's paintings are remarkable in themselves, even more so is the claim that Pedra Furada was occupied by humans in 32,000 B.P.---a date far earlier than the Clovis Limit of 12,000 years.

Pedra Furada is configured differently from the usual rock shelter and, in addition, receives a continuous supply of lithic material from above, as explained by R.G. Bednarik.

> The site lies at the base of a huge overhang, the concavity of which soars up to a height of some 40 m, projecting 18 m from the shelter's deepest part. The huge shelter is about 40 m wide, and is located at the foot of a line of vertical sandstone buttresses of about 100 m height, the southern escarpment of Serra Talhada. On either side of it is a vertical chute extending to the full height of the cliff, providing drainage paths from the plateau above. The upper facies of the sandstone formation is a conglomerate rich in cobbles of quartz, which erode and are swept down the chutes, each one experiencing a free fall of between 30 and 50 m. Huge deposits of these well-rounded cobbles have accumulated over tens of millennia, containing numerous impact-fractured specimens. Among them are many flakes with good cutting edges and other items reminiscent of tool types. While this abundance of silica would have provided a rich source of raw material for early inhabitants of the site, it does pose a vexatious problem in the interpretation of the lithic assemblage recovered from the excavation. (R113)

As might be expected, critics of Guidon's claims for the great antiquity of Pedra Furada have focussed upon the copious source of probable geofacts.

Bednarik, however, also mentioned the presence of "structure hearths"; that is, organized arrays of charcoal and stones that certainly suggest human involvement at the site. Pedra Furada critics, though, here advance the customary argument that the so-called hearths are merely the remains of natural brush fires that were swept under the overhang by wind and floods over the years.

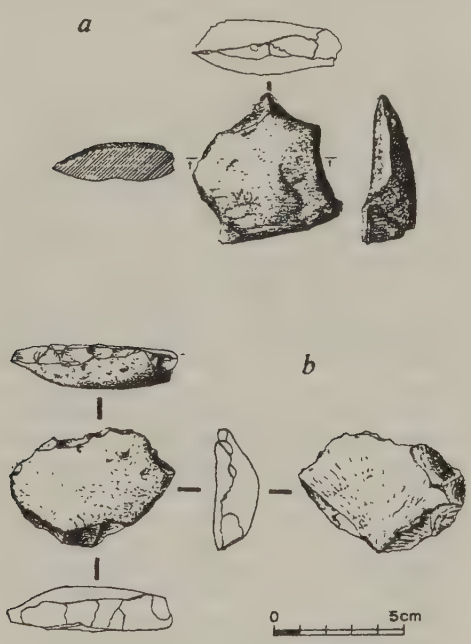
By 1989, Guidon's work at Pedra Furada had produced an even more contentious date for human occupancy of 45,000 B.P. Her claims again met stiff resistance, even though the radiocarbon dates had been confirmed by different laboratories, and all acknowledged that the site had been excavated in a thoroughly professional manner. It is not surprising that under such circumstances, Guidon wondered why her severest critics never visited Pedra Furada to see the facts first hand. (R111)

Of course, there was a reason for this, as R. Bonnichsen, then Director of the Center for the Study of the First Americans at the University of Maine, was quick to elaborate upon.

> "Numerous meritorious grant proposals have been rejected because their goals and objectives were incompatible with entrenched academic opinion," he said. "At least five South American archeologists admitted that they are suppressing pre-12,000-year-old data out of fear that their funds would be cut off by American colleagues who endorse the short-chronology school of thought." (R111)

Of course, there are Guidon supporters, notably A. Bryan (University of Alberta) and R. Bonnichsen, quoted above. But most professionals remain noncommittal and worried about the geofact problem, the same onus that weighs against Calico, Texas Street, Sheguindah,

and other New World sites. Then, there are scientists who are outright hostile; that is, the members of the so-called Clovis Police. (R117)



Two of the many purported stone artifacts from Pedra Furada. (a) a quartz notched point; (b) blunt points made from flakes or pebbles. (R95)

Guidon again and again invited all to come to Pedra Furada to look around and even dig if they chose. But it is a long trip into an uncomfortable wilderness area. Usually left unsaid is the fact that Guidon is a French woman and not part of the North American archeological mainstream.

Nevertheless, work went on under the imposing sandstone overhang. In 1993, F. Parenti and N. Guidon presented further results at a meeting in Paris. At the core of their presentation was a four-volume, 7-kilogram doctoral thesis by Parenti (in French, of course). The presentation concentrated on three lines of evidence:

- A coherent series of 54 radiocarbon dates ranging from 5,000 to 50,000 years.

- Crudely flaked stones, some 6,000 of which are deemed of human manufacture, even when the most stringent criteria are applied. Many of these came from Pleistocene strata 50,000 years old or older.

- Some 50 Pleistocene "structures" consisting of artificial arrangements of stones, some burned, some accompanied by charcoal. These are likely ancient hearths. (R130)

As usual the first two types of data were given the geofact and brush-fire treatments, but the third line of evidence seems to have been ignored altogether. Yet, it seems highly pertinent.

Parenti had identified 150 "structures"; i.e., arrangements of sandstone plaques and pebbles that seemed as though they must have been the work of humans. There was no way in which the randomly falling cobbles from above could have arranged themselves into these "structures."

Finally, in late 1993, a trio of North American experts did accept Guidon's invitation to visit Pedra Furada and judge it for themselves. The group consisted of T.D. Dillehay, J.M. Adovasio, and D.J. Meltzer. As R. Rudgley wrote in his The Lost Civilizations of the Stone Age, the trio came away unconvinced.

> Like many of the critics who voiced their negative opinions from afar and did not have the opportunity (or inclination) to visit the site, Dillehay, Meltzer, and Adovasio were unconvinced by the published evidence resulting from Guidon's excavations. The visit to Pedra Furada did not change their opinions in any significent way and they found neither the charcoal deposits nor the claimed artefacts convincing. They felt that nothing about the charcoal from the Pedra Furada cultural layer indicated that it was the result of human agency at all, and that it was simply evidence that there had been brush fires at the site in the past. (R169)

The stone tools likewise did not impress them, even when subjected to on-site microwear analysis. They were just

geofacts.

Perhaps trying to put the whole Pedra Furada issue to rest, D.J. Meltzer et al penned an intensely negative report on their visit for the important journal Antiquity. (R194)

The reaction of Guidon et al to the Antiquity paper was thunderous to say the least. It revealed the depth of the chasm separating archeologists on the date of human occupation of the New World as well as some of the internecine politics pervading archeology.

Guidon et al flung two serious charges at the authors of the negative Antiquity paper:

(1) They had their facts all wrong; and

(2) Their objectivity was distorted by their loyalty to the Clovis-First paradigm. Not withholding any punches, N. Guidon and coauthor A.-M. Pessis entitled their opening broadside: "Falsehood or Untruth"! They continued:

> The article by Meltzer et al (1994) is based on partial data and false information (highlighted below). Its battery of questions takes us by surprise; none of the three colleagues came up with these questions during the 1993 meeting---mounted precisely to generate direct dialogue on the peopling of the Americas. We disagree with their statement, 'the comments on Pedra Furada are not offered lightly' (p. 696). The commentaries are worthless because they are based on partial and incorrect knowledge.
>
> We believe that the initial intention of the authors was different; they got carried away into an exercise in academic style, from a fragile scientific base of fragmentary data and with a skepticism born of a subjective conviction. (R142)

In the world of science, these are serious charges, particularly because of the charge of subjectivity.

Guidon and Pessis then go on to specifically dismiss each complaint made by Meltzer et al. As for the "geofact" hypothesis, Guidon and Pessis point to two of the illustrations used by Meltzer et al, remarking:

> The artefact in their figures 9 & 10 has five successive parallel flake-scars on the same edge. By the authors' hypothesis, it will have suffered the first when it fell; thereafter, four other pebbles fell on top of it, one beside the other, regularly, causing flake-scars with equal technical characteristics. (R142)

Sounds unlikely, doesn't it---even if 50,000 years are allowed. And there are over 500 such "serial accidents" at Pedra Furada.

In this argument over the geofact matter, it is instructive to insert the following experiment conducted by R. Dennell and L. Hurcombe, two archeologists who were faced with the geofact problem at their Pakistan dig. They deliberately dropped quartzite rocks from heights onto hard surfaces. They concluded:

> While conceding that had we conducted the experiment with a thousand, ten thousand, or a hundred thousand stones, a few might have fractures, we would nevertheless maintain that the chances of any showing multiple, multi-directional flaking and all with bulbs of percussion are as remote as the proverbial monkey typing Shakespeare. (R140)

In other words, nature might not be as proficient a rock knapper as the geofact people were wont to believe.

Yet, one can sympathize with the trio of doubters that travelled to Pedra Furada. We quote Meltzer:

> In the end, the issue somes down to content, as it so often does in archeology. If the Pedra Furada specimens had been found in fine-grained sediments, over even in other sites in locations where a cobble layer did not loom high overhead, they would readily be accepted as human artefacts. But, found as they were amid countless flakes and flaked cobbles, their standing as artefacts becomes suspect. (R141)

Where stands Pedra Furada today? R. Gruhn, from the University of Alberta, has given us a more generous evaluation.

> Some believe the validity of Pedra Furada was buried by a critique published by several North American researchers who attended a field con-

ference at the site in 1993, but it cannot be so easily discounted. The essential issue at Pedra Furada is whether any real stone artifacts came from the Pleistocene deposits within the shelter. Critics of the site have suggested that the specimens classified as artifacts could have been flaked naturally in a high-energy depositional environment---but no such environment existed within the sheltered area where the specimens were found, as the sediments are mainly derived from the weathering of the sandstone overhang. I believe the site of Pedra Furada is not to be dismissed so readily. (R179)

Serra da Capivara. Stone stools and charcoal at this spot in northeasterm Brazil have been dated at 50,000 B.P. This all-too-brief tidbit comes from the BBC Online Network. Details were not forthcoming. (R182)

Toca de Esperanza. This "Cave of Hope" has produced stone tools with uranium-thorium dates in the range 204,000-295,000 B.P.---far older than mainstream New World archeologists like to see. Toca de Esperanza raised blood pressures even further when the cave's ancient residents were called "pre-Neanderthals" in print.

This controversial cave is situated in the State of Bahia. It was located in 1982 by M. Baltrao among a series of other caves containing remarkable wall paintings. From 1986-1987, Baltrao accompanied by the famous French archeologist H. de Lumley dug down through four cultural levels. At the lowest of these, Baltrao and de Lumley came across rough quartz tools, including a chopper, which were comparable in style to the oldest tools from Olduvai Gorge in Africa. The purported tools were indeed old. Multiple uranium-thorium age measurements by three different laboratories produced the dates mentioned above in the "impossible" range from 204,000-295,000 B.P. (R129, R186)

Such dates could not be taken seriously by mainstream archeologists. Of course, the usual geofact claim arose, as did questions about soil disturbance. In 2000, T.D. Dillehay gave the mainstream verdict on Toca de Esperanza in his book The Settlement of the Americas:

> Although the details of this work have not yet been reported, there is no other evidence in the New World to support such an early date. The quartzite artifacts are surely naturally occurring rocks [geofacts] in the area. The bones were probably redeposited by flooding in the cave system and later mixed with much more recent material, including stone artfacts of the Archaic period. (R183)

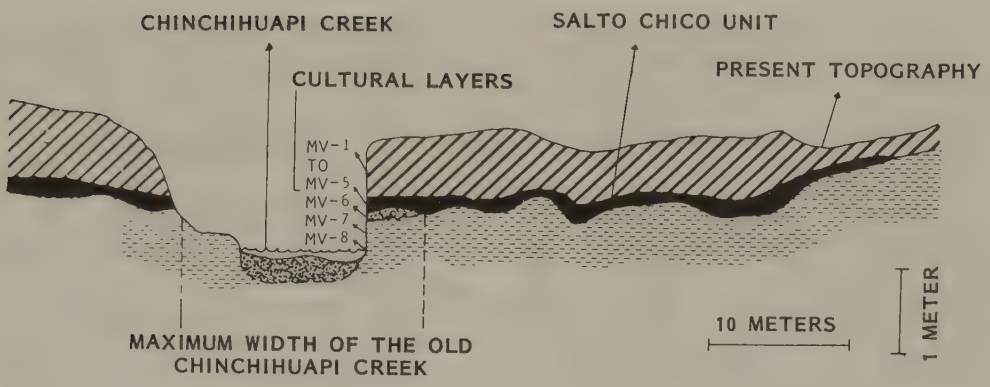
Establishment pronouncements, such as that above, suppress "wild points" in the data, sometimes but not always justifiably. They are often made without even viewing the evidence first-hand. M.A. Cremo and R.L. Thompson had written a pointed rejoinder to Dillehay's type of assessment seven years earlier:

> Toca da Esperanza provides a clear example of how the scientific community hesitates to change deeply held convictions. The discovery was made by a team headed by a famous French scientist, respected in his field. The site was systematically excavated according to strict principles. The implements were discovered in situ, in a defined stratigraphic context. They were clearly intentionally manufactured. There were found in conjunction with a typical Middle Pleistocene fauna, with many extinct species. (R129)

Cremo and Thompson remarked that if the uranium-thorium dates were wrong at Toca da Esperanza, they should also be wrong at other archeological sites that had been fully accepted by science. (R129)

Chile

Monte Verde. This archeological site, certainly one of the most important in the New World is situated on the banks of Chinchihuapi Creek, in south-central Chile. The country there is open and surrounded by sandy knolls. Monte Verde is much richer in cultural remains than Brazil's Pedra Furada. Archeological evidence shows that, circa 13,000 B.P., about a dozen residential structures occupied the spot. Whoever built these pole-and-skin structures also left behind many artifacts of stone, wood, and animal bones. Beginning in 1976, a team led by T, Dillehay has excavated roughly half of the site---about 450 square



Stratigraphic section of the Monte Verde site. (Adapted from R100)

meters. (R151)

Monte Verde is unusual in that a bog eventually covered the old human debris with a layer of peat. The resulting lack of oxygen helped preserve the cultural remains. It was, therefore, a relatively rich site archeologically speaking. In his book The Settlement of the Americas, Dillehay wrote:

> Over the years we have uncovered a number of remarkable and unexpected finds, not only stone flakes, typical of South American unifacial sites, and animal bones but also long, bi-pointed projectile points and a variety of plant remains and numerous wooden objects. The organic remains indicate the importance of plants as well as animals in the inhabitants' diet. The existence of wood and wooden tools, more common at Monte Verde II than stone artifacts, provides an intriquing look at tools and equipment rarely seen in the archaeological record. (R183)

But archeological richness is not Monte Verde's main claim to fame, rather it is the well-established collection of radiocarbon dates circa 12,500 B.P. The big question facing Dillehay was whether these pre-Clovis dates would be accepted by the archeological mainstream, especially those members of the "Clovis Police."

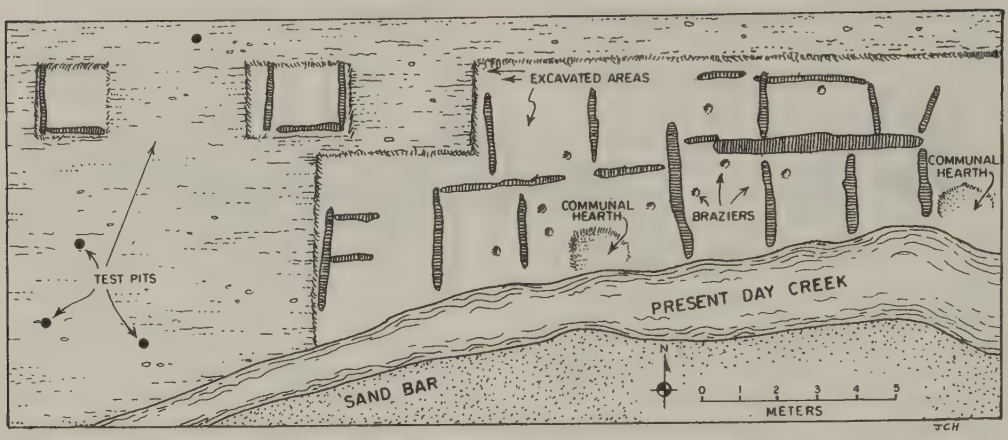
Dillehay issued invitations to visit Monte Verde and see for themselves to a dozen mainstream archeologists, including many skeptics and hard-line Clovis-Firsters. An amenable dozen flew down to Chile in January 1997.

The visit was a landmark in New World archeology, because the visitors came away convinced that at last the Clovis Limit had been smashed. Even the most skeptical visitors gave Monte Verde dates their stamp of approval.

The "official" confirmation of Monte Verde's antiquity appeared, according to scientific protocol, in major journals in the field: Antiquity (R151) and American Antiquity (R152). To confer the sense of closure that existed after the 1997 visit by the archeological "jury," we quote from the abstract of the paper in American Antiquity by D.J. Meltzer and eight coauthors.

> The potential importance of the Monte Verde site for the peopling of the New World prompted a detailed examination of the collections from that locality, as well as a site visit in January 1997, by a group of Paleo-indian specialists. It is the consensus of that group that the MV-II [Monte Verde II] occupation on the site is both archaeological and 12,500 years old, as T. Dillehay has argued. The status of the potentially even older material at the site (MV-I, 33,000 B.P.) remains unresolved. (R152)

These favorable assessments were bolstered by a two-volume, 1300-page report on the site, published by the prestigious Smithsonian Institution. Said report was so well-thought-of that in



Excavated area revealing 12 dwellings along the Chinchihuapi Creek at Monte Verde. (Redrawn from: Dillehay, T.D.; A Late Ice-Age Settlement in Southern Chile)

1998 it received an award from the Society for American Archaeology:

> ,,,for the extreme care given to the site's excavation, analysis, and publication. (R164)

The Clovis Limit had finally been breached! Or had it?

Next, something stange---strange for organized science, that is. A testy and very long article trashing the Monte Verde report appeared in the November/December issue of Scientific American Discovering Archaeology, a brand-new popular magazine. (R168) Discovering Archaeology was not a peer-reviewed journal and hardly the proper venue in which to lodge complaints against the Monte Verde report. The author of the attack on Monte Verde was S.J. Fiedel, a consulting archeologist. He claimed that the Monte Verde report was riddled with so many errors and omissions that it was next to worthless. In fact, Fiedel penned 19 pages of detailed criticisms. Could the dozen experts who examined the Monte Verde evidence and visited the site be so wrong? How could such a supposedly defective report ever have won a prestigious award?

Fiedel's article in Discovering Archaeology was followed in the same issue by reactions from Dillehay and others, some of whom had been on that 1997 visit to Monte Verde. Dillehay (with no fewer than six coauthors) admitted the existence of some errors in the report but asserted that most were of a clerical nature.

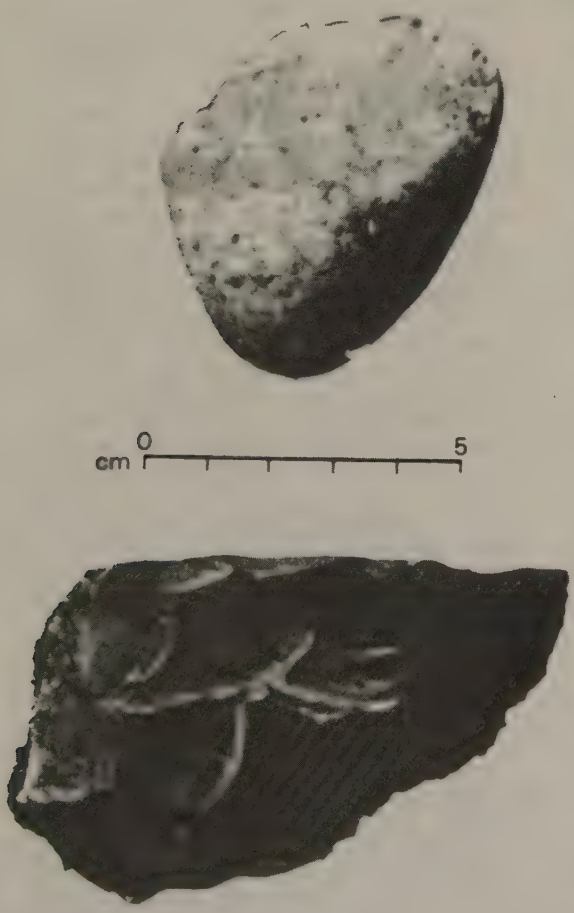
> The article by Stuart Fiedel points out some editorial and factual errors in the lengthy second volume on the Monte Verde site. We are grateful to him for bringing these mistakes to our attention. Most of Fiedel's article, however, is concerned with the multiple and discontinuous numbers often assigned to some artifacts and features, which apparently caused him a great deal of confusion regarding their location in the site, and with the changing typological and functional classification of some artifacts over the past twenty years. Both these concerns reflect misunderstandings about long-term and interdisciplinary research design and analysis and of the necessity to recode and reclassify artifacts for computational studies. We understand Fiedel's concerns and his lack of understanding of these procedures and their implications. We welcome this opportunity to clarify what might be a source of confusion for other readers. (R168)

Other archeologists who reacted to Fiedel's attack commented that such

massive, multi-year projects as Monte Verde always had numbering and classification problems, but these were of only peripheral importance.

J.M. Adovasio's comments were perhaps the least charitable.

> Nevertheless, undeterred by what the late J.D. Dennings once called "the inability to dig one's way out of a sack," Fiedel has opted to plunge into the Clovis/pre-Clovis gunfight armed with an experiential pocket knife. Hopefully, the methodological bankruptcy inherent in Fiedel's critique is evident to any reader. Even if it is not, the few legitimate issues raised by Fiedel, singly or in concert, are scarcely sufficient to alter the pre-Clovis assignment of Monte Verde. Like it or not, sooner or, more likely later, Fiedel will have to go back to the drawing board. The majority of the profession already has. (R168)



Chipped stone artifacts from Monte Verde. Top: a chopper; bottom, a core. (R102)

What had served as a clear-cut victory for the champions of pre-Clovis cultures in the New World was nevertheless a bit diminished by Fiedel's broadside. The pall cast over the Monte Verde work was a very thin one. There is no question that the labors of Dillehay et al in southern Chile has greatly weakened the Clovis-First position.

To those that fully accept them, the Monte Verde findings are far-reaching. A primary question asks: If the little village at Monte Verde was thriving 12,500 years ago 500 miles south of Santiago, how much earlier did these New World immigrants cross over the Bering Strait? Or, more anomalously, did the Monte Verdeans actually arrive in South America by some other route?

Second in importance is that section of the site (Monte Verde I) that seems to be about 33,000 years old. (R109) If people lived at Monte Verde 33,000 years ago, the early dates claimed by N. Guidon at Pedra Furada, in Brazil, do not seem so improbable. Of course, as related above, Pedra Furada, like Monte Verde, was visited by a team of experts, including Dillehay, and unlike Monte Verde was not anointed!

Peru

Pikimachay Cave. This archeological site is southeast of Lima, near Ayacucho. The cave was excavated between 1967 and 1969 by R.S. MacNeish, who was later the principal archeologist at the dig at Orogrande Cave, New Mexico. (X1)

MacNeish discerned two cultural levels in Pikimachay Cave. The upper level, the Ayacucho Phase, had artifacts and animal bones carbon-dated about 14,000 B.P. However, the lower level, representing the Paccaicasa Phase, incorporated stone artifacts and the bones of extinct animals in the 21,000-25,000 B.P. range. (R81, R118, R183)

Venezuela

Muaco. Archeological site location: State of Falcon, northwestern Venezuela,

on the Caribbean. An abundance of bones of Pleistocene mammals, some split and burned, were discovered in the bed of a spring. Tools made of stone not local to the area were admixed with the bones. Two radiocarbon dates have been published: 16,375 ± 400 and 14,300 ± 500 B.P. (R74, R118)

Taima-Taima. Like Muaco and located not far from it, the Taima-Taima site involves a water hole. In addition to the presence of the bones of a juvenile mastadon, there are ample signs of human presence. In fact, the mastadon skeleton enclosed a distinctive El Jobo projectile point shaped like a willow leaf, leading to speculation that the young mastadon had been killed by people of the El Jobo culture. Chipped stone stones were also present plus twigs and other stomach contents of the mastadon. Somehow, the latter were preserved over the millennia.

The Taima-Taima site was first explored by J. Cruxent and later, in 1976, by A. Bryan and R. Gruhn, from the University of Alberta. Over a dozen radiocarbon dates were measured. These established a minimum age for the mastadon kill of 13,000 B.P. However, the oldest radiocarbon dates at the site are: 14,200 and 14,800 B.P. (R64, R74, R79, R116, R183)

The Taima-Taima results imply the presence of a pre-Clovis culture in northern South America; one which used projectile points distinctly different from the classic Clovis type. It can be presumed that the Monte Verde and Taima-Taima cultures arose separately and were unrelated to the somewhat later Clovis culture to the north.

X4. Europe. Unlike the Americas, Europe was not separated by oceans from the evolving hominids pressing out of Africa. There was no Clovis Limit of a miniscule 12,000 years blocking their entry to Eurasia. Nevertheless, mainstream science has settled upon some time barriers beyond which older stone artifacts become anomalous.

- The appearance of crude stone artifacts older than about 1.0 million years, reflecting the "out-of-Africa" theory's schedule of hominid entry into Eurasia.

- The "sophisticated" artifacts of modern man (Homo sapiens sapiens) should nowhere be older than about 40,000 years, reflecting an assumed Pleistocene cultural explosion affecting most of Europe and nowhere else. (R119, R198)

- The appearance of stone artifacts beyond the Arctic Circle older than 10,000 years. No specific date-paradigm guards the Arctic from earlier arrivals, but older dates would be surprising to say the least given the Ice-Age conditions prevailing there.

The eolith problem and early European immigrants. Eolith = dawn stone. In Europe, the eolith problem closely parallels the geofact problem in the New World. The major difference is the height of the age barrier: about 1.0 million years in Europe compared to 12,000 years in the Americas.

The eolith debate began in Europe during the 1800s, at least a century before digging began at the Calico and Texas Street sites in North America. In much of Europe, natural scientists (there were no "archeologists" per se in those days) began extracting what looked like crude stone tools from rock formations that were deemed to be several million years old. In fact, these "eoliths" were found in enormous quantities, especially in Britain, France, and Belgium. But scientists of the day could not believe that humans had occupied Europe that long ago. In fact, there were no skeletons or other cultural artifacts to support this radical notion. Yet, eoliths were collected in quantity from very old rock formations, and they did look as if someone had intelligently shaped them albeit crudely.

To put eoliths on a more scientific basis, M.M. Boule attempted a definition in a 1905 issue of Nature.

> These primitive and rough tools have received the name of eolith. It is believed that they may be recognized by the presence of secondary work (retouchés). that is to say. the removal of small flakes in apparently a systematic manner, in accordance with the needs of the case, or resulting from the wear of the flint by use. (R14)

Boule went on to point out that, de-

spite the abundance of stones meeting the requirements of his definition, he believed that these enigmatic stones had to be the result of natural causes because one never found them associated with human skeletal remains.

Even so, workers on the continent had amassed so much eolithic evidence that Boule's opinion---and those of his persuasion---did not seem sufficient to squelch the belief that forerunners of modern man had lived in Europe for many million years.

M.A. Cremo and R.L. Thompson dedicated some 200 pages of their book Forbidden Archeology to eoliths. They focussed on the discoveries at sites in the following European countries:

Belgium	Oligocene (25-38 million years old)
France	Aurillac and Thenay, Miocene (20-25 million years old) (R129)

Large-end scraper excavated from beneath Late Oligocene sands in Belgium. Oligocene strata are roughly 24-37 million years old. (R129)

Of course, such dates are incredible to modern anthropologists for they now assert that the hominid lineage did not even begin until about 5 million years ago, and the genesis was in Africa.

The eolith saga continued despite the "impossible" implications. A landmark worth mentioning came in the 1920s, when R. Moir discovered some eoliths at Foxhall, near Ipswich, Britain. The specimens seemed to be from the Tertiary period and, therefore, could be at least several million years old. (Radiometric dating did not exist in the 1920s.)

Moir's discovery aroused so much interest and controversy that scientific closure was attempted. An International Commission was appointed by the International Institute of Anthropology of Paris to render a verdict on the age and artificiality of Moir's eoliths.

The Commission quickly determined that Moir's specimens were of Pliocene age. (Today, the Pliocene extends from about 2 million to 5 million years B.P.) This seemed much too old to the scientists of the 1920s---and is so today.

The onus, then, was upon assessing the artificiality of the eoliths. This was addressed in another section of the Commission's report.

> In the report on the archaeological problem, M. Capitan gives the result of a rigorous test. Taking the collections of these implements, in number roughly a hundred, he rejected approximately one-half as being in any way possibly open to doubt. All rostrocarinates were included among the doubtful. From the remainder, about half were set aside as being probably of human origin; but of the remainder, some twenty in all, he was of the opinion that there could be no doubt whatever that they were the work of man or of some subhuman precursor of man. And, indeed, several members of the Commission have pointed out that if this residue had been found among the rougher implements of a Mousterian [Neanderthal] find, no question would ever have been raised as to their human origin. (R19)

The Commission's conclusion that there was "indubitable" evidence of Tertiary man in East Anglia.

Did the Commission's pronouncement end the eolith controversy? Of course

Front and rear views of two purported stone tools from the Red Crag, Foxhall, Britain. Found in Late Pliocene strata, these are typical "eoliths" or "dawn stones." (R129)

not.

Striving to eliminate subjectivity in evaluating eoliths, various technical tests have been tried, such as "microwear analysis." In 1991, some suspect Paleolithic flakes found at Kirmington, England, were subjected to a rather interesting sort of test to ascertain their artifactual nature, as described in the Journal of Field Archaeology.

> A group of possible Paleolithic flakes from Kirmington, England, is examined using general and local flake characteristics. The general characteristics are derived by comparing known archaeological material to known natural material; the local characteristics are derived by comparing the possible artifacts from Kirmington to a natural control sample from the same site. The presence of features deemed significant by these comparisons contributes to a composite score for each object examined; artifacts score higher than natural flakes. The results indicate that some of the flakes in question are artifacts. (R124)

Thus, the Kirmington specimens (the word "eolith" had long ago fallen into disfavor) certainly favored a hominid presence in Britain before the 1.0-million year barrier erected across portals leading out of Africa.

Britain

Cornwall. In his lengthy review of the ancients' mining and uses of metals, E.A. von Fange mentioned briefly the mixing of stone artifacts in the tin-bearing gravels of Cornwall.

> When the tin-bearing gravels of Cornwall were reworked for tin and gold, relics of the Old Ones were found, including many stone bowls, mortars, and dishes, mostly of granite. The great similarity between these vessels and those found deeply buried in the gold-bearing gravels of California was noted already in 1881. One culture spread over the world at a very ancient time. (R220)

This circumstantial linkage of the California auriferous gravels (X1) and the Cornwall gravels is consistent with the frequent claims of the existence of a global traffic in copper metal several millennia in the past. (MMM1-X1)

East Anglia. Much more recently, a flint hand ax was discovered on the coast of East Anglia in sediments dated between 550,000 and 600,000 years. These early dates put hominids in Britain 200,000 years earlier than previously thought. (R221)

France: A modern eolith find. Despite the testimony of the eoliths, collected over many decades, in several countries, and in various geological venues, mainstream anthropologists were content to state firmly that our human ancestors did not even leave Africa until 1.5, perhaps 1.8, million years ago. And then it took them tens of thousands of years to work their way through the Levant and westward into Atlantic Europe. The eoliths spread copiously about western Europe were "too far off the curve" to take seriously. They had to be products of nature rather than hominids.

But then, in the 1980s, E. Bonifay,

an archeologist at France's National Center for Scientific Research, reported the discovery of putative human tools at the Saint-Eble archeological site in south-central France. These tools, he assured everyone had to be 2.2-2.5 million years old. Once again, crude bits of stone were threatening to upset the established and generally accepted timetables for hominid emergence from Africa.

To solve this conundrum or rather circumvent it, E. Delson, of Lehman College, City University of New York, added some conditions to be met before human presence could be confirmed at a site.

> These are; dating, artifacts that are unmistakably made by human intention, a faunal context, traces of fire or other human activity, apart from the artifacts, and human remains. (R112)

Thus, putative artifacts, isolated from additional signs of human activity, were unacceptable as proof of ancient human presence. Of course, one need not apply such stringent requirements everywhere---only where "impossible" situations occurred. In this manner, embarrassing artifacts can be defined out of existence.

Spain. On southeastern Spain's Iberian peninsula, dates of hominid arrival were also getting out of hand, In 1982, at sites around the Andalusian village of Orce, paleontologist J. Gilbert found stone tools and bone fragments that indicated human presence 1.8 million years ago.

Of course, these finds are being contested, but it is interesting to note that 1.8 million years ago, sea level was so low that the Strait of Gibraltar was only 3 miles wide, with an island rest stop along the way. Hominids from African could easily had paddled or swum this short distance---not need to travel around through the Middle East and across European mountains to get to sunny Spain. (R149)

Portugal. In their extensive literature searches, M.A. Cremo and R.L. Thompson discovered that in 1871, Portuguese geologist C. Ribeiro reported the existence of abundant human-worked flints in Pliocene and Miocene strata in Portugal. (R129)

Germany. It has been widely assumed that the hominids occupying Europe more than 40,000 years ago were intellectually and technically greatly inferior to the so-called modern humans. It has even been surmised that these hominids were unable to kill large prey and relied for their suppers upon scavenged carcasses and those small animals they could trap.

But, in February 1997, German scientists reported they had discovered three excellently preserved wooden spears in a stratum 400,000 years old. Butchered horses and stone implements nearby implied the systematic hunting of large animals. Such skills involved foresight, organization, and collective action.(MMW2)

M.B. Roberts of University College, London, remarked:

> I'm amazed at the advanced technology displayed in the German weapons. (R150)

Mainstream thinking states that only Homo erectus roamed Europe 400,000 years ago. However, some anthropologists, such as M.B. Roberts, lean toward an archaic version of H. sapiens; that is, our species. In other words, a form of modern man may have arrived in Europe long before the strictures of the 40,000-B.P. paradigm.

Russia. According to the anthropologists' accepted schedule of hominid diffusion across the planet, the Ice Ages blocked most east-west travel at high latitudes until about 12,000 years ago. This date now seems far off the mark. A team of Russian and Norwegian archeologists has located a hominid camp at Mamontovaya Kurya in Russia on the Arctic Circle. Bones of horses, reindeer, and wolves were strewn about this Paleolithic camp. Most important of all, though, was a 4-foot mammoth bone bearing grooves made by sharp stone tools---a sure sign of human occupation. The mammoth bone has been dated as 36,000 years old. This is the earliest sign of hominid presence in the high Arctic.

You will notice that we use the word "hominid" rather than human, because the campers may have been Neanderthals or, just possibly, Homo erectus. Unfortunately, no hominid bones were found to resolve this matter. (R199-R201)

In fact, the Arctic may have seen hominids much earlier than described

above. See X6 following for some remarkable Siberian purported artifacts.

X5. Africa. Africa is almost universally presumed to be the birth-continent of hominids, including our genus Homo. Time barriers associated with hominid diffusion paradigms are therefore not expected within this continent. Small stone artifacts found at various African digs do, however, raise questions concerning two other widely held paradigms:

(1) Sophisticated tool-making did not begin anywhere until genus Homo arrived on the scene about 2 million years ago. No earlier hominids seem to have acquired this talent. (However, non-hominid animals may have! See later in this discussion of Africa.)

(2) Sophisticated tool-making arose only in Europe 40,000 years ago during the claimed cultural explosion associated with the arrival of Homo sapiens sapiens, the so-called Cro-Magnons.

South Africa. The contents of Swartkrans Cave presented anthropologists with the opportunity to test the first of the above paradigms. In the 1980s, R. Susman, from the State University of New York, Stony Brook, focussed his attentions on a cave deposit established to be about 2 million years old. This deposit yielded both crude stone tools and hominid bones. Some of the bones belonged to Homo erectus, a forerunner of modern man, but most of the skeletal material belomged to Paranthropus robustus (also called Australopithecus robustus), a small-brained hominid. Given that Paranthropus robustus was the primary occupant of Swartkrans Cave and, unlike many early hominids, had the fingers and dexterity required for tool-making, Susman suspected that he might have found an unexpected non-Homo tool maker. (R108)

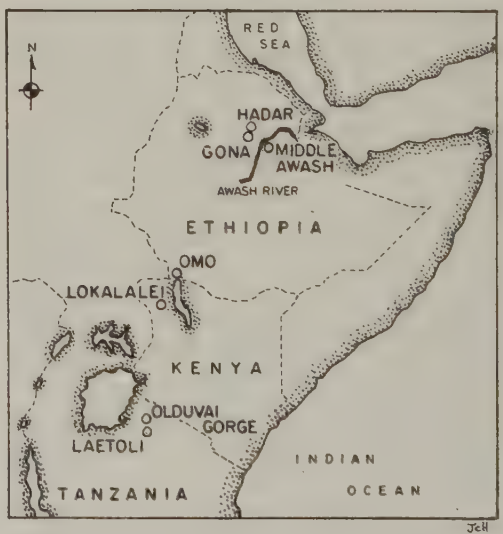
Ethiopia

Hadar region. In 1976 and 1977, H. Roche and J. Harris excavated pebble choppers and small stone flakes that were securely dated between 2.5 and 2.7 million years of age. This was that exciting period when the genus Homo is believed to have emerged among the hominids, possibly from Australopithecus afarensis stock known to have existed in the Hadar region in that time span. Unfortunately, it has been impossible to decide if Homo or Australopithecus afarensis made the tools. The tools were of the Oldowan style, like those found at Olduvai Gorge and Lake Turkana to the southwest of Hadar. (R90, R91)

Gona region. Some twenty years after the Hadar work mentioned above, S. Semaw et al reported additional tool finds at nearby Gona. These were dated at 2.5-2.6 million years, but did not seem to be the work of novices.

> The artefacts show surprisingly sophisticated control of stone fracture mechanics, equivalent to much younger Oldowan assemblages of Early Pleistocene age. This indicates an unexpectedly long period of technological stasis in the Oldowan. (R148)

This stasis in technology---about a million years long (1.5-2.5 million years



Sites of early hominid workshops in East Africa. Some of the tools recovered from these sites are dated between 2.5 and 2.6 million years. (R147)

the arrival of genus Homo on the scene. With the presence of Homo one would expect revolutionary developments in stone-tool technology. It seems more than likely that the Hadar and Gona tools were the work of hominids other than Homo. (R147, R148, R157))

Kenya

Lake Baringo. The next scene takes place in Kenya, where S. McBrearty of the University of Kenya reported that she found surprisingly advanced stone tools under a layer of volcanic ash 240,000 years old. Obviously, these tools are far-removed from that period some 2.5 million years ago when genus Homo was just coming upon the African scene. The important characteristic of the long, thin stone blades uncovered by McBrearty is their technological sophistication.

> An extraordinary feature of these tools is that they seem to have been carefully shaped even before they were knocked off a rock core---and that, McBrearty contends, indicates a solid form of abstract thought. Moreover, she argues that similar sites show signs of modern behaviors such as carefully planned resource use and hunting. (R138)

The Kenya 240,000-year-old blades, in fact, can be favorably compared with the stone tools that suddenly appeared in western Europe 40,000 years ago during the vaunted cultural explosion that was supposedly stimulated by the arrival of the Cro-Magnons or modern man. Evidently, this European so-called Upper Paleolithic Transition seems to have also taken place, at least in the art of tool-making, about 200,000 years earlier in Africa. There are differences in the technological details, of course, but the similarities are impressive. (R139) It seems that the second paradigm listed at the beginning of X5 has been severely weakened.

Who made these advanced tools? The mostly likely knapper is Homo erectus, who had already been around for hundreds of thousands of years in both Africa and Eurasia. But there's also the possibility that some early form of Homo sapiens; i.e., modern man, was responsible. Bones of the "archaic" form of Homo sapiens exist in South Africa

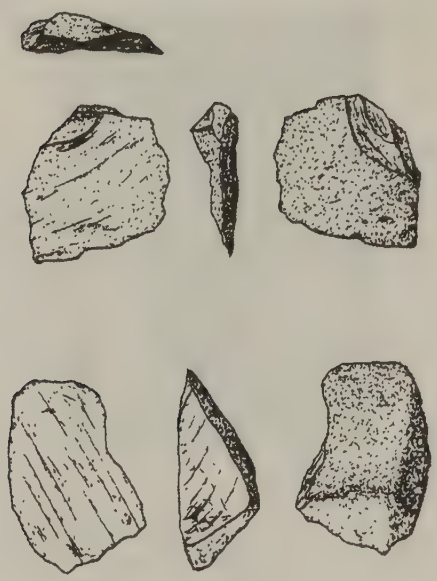
240,000-year-old stone cores from Kenya. They resemble the cores that appeared suddenly in Europe merely 40,000 years ago. (S. McBrearty, R138)

bearing dates as early as 130,000 B.P.

Lake Turkana. At an archeological site named Lokalalei 2C, on the western shore of Lake Turkana, H. Roche and her team came across stone tools demonstrating superior "cognitive capacity and motor skill." These tools, however, were 2.34 million years old, not 240,000 as at Lake Baringo. In age and knapping expertise, they are reminiscent of the tools at Gona, Ethiopia. But, once again, the identity of the tool-makers has evaded anthropologists. All we know is that some late-Pliocene African hominids showed considerable, unexpected technical skill. (R207-R209)

Chimpanzees as tool-makers. In the Tai Forest, Cote d'Ivoire, naturalists have come across centralized sites where chimpanzees crack nuts with rocks carried there for that purpose. To an untrained eye, some of these chimpanzee artifacts (stone hammers, accidentally produced stone chips, etc.) can be easily mistaken for human artifacts. (R222-R224)

In fact, some of the stone debris at the chimpanzee nut-processing sites is not all that different from those "eoliths" ("dawn stones") found in European Miocene strata. (X3)



Sharp stone flakes from a chimpanzee nut-cracking site. The sharp flakes could be easily mistaken for ancient hominid tools. (R224)

X6. Asia

Siberia. In X4, human-made tools dated about 40,000 B.P. were recognized near the Arctic Circle in European Russia. Even this comparatively recent date is considered remarkable because of the high survival requirements placed upon the primitive tool-makers in that frigid land. How much more remarkable the situation would have been if the tools were ten times older---400,000 or so years of age. Tools that old would have to be the product of one of modern man's predecessors, such as Homo erectus. Yet, some recent discoveries in Siberia seem likely to further enforce our appreciation of the toughness and wanderlust of early hominids.

There are, in fact, two pertinent Siberian sites. The first, on the Ulalinka River, was discovered in 1961. It is scarcely mentioned in the English language literature investigated so far. The second site, found on the Lena River in 1982, however, received considerable attention from scientists in the literature.

Ulalinka River site. The site is on the river's steep slope at the edge of the city of Gorno-Altaisk; latitude: about 52° N. It is far south of the Arctic Circle and about 400 kilometers north of the Chinese border.

The site's discoverers, A.P. Okladinov and L.A. Ragozin wrote:

> "Stone tools of primeval man were found here in the form of cobble stones only partially worked over by a coarse chipping. Half or even two-thirds of such a stone retained its pebbly surface, a kind of scale, which had been removed only at the working end of the tool, at its cutting edge. A person not acquainted with the technology of those remote times would have tossed this stone away, seeing nothing striking in it." ...Six hundred such tools were found at Ulalinka. (R129. Source cited: Soviet Anthropology and Archaeology, p. 3, Summer 1984)

Initially, the Ulalinka River tools were dated at 40,000 B.P.---not an anomalous date for that region. But subsequent studies pushed the date back to 150,000-400,000 years. Then, in 1977, the cultural layer containing the tools was redated to 1.5-2.5 million years B.P., as measured by thermoluminescence analysis by A.I. Shliukov at Moscow University.

These latter dates redrew the anthropological picture completely.

> Okladinov and Ragozin then posed a question: "was the Ulalinka man an aborigine or did he come from somewhere else?" It was possible, they stated, that the ancestors of Ulalinka man had migrated from Africa. If so, the migration must have occurred over 1.5 million years ago, and the being that migrated must have been Homo habilis. (R129)

Speculating further, Okladinov and Ragozin wondered whether the hominids that made the pebble tools found in such large numbers at Ulalinka might actually have originated in Siberia, and that Siberia rather than Africa was where the hominid line began!

It must be added here that thermoluminescent dating is difficult to use and considered by some to be unreliable.

Eastern Russia showing the location of the Diring Yuriakh site. (R143)

The Lena River site. The second Siberian site yielding anomalously old tools is near Yakutsk, about 3,000 kilometers northeast of the Ulalinka River site and closer to the Arctic Circle, being at latitude 61° N.

Here, the artifacts---also perhaps a million years old---engender the same question: Could hominids have evolved in Siberia?

Russian academician Yuri Mochanov, discovered of the site thinks so! He does not dispute that hominids may also have evolved in Africa and, perhaps, Southeast Asia. He has brought back some 4,000 stone tools collected at 15 sites in the Siberian permafrost to bolster his claim that Siberia, too, may have been a region of origin for hominids.

> Molchanov's controversial evidence is indeed striking: a collection of chipped and flaked rocks that are clearly artifacts fashioned by humanlike hands and that he contends are 2.5 million years old---plus or minus a half-million years.
>
> Remarkably, that same era marked the time when early human ancestors known as Homo habilis lived and left their remains in the tropical Olduvai Gorge of what is now Tanzania. Mochanov's collection of tools closely resembles the ones that anthropologists have long collected from digs in Africa. (R136)

Of course, all this contrasts strongly with the dominant view of hominid evolution, which cites warm, verdant African forests and savannas as our most likely place of origin. Siberia, with its -50° winters and fleeting summers, hardly seems conducive to hominid speciation. Mochanov's rationale is that this severe climate actually stimulated ancient hominids to create tools, fashion warm clothing, and build winter shelters---these postulated Siberian hominids had to evolve or perish!

In addition to the climate factor are two other problems: (1) The Siberian sites have yielded no hominid bones nor have animal bones of any kind been found with them; and (2) The dating of the tools is shaky. They cannot be radiometrically dated. Instead, Mochanov has had to rely upon the tools' similarity to African tools of 2 million years ago, magnetostratigraphy, the thermoluminescence of the soil, and the ages of the strata in the 450-foot gorge of the Lena River. It goes without saying that other anthropologists are reserving judgment.

Nevertheless, Mochanov's Siberian discoveries have produced a magnitude-8 tremor in science.

But the 2.5-million-year date has not held. The lack of bones and datable cultural artifacts meant that thermoluminescence dating would have to be the decisive dating technique. To this end, M.R. Waters, from Texas A&M, visited the Diring-Yuriakh site in 1997. His thermoluminescence analysis produced a younger, but still remarkable, date. We quote from the abstract of his 1997 paper in Science.

> Thermoluminescence age estimates from eolian sediments indicate that the cultural horizon is greater than 260,000 years old. Diring Yuriakh is an order of magnitude older than documented Paleolithic sites in Siberia and is important for understanding the timing of human expansion into the far north, early adaptations to cold climates, and the peopling of the Americas. (R143)

The 260,000-year date meant that the maker of the Diring Yuriakh tools might well have been Homo erectus. Actually, the remains of H. erectus, 400,000 years old, were already known from China. (R145) Thus was dispelled the thought of a Siberian Garden of Eden!

It was to be expected that the age and crude nature of the Diring Yuriakh tools would bring forth the familiar "geofact" charge. Indeed, they did. (R135) To blunt this criticism Mochanov carried 260 of the Siberian tools to the Smithsonian Institution in Washington, D.C. for examination. There, R. Potts, an expert on early tools, evaluated them in these words:

> "The Diring artifacts are very, very simple one-step tools," explains Potts, who had only heard sketchy details about the site until Mochanov's visit. "All they were basically doing was smashing one rock with another, just to get a few pieces off. That's why the tools look very rough and crude---I think Diring was their quarry site." Perhaps, Potts, speculates, the inhabitants broke the rocks into smaller pieces that were easier to hold, then carried these to other sites where they fashioned more elaborate tools. (R135)

Unifacial choppers from the Diring Yuriakh site in eastern Russia. (R143)

In his 1997 Science article, Waters has also supported the artificial nature of the Diring Yuriakh specimens in a lengthy note listing four additional confirming characteristics.

With hominid-manufacture of the tools established and more realistic dates in the 240,000-year range, the anthropological implications of the tools from the banks of the Lena River were of two sorts:

(1) The need to reassess early hominid capabilities to survive Siberian winters, and;

(2) The acknowledgement of their ability to venture deep into the Asian land mass---perhaps even into North America.

R. Rudgley expounded on these early hominid capabilities in his book The Lost Civilizations of the Stone Age.

> Most archaeologists simply do not believe that humans---even 200,000 years ago---were capable of colonising the harsh natural environment of the Far North because they were not advanced enough to control fire and make themselves clothes. But as Larichen and his colleagues have pointed out, the earliest people to enter Siberia cannot, in the light of the archaeological discoveries of Mochanov, Medvedev and others, be seen as 'instinctive, semi-animal' beings but rather as in possession of human minds. (R168)

As far as the possible peopling of the New World is concerned, V. Morell quoted the Smithsonian's D. Stanford:

> For those who've wanted to see an earlier date for the peopling of the Americas this date is a cause for celebration...If people were dealing with the cold that far north in Siberia 500,000 years ago, then a little bitty ice age like the Wisconsin isn't going to stop you from getting to America. (R135)

Pakistan

Riwat. Thousands of miles southwest of the foregoing claims of anomalous Siberian artifacts,an all-too-familiar situation presented itself in the Pabbi Hills in northern Pakistan, not far from Rawalpindi. Here, the Sawalik Series of river deposits give the paleontologist a fairly well-defined and dated stratigraphy for the past 4 million years. The artifacts found in these rocks suggest some anomalous hominid comings and goings through south Asia. No hominid skeletal

material has been dug up but the artifacts are too old---2 million years--- to be accommodated by prevailing paradigms.

H. Rendell and R. Dennell have set the theoretical stage for us in their 1987 paper in the Geographical Magazine.

> It has been long accepted that Early Man first first appeared in Asia less than one million years ago, yet the recent dating of stone artefacts found in northern Pakistan could force a reappraisal---they are at least two million years old. The discoveries were made during a collaborative project involving the British Archaeological Mission to Pakistan, and the Pakistan Government Department of Archaeology and the Geological Survey of Pakistan. They bring into question the whole chronology of the evolution and dispersal of hominids both in Africa and Asia. (R105)

The chronological problem is this: The Siwalik artifacts are too old to have been knapped by Homo erectus, our immediate predecessor and supposed to have evolved in Africa only about 1.6 million years ago. This means that the manufacturer of the Siwalik specimens must have been the forerunner of Homo erectus; that is Homo habilis. And there seems to be no skeletal evidence that H. habilis ever left Africa.

In his The Lost Civilizations of the Stone Age, R. Rudgley wrote:

> If neither Homo habilis nor Homo erectus made the tools, then there must be another hominid at work in this region during an extremely remote period. (R168)

Naturally, such thoughts are anathema to even avant garde anthropologists. The Siwalik dates must be off, or the artifacts are only geofacts. It's the same debate we have seen so many times in this volume.

The dating the the Siwalik specimens is difficult to challenge for, rather than being loose in sand and gravel, these quartz artifacts were firmly embedded in a stratum of conglomerate that could be rather confidently dated employing paleomagnetic measurements and stratigraphic analysis. (R129)

To fend off the expected geofact (or eolith) charge, R. Dennell and his associates sorted out the collection of controversial artifacts they had chiseled out of the solid rock into five groups based (rather subjectively, or course) upon how clearly and convincingly they seemed to be artificial. The top scorer was R014, with a very large flake detached on one side and a further seven knapped elsewhere. Several other specimens exhibited multiple flaking. It is hard to blame natural causes for such well-controlled, multiple flaking. Even experts who examined the artifacts did not doubt that some were hominid-made. They believed in the artifacts but not their 2-million-year-old dates. (R168)

M.A. Cremo and R.L. Thompson commented:

> So what is going on with the find in Pakistan? It appears we may have a recent example of scientists being unable to objectively evaluate evidence that contradicts their preconceptions about the progress of human evolution. (R129)

A stone tool from Pakistan's Upper Siwalik formation, which is dated at about 2 million years. (R129)

China

Bose Basin. The Bose Basin is located in southern China just north of Vietnam. It is also far to the east of the so-called Movius Line. This artificial geographical

division was defined in 1944 by Harvard's H.L. Movius. Movius had concluded that circa 500,000 B.P., the lands east of his Line (northern India, China, and Southeast Asia) were cultural backwaters compared to Europe and the Middle East to the west of his Line.

Homo erectus had diffused into the territories on both sides of the line; but for some reason the population to the east did not develop as rapidly---so the academic thinking went.

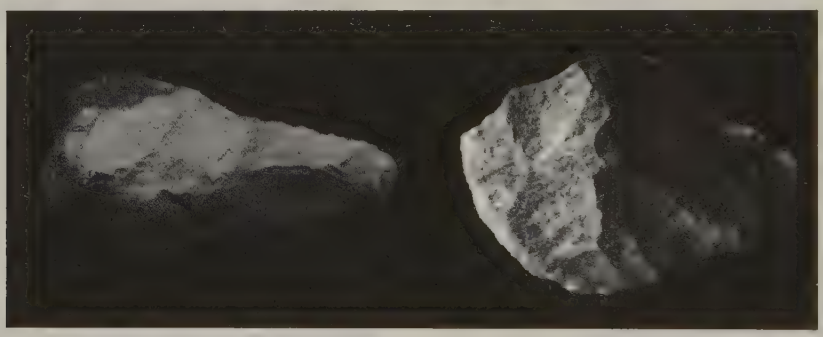
The discovery of large hand axes in the Bose Basin in the 1990s by H. Yamei et al in effect breached the Movius Line, for they were in no way inferior to hand axes found west of the Movius Line. The Line, however, was not completely erased because the definitive hand axes have not yet been found outside the Bose Basin.

by their association with Australites. Australites are tektites that fell over a huge area of Southeast Asia and Australia about 800,000 years ago, according to radiometric dating of the tektites. (R174, R176, R177)

In passing, we should note that the crater supposedly made by the object that created the wide strewn-field of Australites has never been found. (See ETC3-X2 in Neglected Geological Anomalies.)

In summary, the Bose Basin stone hand axes: (1) breached the Movius Line; (2) demonstrated that Asia was not lagging Africa technologically; and (3) that the Homo erectus population in the Basin was coping with the results of celestial catastrophism.

Nihewan Basin. Another Chinese



Bifacial hand axes from the Bose Basin, China. These artifacts are associated with 800,000-years-old Australites (tektites) (R177)

An anthropologically important feature of the Bose Basin hand axes is their sophistication of manufacture. One could lose them completely in a collection of hand axes from Africa of the same period. In hand-ax terms, China was technologically on a par with Africa 800,000 years ago. This was a surprise to all.

Of extra interest to anomalists is the fact that that the Bose Basin geology tells a story of incredible environmental devastation at about 800,000 B.P. The area's forests had been burnt and rocks scorched. In fact, the age of the artifacts Yamei et al picked up were dated

archeological site of interest is 15° farther to the north of the Bose Basin at 40° N. latitude, about 150 kilometers west of Beijing, at a place named Xiaochangliang. The artifacts found here consist of simple flakes, cores, and scrapers---nothing as sophisticated as the hand axes of Bose Basin. They are, however, much more ancient.

The Xiaochangliang stone tools were first collected in the 1980s but could not be accurately dated at that time. However, in 2001, in an issue of Nature, R.X. Zhu et al described how the tools have now been accurately dated at 1.36

million years by magnetostratigraphic analysis. It seems that the clay layer containing the tools exhibits reversed magnetic polarity. It is sandwiched between layers of normal magnetic polarity, which are 1.0 and 1.77-1.95 million years old. Zhu and colleagues adopted an age between these limits.

The importance of the Nihewan Basin artifacts is that they represent the oldest penetration of Homo erectus into northeast Asia. Quite obviously, H. erectus was a far-traveller, and an early one, too. One sees easily why some scientists hold that H. sapiens ("us") could have evolved from H. erectus in Asia as well as Africa and elsewhere. (The controversial "multiregional theory.")

An anthropological reference point here is the existence of H. erectus fossils at Dmanisi, Georgia, at Asia's western edge, dated at 1.7-1.9 million years. (R202-R204)

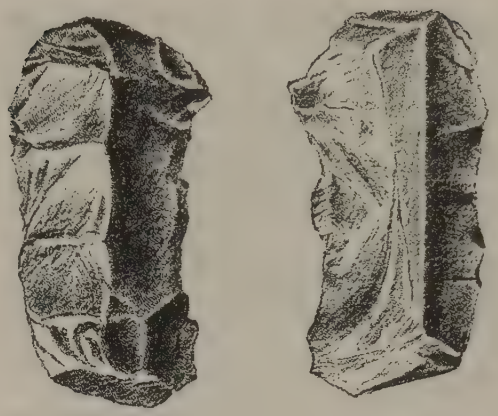
Nowhere in all of the references dealing with the Chinese stone artifacts are Mochanov's Siberian older dates mentioned.

Anhui province. Even older evidence of the presence of H. erectus in China has turned up at the Renzidong Cave site in the eastern part of the country. Here, animal bones showing signs of being butchered are mixed with stone tools dated as early as 2.25 million years B.P. This amazingly early date for H. erectus was determined by the presence of the bones of extinct animals, such as the monkey Procynocephalus, which was still living 2.0-2.5 million years ago. (R225)

Myanmar (Burma)

Yenangyoung. Another unusually old hominid date in Asia comes from central Myanmar near the Yenangyoung oil field. The account was published more than a century before the Chinese artifact discoveries mentioned above.

The discoverer of the subject artifacts was F. Noetling, a paleontologist working for the Geological Survey of India. While collecting vertebrate fossils in the area of the oil field, he came across more than a dozen chipped flakes of flint. Some were more or less triangular in shape, but two were oddly shaped, as illustrated, and obviously artificially made. But there is an age problem connected with them that becomes apparent in the following statement by T.R. Jones:



Curiously shaped flint flakes taken from a Miocene stratum in Myanmar (Burma). The geological formation is said to be about 5 million years old. (R8)

> There is no doubt of this being an artificially dressed flake of flint, actually dug out by an experienced geologist of the Indian Geological Survey, or of the ferruginous conglomerate that contains it and other dressed flakes, belonging to the Yenangyoung Tertiaries of Burma, and to be regarded either as an Upper Miocene bed, that is, of the latest Miocene age, or, at the least, of the earliest Pliocene. (R8)

An artifact from the latest Miocene would be about 5-million years old---older than the oldest hominid according to current thinking. But in 1897, F. Noetling, the discoverer of the artifacts, wrote that the stratum from which he had plucked the flint specimens had been reevaluated and assigned to the Lower Pliocene. He wrote:

> To sum up: in the neighborhood of Yenangyoung, curiously shaped flint-flakes, the shape of which it is difficult to explain by any other than human agency, were found at two localities in beds of Lower Pliocene age. It is absolutely certain that they were in situ when found at one locality and more than probable that they were so at the second. If their shape is attributed to human agency, additional evidence for this theory is afforded by a remarkably polished

femur or humerus, found in the same beds. (R9)

A Lower Pliocene date would make the flint artifacts 3-4 million years old, much older than any other Asian stone tools. They are according to current theory older than Homo erectus. Was H. habilis or some other hominid there?

We have seen nothing further so far on these remarkable Yenangyoung artifacts or the hominid bone found in the same stratum.

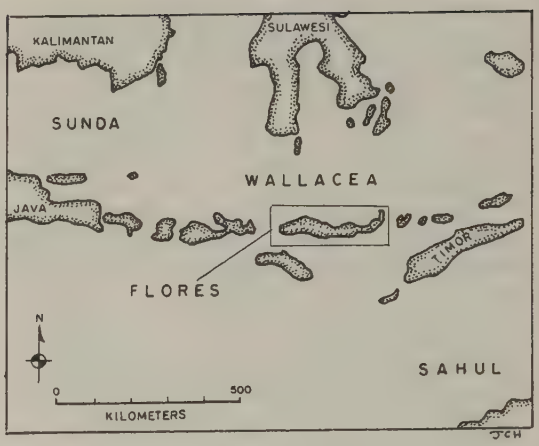
Indonesia

Flores. In 1968, T. Verhoeven, a Dutch missionary on the Indonesian Island of Flores came across the bones of an extinct form of elephant known to have lived about 750,000 years ago. From among the bones, Verhoeven collected some obvious stone artifacts. His discovery, however, was widely disbelieved, not for the age of the artifacts, because the large island of Java to the west of Flores was known to have been reached by Homo erectus at least a million years ago. There had been variations in sea level that made it easy for H. erectus to cross over to Java from Southeast Asia. Flores, though, was a different story because it is separated from the Indonesian islands to its west by a deep strait that had never been narrower than 20 kilometers (11 miles). Since H. erectus is not know to have built watercraft and in addition was not considered particularly bright, he obviously could never have made the water crossing to Flores. So the thinking went in the 1960s.

Actually, few of the fauna and flora of Southeast Asia had been able to make the Flores crossing. The Lombock Strait separating Flores is the site of Wallace's Line. Drawn by the great naturalist A.R. Wallace, this imaginary line separates most Southeast Asian life forms from the Australasian biota on Flores and islands to its east and the continent of Australia.

In the 1990s, however, T. Verhoeven was vindicated by the confirmation that hominid tools on Flores were indeed very old. In fact. fission-track dating put them on Flores 0.88 ± 0.07 to 0.80 ± 0.07 million years ago. (R161-163, R168)

We can imagine that some plants and plants typical of Southeast Asia might have drifted across to Flores on logs or masses of floating vegetation, but how



Location of the Indonesian island of Flores. It was colonized by early hominids some 750,000 years ago. It is uncertain how the wide, deep-water strait was crossed. (R162)

did the hominids and that relative of the elephant that Verhoeven found ever make the passage? H. erectus was not known to have marine capabilities capable of crossing 11 miles of deep, swiftly flowing water. As for that ancestor of the elephant, it obviously could not build boats.

The members of elephant family, however, are now recognized as remarkable swimmers. They have been seen swimming snorkel-up many miles from land! It turns out that humans, too, are excellent swimmers. Modern long distance swimmers can readily swim 11-mile bodies of water. So, perhaps watercraft were unnecessary for the crossing of Lombock Strait to Flores by H. erectus. (R213)

Even so, it is more reasonable that these early humans were better at building boats and seafaring than we give them credit for. In other words, H. erectus probably crossed over to Flores on a raft or boat rather than by swimming. (R226)

X7, Australia. It is possible, as alluded to above, that Homo erectus might have swum across the Lombock Strait to Flores, but he and she could not have paddled across the 55 miles separating East Timor, Indonesia, from Australia. The ambitious

hominid would have needed watercraft of some kind.

Much later than H. erectus, H. sapiens, presumably more clever, could have manufactured suitable seaworthy vessels for the trip. The earliest accepted date of human occupation of Australia is 40,000 B.P.---well within the history of H. sapiens. This date is based upon spear points unearthed at a dry lake bed named Lake Mundo.

There are, however, claims of earlier stone artifacts in Australia. In 1978, M. Lofgren and J. Clarke collected more than 30 stone tools in Western Australia that were claimed to be more than 100,000 years old. (R185)

We have seen nothing further on this claim.

More highly publicized has been the discovery at Jinmium, in Australia's Northern Territory, of circles engraved on tall boulders. The circles are obviously the work of humans. There are thousands of these etchings all told.

No one doubts that the Jinmium site is ancient. Judging from the sediments that cover the lowest circles, these engravings are about 60,000 years old. If this date survives scrutiny, the Jinmium carvings will be the oldest human art on the planet---twice as old as anything found in Europe as of 2000. No wonder the circles have created a stir.

Actually, though, a larger issue is at stake. In the sediments around the engraved boulders, anthropologists have discovered what seem to be even-more-ancient signs of human activity: stone tools originally stratigraphically dated at 116,000 and 176,000 years. The problem here is that most anthropologists hold (rather fervently) that modern humans (Homo sapiens) did not expand out of Africa until about 100,000 years ago. Unfortunately for this mind set, the Australian tools (and carvings) seem to be the work of H. sapiens. Paleoanthropologist R. Klein has offered the following pertinent comment.

> If it could be demonstrated [that] people were in Australia more than 100,000 years ago, we would have to rethink everything we thought we knew about the later phases of human evolution. (R214)

If the early Jinmium dates mentioned above were to hold up, they would bolster the unpopular "multiregional" hypothesis, which holds that modern humans arose separately from several protohuman populations---not just the African population. The battle between the "Out of Africa" proponents and the multiregionalists has been a fierce one. The Jinmium artifacts may tilt opinion in favor of the latter. That is why this site is potentially so anomalous.

But, according to R. Rudgley's 1999 book The Lost Civilizations of the Stone Age, the dates for Jinmium's stone tools are highly flawed. Since we have not yet seen any published corrections, the earliest human activities Down Under are still up in the air.

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Persuant to the global eolith/geofact controversy that pervades this section, we add this eolith from the Kent Plateau, Britain, which displays a row of several, non-random flake removals---hardly the work of natural forces---yet predating hominids by millions of years. (R129)

MMS2 Large Assemblages or Caches of Stone Implements

Description. Large, often buried, assemblages of stone tools, spearheads, and other useful implements as well as discs and shapes of no known practical value. The stone objects may be aligned in formations amid enigmatic sand layers and sprinkled with red ocher.

Data Evaluation. Most of the discoveries were reported in the Nineteenth Century professional journals and books. A few good-quality descriptions come from recent popular journals and books. Rating: 2.

Anomaly Evaluation. The anomalousness of stone-implement accumulations is not in their size---although some are amazingly large---or in their age and workmanship. Rather, the enigma is in the purpose of those buried assemblages that were laboriously manufactured, precisely arranged in rows and layers, and then concealed. No burials accompany these buried massed implements, so they were probably designed for religious purposes, perhaps to propitiate some god. Possibly, some were cenotaphs; that is, memorials to some exalted person. Rating: 2.

Possible Explanations. See above.

Similar and Related Phenomena. Buried stone spheres in Costa Rica (MSO2 in Ancient Infrastructure); buried Olmec heads (MGP in a future volume); caches of microliths (MMS4); giant flints (MMS5).

Entries

X1. Immense Accumulations of Ancient Stone Implements. The Old-World Neolithic and New-World Precolumbian peoples used stone as a major raw material. Their flint, quartz, jasper, and other kinds of mines are described in MSE4 in Ancient Infrastructure. Such ancient mines are often littered with lithic debris but rarely provide archeologists with finely finished tools and materials for making weapons. Much of the time, unfinished "blanks" were mined and carried away to distant "lithic factories" and population centers. Some of these manufacturing centers are remarkable for their size and output.

France. In 1864, a physician at Grand Pressigny discovered an ancient flint-implement factory near his town.

> Vast quantities of chips of siliceous stones, of arrowheads, hatchets, knives 15 to 20 centimeters long, of lanceheads, &c. have been obtained from it. Cut stones of prismatic shape and about 20 centimeters long, are especially abundant; they occur by the thousands over an extent of 5 or 6 hectares. (R2)

Six hectares equals almost 15 acres, so this was an impressive lithic factory. Without doubt, we have not found many others in our literature searching.

Belize. Even more impressive than the French implement factory is the evidence for a vast, highly productive Precolumbian workshop in Central America.

> For miles along, and for miles on either side of what is now called "The Old Road," north from the capital of the little Central American country still called British Honduras [now Belize], there is an area of flatland---uninhabited and overgrown with stands of Cohune Palms, which mark amcient Amerindian village sites, and a thorny shrub called generally akalche---that has no natural stones but which is completely covered with nothing but flint spear-heads, arrowheads, scrapers, other finely chipped stone tools, and flakes and chips. This area lies from five to ten miles north of a place called Maskall's, and fifteen miles south of Orange Walk, as measured along this Old Road. So numerous are these artifacts that they

were used exclusively as road-bedding for several miles, and after forty years of use by all north-south-bound traffic on that road, one could just step out of a car and fill as many baskets as you wanted with shovelfuls of the stuff. In a bushel basket you would get about 30% perfect specimens, another 20% broken pieces, and the rest flakes and chips.

Flint instrument factories are known from all over the world, notably near natural sources of this material, like the South Downs of England, but there is nothing known anywhere of an extent such as this. What is more, there is no known flint, chert, or other such substance anywhere within some two hundred miles of this place. (R8)

X2. Caches of Engraved Stone Discs.

Michigan. Michigan is a state noted for more than its share of engraved stone artefacts---especially those conroversial stones bearing the so-called "Mystic Symbol." [MGP in another volume]

Our present interest focuses on shale discs about the size of a quarter reportedly occurring in caches in Alpena County near Lake Huron shores. These surprisingly small discs are often engraved with representations of the Thunderbird and other creatures and symbols sacred to Algonquian mythology. Many of the discs are neatly pierced with central holes. They date back to 1250-1400 A.D.

These particular Michigan discs number in the hundreds but have so far been found only in four caches in the Thunder Bay region. Most come from the Haltiner site, which seems to have been the manufacturing center.

Since some of the discs are engraved with sacred symbols, they were probably worm as talismans or charms. (R9)

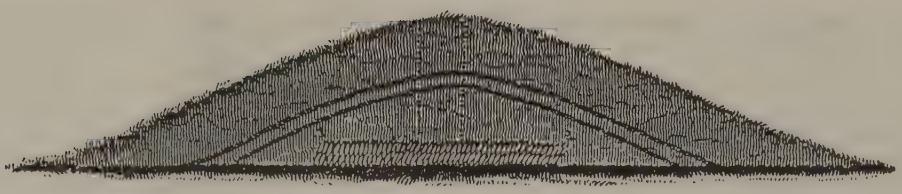
We include this nonanomalous item because it is associated geographically with the suspect Mystic Symbol materials, the famous Michigan garden beds, and the proximity to the immense copper mining areas on the Keweenaw Peninsula. (See MSC5 and MSE6 in Ancient Infrastructure.)

X3. Large accumulations of systematically ordered, buried stone implements. In the early 1800s, when many of the Indian mounds of the Mississippi Valley were being opened up, their excavators were surprised to discover that some of them contained, not burials, but thousands of beautifully finished stone implements of various sorts. These were not arranged helter-skelter but rather oriented in neat rows and layers surrounded by layers of burnt sand. A mound at Clarke's Ford, Ohio, yielded no fewer than 7,230 flint discs. Obviously, these buried arrays of stone implements were of great significance to the Precolumbian Moundbuilders. (R4-R7)

These buried, finely crafted stone implements, although representing great labor, were apparently never intended to be dug up and used for hunting or any practical purpose. If burials accompanied these large accumlations, we could designate them as "grave goods." But usually such was not the case, so we assume the buried rows and layers of artifacts had some still-undetermined ritual or magical significance.

From among several descriptions of these implement burials, we choose one reported by the team of Squier and Davis. This particular mound was located in Ross County, Ohio, and designated as the North Fork Works.

> It has two sand strata; but instead of an altar, there are two layers of discs chipped out of hornstone, some nearly round, others in the form of spear-heads. They are of various sizes, but are for the most part about six inches long, by four wide, and three quarters of an inch in thickness. They were placed side by side, a little inclining, and one layer resting immediately on the other. Out of an excavation six feet long by four wide, not far from six hundred were thrown. The deposit extends beyond the limits of the excavation on every side. Supposing it to be twelve feet square, (and it may be twenty or thirty,) we have not far from four thousand of these discs deposited here. If they were thus placed as an offering, we can form some estimate, in view of the facts that they must have been brought from a great distance, and fashioned with great toil, of the devotional fervor which induced the sacrifice, or the magnitude



A sketch from R1, published in 1848, showing the cross section of an Ohio mound containing two layers of carefully oriented hornstone discs---thousands of them! (R1)

> of the calamity which that sacrifice was perhaps intended to avert...It is incredible, however, that so much care should be taken to fashion the mound and introduce the mysterious sand strata...An excavation below these layers discovered traces of fire, but too slight to be worthy of more than a passing remark. (R1)

Not all such arrays of multitudinous stone implements were found in conspicuous mounds. Some were buried without surface traces and were only exposed by flooding or construction crews. The complete concealment of some of these large, systematically ordered accumulations of stone implements deepens the mystery of their purpose.

J.F. Snyder summarized his observations at two of these cryptic sites in an 1893 paper. The one described below was located on the Illinois River at Beardstown, Illinois. It had concealed a total of 1,580 flint discs.

> The discs in both were buried in the ground five feet below the surface; and neither deposit was marked by mound or other discernible object or sign to denote their place of burial... In making the deposit at Beardstown a pit shaped like the flints, with apex upstream, had been sunk near the river's edge, five feet in depth, down through the sand to the underlying drift clay (loess). The flints were laid in this pit in five courses, separated from one another by layers of clay two inches in thickness, and in each course the discs were carefully placed with their pointed ends upstream and overlapping one another, as slates are arranged on a roof; and the pit was then filled with sand. In neither of these burials was there any indication of the action of fire, either above or below the flints. (R5)

X4. Caches of Clovis-Culture Implements. The stone-implement caches now introduced are separated from those of the relatively recent Moundbuilder accumulations of X3 by a thousand miles and perhaps as many as 10,000 years of time. The Clovis-Culture caches are small, containing less than one hundred artifacts, among which are usually found some of the distinctive Clovis points. Several Clovis-era caches have been uncovered in southern Idaho not far from the Snake River, but we suspect that more will be found in other western states.

Typically, this class of caches contain mainly roughed-out stone blanks and lithic tools in various stages of manufacture and some of the beautifully crafted Clovis points.

The possibility that some of the Idaho caches may have mystical significance is seen, first, in the presence of red ocher (an ancient "ritual" substance) and, second, in the fact that some of the contained implements are so oversized as to be impractical for mundane purposes; that is, their very size implies an expensive "offering" to someone or something.

Of the several Idaho Clovis-era caches known to archeologists, the Simon Cache seems to be the best known. Discovered in 1961, it contained 33 bifaces, a scraper, and a spall, all of which were strewn with red ocher. These implements were made from non-local materials. Some stone apparently came

from the prehistoric Alibates quarry in Texas, suggesting far-flung commerce in North America circa 10,000 years ago. The Simon Cache artifacts were buried 12-18 inches below the surface. No human remains were found.

The Simon cache probably had a mystical purpose; perhaps a religious offering, perhaps it was intended to honor the memory of someone. Or, it may have been only a storage cache. (R10)

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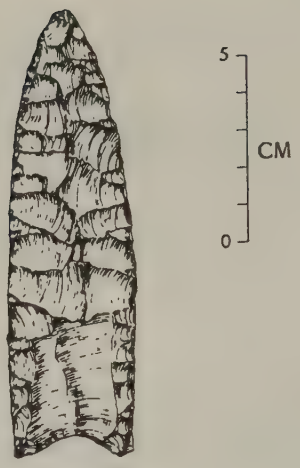


A typical Clovis point. These have been found buried in large caches in finished and partially worked forms. These points are surprisingly like the European Solutrean points discussed in MMS3-X4.

MMS3 Stone Artifacts Found in Unexpected Locations

Description. The discovery of stone tools and weapons characteristic of specific cultures and time periods in locations contrary to accepted models of human diffusion around the globe.

Data Evaluation. As in MMS1, the pertinent literature is large. Most of our references come from reputable science journals, but there is a sprinkling of newspaper and web sources. For these reasons we evaluate each anomaly separately. In the list below, the first figures in the ratings are the data evaluations.

Anomaly Evaluation. We find nine potential anomalies in the subject matter of this section. These are listed below. The second figures in the ratings are the anomaly evaluations.

- Stone artifacts in locations suggesting Precolumbian contacts with the New World from northern Asia, China in particular (X1). Ratings: 1/3.
- Large, unexplained concentrations of small, stone mortars in shallow waters off the California coast (X2). Ratings: 1/2.
- Stone tools in deep water on the northwestern North American continental shelf (X3). Ratings: 1/3.
- Solutrean characteristics of some New World stone tools (X4). Ratings: 1/3.
- Precolumbian Polynesian stone tools in the New World (X6). Ratings: 1/2.
- Precolumbian Australian-style stone tools in South America (X7). Ratings: 1/3.
- Precolumbian jade artifacts in the New World (X8). Ratings: 1/4.
- Neolithic jade axes of unknown origin in Western Europe (X9). Ratings: 1/2.
- Stone tools at great depths in the Black Sea (X10). Ratings: 2/2.

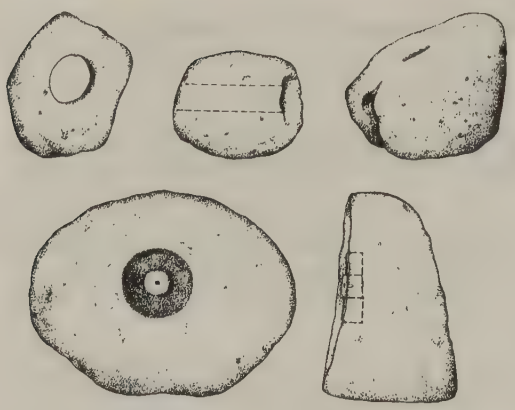
Possible Explanations. The New World received Precolumbian vistors across both the Atlantic and Pacific Oceans.

Similar and Related Phenomena. Many other entries in this volume suggest the unexpectedly early diffusion of cultures around the globe. It is impossible to list them all here. By way of example: stone artifacts of anomalous ages (MMS1); bone artifacts of uncertain affiliation (MMB2).

Entries

X1. Mystery of the California "anchor" stones. Evidence has accumulated suggesting that Chinese and Japanese ships, perhaps off-course or adrift, made contact with the west coast of the Americas long before the Europeans reached the eastern American shores. Native American traditions tell of "houses" seen on the Pacific waters. Chinese history describes a land across the waters to the east called Fu Sang. Even old Spanish documents mentioned oriental ships seen off the Mexican coast in 1576. It was not surprising, then, when in recent years large, holed stones fished out of California waters and resembling old Chinese anchors, caused the media to proclaim that the California coast had been visited thousands of years ago by Chinese ships.

The year was 1980, when L.J. Pierson and J.R. Moriarty, historians at the University of San Diego, published a



Some types of California "anchor" stones recovered in 65 feet of water, a quarter mile off Palos Verdes. (R14)

report describing the 1973 discovery of a large, doughnut-shaped stone under 6,000 feet of water. This stone, about 15 inches in diameter by 5 inches thick, had been dredged up from the Patton Escarpment off the California coast by a U.S. Geological Survey research vessel. The stone looked very much like an Asiatic anchor or perhaps a "messenger stone" used for cleaning debris off anchor lines. A layer of manganese about 3 millimeters thick suggested that this stone had been submerged for about 3,000 years. (R11, R13)

Shortly after this discovery, divers came across twenty or so similar stones in shallow water off Palos Verdes, California. Thus, the media's mystery was born. But were these curious stones really of Chinese origin and were they really all that remained of a 3,000-year-old shipwreck as the newspapers announced?

In 1982, F.J. Frost, an underwater archeologist at the University of California, Santa Barbara, ventured that these odd stones found in the shallows off Palos Verdes were Chinese all right, but dated only from the mid-1800s when Chinese immigrants who had arrived for California's Gold Rush turned to commercial fishing. The Chinese simply transferred Asiatic fishing techniques to the New World. The Palos Verdes stones, in fact, were easily identified as having been fashioned from the local Monterey shale. No manganese coatings indicative of great age were reported. on the Palos Verdes stones. There seemed to be no mystery at all. (R12, R14)

But the mystery didn't go away. By 1987, the total number of suspicious stones, mostly holed, reached 40. They had been pulled out of shallow waters from Point Conception south to the Mexican border. In weight, they varied between 70 pounds and about a ton. The Chinese fishermen theory was strained because their small boats were not likely to have used ton-sized anchors.

Scientist P. Chase stepped in with a new theory. The holed stones had been instead been deployed by Portugese whalers in the mid-1800s when they were preying on the grey whales migrating along the California coast. They had used the stones as anchors for the buoys to which they attached dead whales prior to hauling them up on the beach for processing. (R15)

Regardless of who made and used these shallow-water stones, these objects do not seem particularly anomalous. They are recent albeit of uncertain origin. Left unexplained, however, is that single manganese-coated stone found in deeper waters. It is very old and no one knows who made it and lost it.

X2. Stone mortars retrieved off the southern California coast. It is odd that the hullabaloo of the 1980s over the claims of Chinese anchor stones (X1) offshore of Palos Verdes somehow overlooked the hundreds of more mysterious stone mortars (Indian grinding stones) that had been pulled out of the same waters 30 years earlier. An archeological connection between the two phenomena seems unlikely, but who knows? In truth, the mortars seem more mysterious.

The mortar story began in 1951 when unusual scouring currents removed massive quantities of sediments along the southern California coast. In February of that year, two skin divers were hunting for abalone and lobsters in 9-12 feet of water off Solano Beach. They saw and retrieved a piece of an old Indian mortar. One of the divers, wondering if more artifacts might exist in the area returned and came across an archeological bonanza. He eventually recovered 141 artifacts, mostly small mortars only 6-8 inches across. All had accumulated in a

Hundreds of unusually small (6-8 inches in diameter) stone mortars have been found in clusters in shallow waters off California shores. (R7)

"little bay" in the rock bottom---an area only 15 by 20 feet in extent. Such a localized underwater concentration of Indian artifacts was unheard of. Strong water currents must have concentrated the artifacts in the depression.

In September of the same year, off La Jolla, 15 miles south of Solana Beach, divers came across another concentration of mortars. A.A. Allanson, a field archeologist and expert diver began a systematic search between the shoreline and the steep cliffs of a submarine canyon just a half-mile from the beach. Allanson collected 275 stone artifacts, again mostly small mortars. Other divers from nearby Scripps Institution brought the total up to 600!

The questions are several:

- Why so many small mortars and so few other common Indian artifacts?
- Why were so many localized in just two areas?
- Who had made them?
- Why were no pestals found to go with the unusually small mortars?

In fact, the mortars were too small for grinding the abundant acorns of the region---small seeds perhaps. Some mortars had been well-used; others showed no wear. This latter fact and their small size led to the theory that the mortars may have been made for ritual purposes. (R7)

One suspects that the two concentrations of mortars might have been formed when ancient floods (tsunamis?) washed shoreline settlements out to sea. If so, where were the other types of common Indian artifacts?

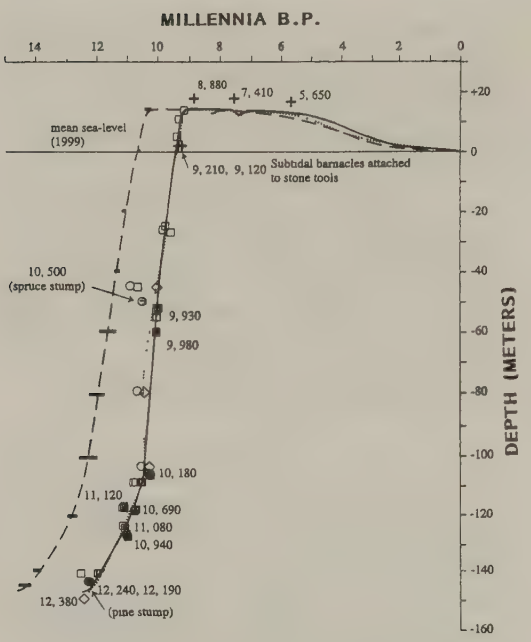
In mulling over these conundrums, it may be pertinent that the underwater concentrations of mortars were found not far from a major submarine canyon, which is a product of strong currents, and that a somehat analogous concentration of mortars is present in the massive flood deposits of auriferous gravels in the California Sierras to the east.

X3. Stone Tools in Deep Water off British Columbia. The modern shore of British Columbia is steep and rugged---hardly a thoroughfare for immigrants from Asia travelling by foot or boat. However, 10,000-12,000 years ago the geographical situation was radically different according to recent sonar imaging and bottom-sampling.

One of these surveys was conducted offshore of Queen Charlotte Island, Canada. The surveyors discovered extensive post-glacial landscapes suitable for human use but now covered by 150 meters (500 feet) of ocean. These lands were exposed and verdant 10,000-12,000 years ago.

> In situ tree stumps and shellfish-rich paleobeaches are present on these drowned landscapes. A stone tool [a knife] encrusted with barnacles and bryozoa were recovered from a drowned delta flood plain now 53 m below mean sea level. This is the first tangible evidence that the subaerial broad banks of the western North American Continental Shelf may have been occupied by humans in earliest Holocene and possibly late glacial time. (R30)

A map in the referenced report reveals that some 12,000 years ago broad stretches of land several hundred kilometers wide bordered Canada, Alaska, and Russia. Not only could this exposed land have encouraged entry into the New World by land (as long-theorized), but also by boat given the encouragement of numerous bays and natural harbors and the attendant good fishing.



Sea-level curves for the British Columbia coast versus time. (Left) dashed curve in calendar years. (Right) Solid curves indicating radiocarbon measurements. A stone knife was recovered from a depth of 53 meters. (R30)

(R25, R26)

Also, this universal 500-foot drop in sea level provides us with ample opportunity to speculate for a moment not only about fabled Atlantis and other drowned cities around the planet but also about early maritime cultures now lost in time. (This latter vision is consistent with C.P. Hapgood's Maps of the Ancient Sea Kings.)

One can imagine that, 12,000 years ago, there were vast plains abutting the steep, exposed edges of today's continents, and that they were fringed with great waterfalls hundreds of feet high as the continents' swollen rivers scoured out the great submarine canyons drawn on modern bathymetric maps. There are no reliable reconstructions of this segment of human history when the continents were much wider and human cultures worldwide were recovering from the Ice Ages.

As the recovery of that stone knife off the British Columbia coast proves, humans were utilizing those lands that are now drowned. Where these humans then occupying the New World came from originally is still being argued.

X4. Solutrean characteristics of New-World stone tools. For decades it has been axiomatic that the first Americans were Asians who had migrated by land south through Alaska, or perhaps by boat along the then-exposed coastal plains described in X3. But, at least a century ago, a few anthropologists had surmised that there may have been a European influence in the early peopling of the New World. This can be seen in this quotation from an article in the 1935 annual report of the Smithsonian Institution.

> ...taking into consideration all the facts set forth, the only conclusion that now seems warranted is that man did not reach the American continent until some time after, but probably incidental to, the general disruption caused by the last ice retreat, and that he came as the bearer of the partially developed Neolithic culture, somewhere between 5,000 and 10,000 years ago. If, on paleontological grounds, more time than this must be granted, then---in keeping with the suggestion made in Natural History in 1919---the most that the archeologist can concede at present is that possibly we have in America very faint traces of the Solutrean culture stage, of which the Folsom, N. Mex., discovery may be an example. (R5)

Above, we see much earlier human entry dates than now accepted plus the suggestion that the European Solutrean culture may have influenced the North American Folsom culture. In this book, written as the 21st. Century begins, most mainstream archeologists no longer automatically reject North American human-entry dates of a millennium or two beyond the Clovis Limit of circa 12,000 B.P. There is even speculation about a tenuous Solutrean connection with the Clovis culture, which hadn't was not considered in 1935 when the above quotation was penned.

The Solutreans were a dominant force in Iberia (Spain and Portugal) and the

corner of southwestern France in the period 20,500-18,500 B.P. (R27) These Europeans obviously preceded the Clovis Limit of 12,000 B.P. by thousands of years. However, the Clovis Limit is crumbling, and some anthropologists think the Solutreans might yet fit somehow into the history of the New World.

Actually, back in the 1930s and 1940s, F. Hibben had suggested that stone points found in Sandia Cave, New Mexico, did look a bit like those made by the Solutreans 20,000 years ago. (R20) Hibben's surmise remained just that. The temporal gap between the two groups of artifacts was just too great.

In the 1990s, though, D. Stanford of the Smithsonian Institution made the same point, except he specifically compared Solutrean points with Clovis points. Both cultures, he maintained, apparently used the same flaking technique and had the same habit of burying caches of partially worked points and covering them with red ocher. It is also relevant that while Clovis points have been collected in all of the lower 48 states, the points found in Alaska, the supposed route of Asian immigrants, do not resemble Clovis points at all.

By 2001, Stanford had found the Clovis-Solutrean connection even more impressive, especially in flint-knapping technique. Both the Solutrean and Clovis knappers seem to have perfected the "overshot" or "outre passe" method of manufacturing arrowheads. According to Stanford, only these two cultures really mastered this complex and sophisticated technique. Stanford insists:

> There is very little in Clovis---in fact, nothing---that is not found in Solutrean technology. (R34)

These facts, combined with the general collapse of the Clovis Limit, have opened the door to a reconsideration of early New World contacts by the Solutreans (or perhaps other Europeans). Some anthropologists also see some European characteristics in very early New World skeletons, such as that of Kennewick Man. Perhaps weighing more heavily is the discovery that some Native Americans carry a genetic marker called "haplotype X," which is of European rather than Asian vintage. (R20)

Following Stanford's thoughts, the "Solutrean Hypothesis" has these Iberian people taking the northern route across the Atlantic (like the much later Vikings), skirting the retreating ice sheets in skin boats, and ending up somewhere on the eastern American coast about 18,000 B.P. From these landfalls, they spread inland and even as far south as South America. (R22)

Many anthropologists and archeologists raise serious objections to the Solutrean Hypothesis.

- The similarity of the Clovis and Solutrean points is superficial. The differences are many. (R27)

- The date of 18,000 B.P. is 5,000 years earlier before any sign of the Clovis culture in the New World.

- The Solutreans had an extensive, sophisticated tool kit. None of these many other Solutrean stone tools has been found in the New World.

- The Solutreans were not a marine culture. It is hard to conceive of them building seaworthy boats and having the necessary navigation skills for a 5,000-mile ocean voyage.

- There are as yet no signs of any Solutrean settlements in the New World. (R20, R22, R27)

The above objections are weighty. Perhaps haplotype-X was brought to the America by another European culture at a later time.

X5. Unexpectedly early long-distance travel in the South Pacific. By the early 1970s, archeologists recognized that the peoples of the South Pacific had made epic sea voyages at least 3,000 years ago. This was apparent in the far-flung presence of a distinctive type of pottery called "Lapita ware," which has been found all the way from New Britain to Tonga---a distance of about 4,000 kilometers. It is well-accepted that at least as early as the First Century B.C., seaworthy vessels and sharp navigational skills were in use in the South Seas. (R10)

By the 1990s, though, the maritime accomplishments of the inhabitants of the South Pacific were shown to be even older and more ambitious than believed

earlier. In 1996, for example, S. Chia and R. Tycot demonstrated that a trade corridor had been plied regularly between Borneo and New Britain (3,500 kilometers apart) as early as 4,000 B.C., as evidenced by the distribution of obsidian artifacts that could be traced to specific islands. (R18)

Thus, the date of long-range voyaging in the South Pacific was pushed back from the First Century B.C. to about 4,000 B.C. Much of this seafaring occurred far from land and required acute navigational skills.

When European adventurers finally reached the South Pacific a mere 300 years ago, they found that the Polynesians had colonized an immense triangle with corners at Hawaii, Easter Island, and New Zealand. However, by then, the days of the epic voyages had long passed, and Polynesian culture had diverged due to lack of contact among the isolated islands. The great canoe trips are now only myths from the past.

Nevertheless, archeologists can demonstrate that a thousand years or so ago, the islands of Polynesia were not isolated and that two-way commerce existed. Again, the distribution of stone tools constituted the primary evidence, for chemical analysis could identify the islands where obsidian and basalt had been mined and which islands had received these materials. (R18, R19)

What is clear from this quick sketch of Polynesian history---as revealed in part by the stone artifacts---is that in the distant past these intrepid voyagers apparently had the sailing skills nescessary to reach the New World. That they may have done this is the subject of X6.

X6. Precolumbian Polynesian tools in the New World. The highly favored route for the first human entries into the New World took a northern path from Asia to North America across land exposed by lower sea levels during the Ice Ages. But a southern, island-hopping route across the Pacific would not have been out of the question given good vessels and navigational know-how. The early Polynesians were good candidates for this trans-Pacific adventure. In fact, some stone artifacts found in both North and South America hint that the Polynesians actually did make Precolumbian contacts up and down the Americas.

Stone tapa mallets. Tapa is a sort of cloth made from bark. Paper, too, can be manufactured from tree bark using tapa mallets. The process is an ancient one well-known in Asia and Oceania. To make bark paper, one first takes the inner layer of bark, or bast, from a tree. The material is then thinned, widened, and made flexible by soaking it in water and beating it with a grooved mallet. The final product retains much of the bark's structure with its interconnecting fibers. Ordinary paper today is also made of wood fibers, but a pulping process is used.

The manufacture of bark paper requires specialized grooved beaters, specimens of which have been found in both Mesoamerica and Southeast Asia. Were bark paper and the tools required to make it invented independently on both sides of the Pacific, or were they

Stone tapa beaters like these were employed widely in Asia, Oceania, Mesoamerica, and South America.

transported across the Pacific by early navigators? If the latter, the flow was probably from Asia to America because the paper-making tools first appeared in Southeast Asia 4-5,000 years ago. They showed up in Mesoamerica only 2,500 years ago.

This implication that trans-Pacific voyages took place 2,500 years ago is definitely not part of acceptable archeology. (R3)

Anthropologist P. Tolstoy, swimming against the scientific mainstream, has surveyed the manufacturing technology of both bark paper and ordinary paper on a worldwide basis. He has identified some 300 variable features in the process, 140 uses of the final products, and 100 specific details of the bark beaters, which were often made of stone. Tolstoy concluded:

> All this points to the direct transfer of technology from Southeast Asia to Mesoamerica, apparently by a sea voyage that took place about 2500 years ago. (R16)

Tolstoy rejects the tapa (bark cloth) of Polynesia as a credible link between Southeast Asian and Mesoamerican bark-paper making. Instead, the technology transfer was not island-to-island but direct! Invoking Kon Tiki and the prevailing currents and winds, he postulates a 2,500-year-old voyage swinging north of Hawaii along an islandless route to Mesoamerica. Obviously, this is a much more challenging route than island-hopping.

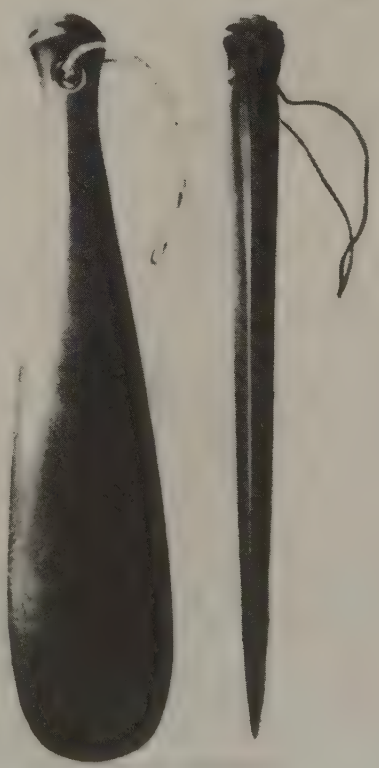
G.R. Kearsley, however, sees the tapa beaters as indicators of a broader advance of Asian influences across Melanesia and Polynesia and thence to the New World. He wrote:

> Barkbeaters are known for their use in producing cloth from tree bark from Asia through Melanesia, Polynesia into Mesoamerica and the Pacific Coast of South America. This follows the central Pacific ocean currents as migration highways for the distribution of cultural advances from Asia into the Pacific Ocean and beyond, and the techniques are so closely similar that they could only have been initiated from a common source. (R35)

Polynesian stone weapons. Rarely does one find mention in the literature that many typical Polynesian stone weapons have been found in North American Indian mounds and at South American sites as well. In 1930, J. Imbelloni surveyed such New World finds of the so-called "mere" family of Polynesian weapons. There also exist in the New World ceremonial stone axes (celts) and other Polynesian-made artifacts that are outside the purview of Imbelloni's article. In addition, it is probable that more "mere"-family weapons have been discovered in anomalous places since 1930.

Selected paragraphs from Imbelloni's survey follow:

> To North America belong the following specimens: five standard patu onewa [a type of weapon] made of green and brown stone; two bodies of patu which very probably were of the onewa type; one argillite patu with a two-headed handle, similar to the Chatham specimens; three specimens of the miti model; and several patu



A Polynesian onewa (a type of stone weapon) discovered in California. (R4)

paraoa, shaped according to the pattern of New Zealand.

To South America belong the following specimens: four patu onewa and two okewa.

The discoveries are located all along the Pacific Ocean zone in the northern continent, as well as in the southern.

.....

Thus, the facts are connected by a natural logic that links them and throws light upon them all; and I am quite ready with profound admiration for those ethnologists who, with the preconceived idea of denying the miration of cultures from the Pacific, will be obliged to display much ingenuity in refuting, or cloaking with smoky clouds, the simple nature of the facts I have stated. (R4)

While we have focussed upon Polynesian contacts with the New World, it should be added that, although Australia is much closer to Polynesia, it is widely asserted that the Polynesians never made landfall on that continent. Nevertheless, In 1929, W.W. Thorpe announced that undoubted Polynesian adzes had been discovered at Dark Point, New South Wales, and on Norfolk Island which lies off the east coast of Australia. (R33)

X7. Australian-style stone tools in South America.

Brazil. Some human skulls and stone tools at the Serra da Capivara archeological site in northeastern Brazil have features that closely resemble those existing in contemporary Australia and Melanesia 60,000 years ago. The claim is that people from the South Pacific reached Brazil circa 50,000 B.P. The archeological record, though, suggests that these people were exteriminated by a later influx of Mongoloid invaders. (R21)

The foregoing revelations appeared in a BBC TV documentary and were posted on the web. Given the extremely early 50,000-B.P. time line, caution is advised here.

Argentina. Scrapers and other simple stone artifacts from Los Toldos Cave in Patagonia are suspiciously like late-Pleistocene tools from Australia. The Patagonian tools have been dated at 12,000 B.P. Human fossils and rock art at the site also possess Australian affinities. (R29) Here, the time line is easier to admit to discussion.

X8. Precolumbian jade artifacts in the New World. A little more than a century ago, archeologists were faced with the discovery of numerous jade artifacts from Central America and, to a lesser extent, all along the Pacific Coast from Alaska to southern Peru. New-World jade sources were virtually unknown is those days. It seemed reasonable to look to China, where jade carving was an ancient art, as the source of the New World jade. But of course Precolumbian Chinese contacts were unacceptable to the archeologists. There was, therefore a "jade dilemma." (R1) Over time, this century-old enigma has been largely eroded away by new finds of jade deposits.

The name "jade" is applied correctly to two different minerals: jadite and nephrite. Some other look-alike minerals also exist: idocrase is "California jade"; dyed calcite is "Mexican jade." Of course, experts are not fooled.

Of the two true jades, jadite is the rarest and most cherished. Thought of as green, it actually comes in white, orange, reddish violet, and other colors. The most important source of jadite is Burma, which is probably where most of the old "Chinese" jade came from. Small deposits also exist in Mexico and California. Until 1998, Guatemala also supplied jade in small quantities. But, in that year, a fierce storm lashed Central America precipitating floods and landslides. Afterwards, prospectors were surprised to find that rocky debris containing jadite had been carried down some of Guatemala's rivers by the deluge. The prospectors followed the trail upstream into the mountains and discovered what must have been the Mayan's mother lode of jadite. This immense deposit of jadite had obviously been mined for centuries. Thus, the old mystery of the source of most Mayan jadite was solved. (R31)

In contrast to jadite, nephrite is rather common. It is mined in New Zea-

land, Russia, Alaska, and several U.S. western states.

With the above facts available, we can understand that Precolumbian jade ornaments in the New World are not necessarily from China or Polynesia, although a few might be. There is enough jadite and nephrite available in the Americas to account for what the archeologists have discovered. However, there is always the possibility that chemical analysis will some day prove that some New World jade artifacts must have come across the Pacific in Precolumbian times.

Two interesting occurrences of jade in Central America encourage the diffusionists. The first is observation that some jade artifacts were cut from large, well-made jade celts (ax heads). One wonders who did this and why. It is relevant that celts were popular weapons in ancient Polynesia, where some jade deposits were available. (R1)

The second puzzle is implicit in the following quotation from a 1937 issue of Science.

> A 200-pound boulder of jade has been unearthed ruins of a Mayan pyramid near Guatemala City by an expedition of the Carnegie Institution of Washington. Dr. A.V. Kidder remarks:" We were astounded, for no piece of jade even remotely approaching this size has ever been found in America before." The rough ball of jade bears scars where Mayan Indian workers had cut out slices of clear green stone for use in jewelry or ceremonial objects. Why the Indians then buried their treasure at the very center of a pyramid stair is a mystery. The whole boulder was of good quality and might have represented a vast value. Modern investigators have searched without success for the natural source where American Indians got their much-treasured jade in Mexico or Central America. The American jade is similar to Oriental jade in appearance, but differs in chemical structure, and in range of coloring. (R6)

The recent finding of vast, ancient jadite mines in the Guatemalan mountains, as mentioned above, suggests the source of the mysterious jadite boulder.

X9. British Neolithic jade axes from an unknown source. Over the years, British archeologists have collected some 60 highly finished, neolithic jade hand axes (celts). The same artifacts are also found widely in Western Europe. The jadite composing these axes is of high quality. Such stone does not seem to exist in Europe, although there are nephrite sources. The probable origin of the British jadite, then, would have to be Asia or Mesoamerica. The former implies at the very least long-distance Neolithic communication and trade links across Eurasia. Neolithic voyages to Mesoamerica are of course less likely. (R8)

Referring back to X8, where similar, finely worked jade celts were unaccountably carved up for ornaments by the Mayas, one wonders if there might be a connection between the British and Mayan jadite celts, despite the obvious time difference.

X10. Stone Implements Found at Great Depths in the Black Sea. A controversial theory involving, perhaps, the Biblical Flood, is supported by the discovery of stone tools, ceramic fragments, and the remains of a wooden structure under the Black Sea. The site was first located with sonar and then explored in detail by underwater cameras. Said artifacts lie at a depth of 91 meters (300 feet).

One relevant theory asserts that about 7,500 B.P. the rising waters of the Mediterranean breached the Bosporus Strait and cascaded into the Black Sea, which was then hundreds of feet lower. The immense discharge of Mediterranean water quickly raised Black Sea levels, driving panicked settlers around the Sea to higher ground. Such an event could have led to the tale of Noah's Flood. (R23)

The ruptured-silt-plug theory has been essentially reversed by A. Aksu, at the University of Newfoundland, who asserts that 10,000 years ago melting glaciers in northern Europe raised the level of the Black Sea to such heights that it poured through the Bosporus into the Mediterranean. (R32)

Obviously, we need more field work in this area of the planet.

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MMS4 Pigmy Flints and Other Microliths

Description. Exceedingly small objects knapped from flint, chert, and other suitable stone. Dimensions are often less than 0.1 inch. Microlith shapes vary widely, some resembling useful objects, such as scrapers, but others of seemingly no practical design. Distribution is virtually worldwide. Ages range between 70,000 and 3,000 years.

Data Evaluation. "Pigmy flints," as they were termed in the 1800s, were the subject of considerable puzzlement to early archeologists. Consequently, many detailed reports are found in the older science literature. One rarely encounters microliths in today's journals. Rating: 1.

Anomaly Evaluation. Two salient anomalies are associated with the microliths.

- Many microliths are so tiny that one wonders how people of normal size and eyesight could manufacture them in such exquisite detail.

- While some of the larger microliths, say, ½-inch in their largest dimension, may have had a useful purpose, most were nonutilitarian. In short, we do not really know why they were made.

Overall rating: 1.

Possible Explanations. Microliths may have represented an art form and valued for their minuteness and skilled workmanship. Given this sort of aesthetic value, microliths might have also had ritual purposes.

Similar and Related Phenomena. Ancient humans also carved miniature sculptures from stone (MGP in another Series-M volume), engraved miniature texts and icons (MGW in another Series-M volume), and even constructed very tiny buildings (MSB2 in Ancient Structures); caches of stone objects (MMS2, MMS5-X3).

Entries

X1. General observations on microliths. In this section we deal with a species of stone artifact that has been excavated virtually worldwide but is nevertheless usually isolated from "normal-size" artifacts and dig sites. We speak of the so-called "pigmy flints" or "microliths." Very tiny, as their names suggest, it is difficult to imagine practical purposes for most of them. Yet, they display exquisite workmanship and, when they do occur, they often number in the hundreds and are frequently located in spots difficult of access. Despite their beauty and unusual sizes, they are rarely disussed in the pages of today's premiere archeological publications. Fortunately, writers a century ago were not reluctant to effuse over the pigmy flints, and we have abundant descriptions and speculations.

Sizes. Since size is the key feature of this species of artifact, we present a some statistics from four "finds."

- Less than ¼ inch to ½ inch. Mixed shapes. No arrowheads. (R26)
- 0.06 inch to 1 inch. All were tiny arrowheads. (R8)
- 0.1 to 2 centimeters. Mixed. (R24)
- 64 circular "scrapers" weighed less than ½ ounce. (R4)

A tenth of a centimeter is about the size of a sesame seed. Even so, most microliths exhibit the finest workmanship. Given their small sizes, one wonders how they were held and shaped during the finishing phase. One needs a magnifier to appreciate the more delicate of them.

The materials used most often include flint, chert, jasper, quartz, and obsidian.

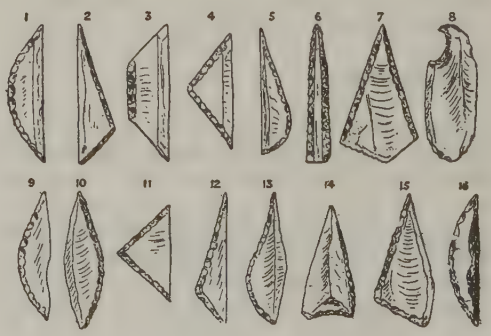
Quality of workmanship. In comparing pigmy flints to ordinary flints, R.A. Gatty first reminded us that flint knapping involves the application of pressure to the object being shaped.

> A hard body is pressed against the side [of the flint] which it is intended to sharpen, and fragments of it fly off leaving a scar behind in the form of a slight indentation. This is readily observed on a flint some inches in length, but when you get down to very minute sizes, to little well-formed flints less than a quarter of an inch, you need a magnifying glass to discover the workmanship. What hands, what eyes, these pre-historic flint-flakers must have had to frame such delicate tools! I often look in amazement at a drawer of these pigmy flints. Perhaps sixty or seventy knives and borers will make one row, and when seen together, row after row, you realize that these flints were fabricated with a design and purpose, and whoever the people were who made them, dwarfs or fairies, they certainly were handicraftsmen of no mean order. (R2)

Shapes. Actually, arrowheads are quite rare in collections of microliths. Perhaps most common is a crescent-shape of uncertain practical value. (See figures.) Indeed, most of the other shapes also strain one's imagination in searching for a practical application.

India had a large and widespread microlith industry in prehistory. D.H. Gordon made these observations regarding.

> The Central Indian industry displays a wide range of types including crescents, triangles, trapezes [trapezoids] (very rare), crescentic blades, straight blades (pointed and unpointed), disc-scrapers and end-scrapers, worked points, borers, and cores. (R14)



Microliths (actual size) from India. (R1)

Note that Gordon counted only one true arrowhead in the Indian microlith collections. He also concluded that it was unlikely that all the assemblages of microliths he inspected were contemporaneous although they were all apparently of pre-pottery age. (R13)

Gordon's list above includes descriptor that imply certain practical uses for some of the microliths. Actually, to be truly useful to a human of normal size, said scrapers and borers would have had to be much larger for the user to get a grip upon them.

Distribution of microliths. The geographical distribution of pigmy flints and microliths is not quite worldwide. We find no reports from South America or Siberia but they are found just about everywhere else: Western Europe, Africa, China, India, Egypt, Arabia, even Greenland. In North America, the major microlith finds have been in Alaska and at the Poverty Point site in Louisiana.

Microliths (see scale) from the Dee Valley, Scotland. (R9)

Age. The microlith industry of Western Europe, according to several old reports, is termed Neolithic, which makes them perhaps 5,000+ years old. Since the pigmy flints are rarely accompanied by well-dated artifacts or human remains, their ages are often uncertain.

Some more precise dates come from Africa: 70,000 B.P. for the Lake Turkana area in western Africa, and 18,000 B.P. for Zambia. In North America, Poverty Point is supposed to be about 3,000 years old, and the microliths found there the same. The large assemblages of microliths uncovered in Alaska (1,500 in one find) are pre-Eskimo, which means at least several thousand years. (The Eskimos have a legend that ancient dwarfs preceded them in Alaska!)

The great age range of the microliths exceeds that of any culture we know of. In this light, microliths might be an expression of a common human art form ---unless someone can prove practical purposes for them.

Microlith isolation. Microliths are notably absent from accumulations of normal-size artifacts. Nor are human or animal bones associated with them. Microliths seem to occur in splendid isolation---often by the hundreds---in caves and in buried caches. Without associated artifacts, the lack of cultural references, and the great time span---70,000 to a few thousand years, it is impossible, as suggested above, to assign the microliths to any single culture.

Who made the microliths? The tiny tools at Poverty Point represent an exception to our general ignorance about the microlith makers. The Poverty Point people were of normal stature. The rest of the microliths from Britain to Australia, presented anthropologists with an enigma. In some early scientific papers, the writers were not afraid to suggest that "miniature people" had manufactured them. In support of this idea, there are myths and legends about "little people" in many parts of the world. There is, however, little hard evidence to back them up. The extant African pigmies and Negritos of Asia are not sufficiently "miniature" to find practical uses for most of the microliths. The best answer is that the microliths were made by exceptionally dexterous and keen-sighted normal people from many cultures, over a period of tens of thousands of years, for some non-utilitarian objective.

It is pertinent that humans of normal stature have frequently made (and still

make) miniature versions of macroscopic objects. For example, the Pomo Indians of the American Southwest are known for their miniature baskets. (R8) More to the point, miniature stone sculptures of human heads, rings, cogged wheels, and yokes are rather common in Mesoamerica. (R22) Occasionally, one even sees miniature buildings in some Maya cities. (MSB2 in Ancient Structures)

Proposed Uses for Microliths. Back in 1888, J.A. Brown expressed a common sentiment about the pigmy flints that had been turning up all over Western Europe.

> It is not easy to determine the purpose for which the small crescents, trapezoids, scalene triangular, the similar form rounded at one end, and the long thin, delicate knifelets, &c., all which are beautifully worked with minute secondary chipping, were made. (R1)

Microliths from Australia. (R11)

In a 1935 number of Nature, an anonymous writer concurred with Brown, asserting that: "Their purpose is beyond conjecture." (R12)

Nevertheless, many practical suggestions are to be found in the literature: borers, gravers, tattooing instruments, scarifiers, fish-hooks, ritual displays, and incorporation in composite weapons and tools, such as harpoon barbs, saw teeth, and clubs. Generally, though, the microliths display little evidence of any utilitarian use at all or of once being fixed to a saw or club.

One possible explanation of universal scope lies in the worldwide human appreciation of miniature objects, especially if they are also beautiful and represent great investments of skill and time. Perhaps, the often-exquisite microliths served the purpose of today's gems---something basically useless in the practical sense but attractive and valuable for their superb artisanship.

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MMS5 Nonutilitarian and Totally Enigmatic Stone Artifacts

Description. Stone spheres, rings, and discs, especially the latter, are common at many archeological sites. More perplexing are very tiny stone artifacts (microliths, MMS4) and, at the other end of the size scale, giant flints; all of which are of sizes unsuited to practical use. Often these malproportioned stones are discovered in caches containing tens, even hundreds, of the objects. (MMS2) Then, there are stone yokes and collars plus a remarkably extensive array of artificial stone objects of such strange shapes that even trying to give them names is fruitless.

Data Evaluation. Scores of reliable reports of these many perplexing stone artifacts have been gleaned from the science literature of the past 200 years. Rating: 1.

Anomaly Evaluation. When searching for explanations of items in our diverse collection of ancient stone oddities, it is convenient and professionally conventional to simply pass them off as "ceremonial" or "artwork." If this is all they are (of course, we cannot be sure of this), they are simply curiosities. Rating: 3.

Possible Explanations. See our above admission of impotence in the matter of explantion of artifact purpose or use here.

Similar and Related Phenomena. Costa Rican stone spheres (MSO1 in Ancient Infrastructure; miniature Mesoamerican buildings (MSB2 in Ancient Structures) and sculptures (MGP in another volume).

Entries

X0. Introduction. Ancient and not-so-ancient humans have manufactured a wide spectrum of perplexing objects from stone. The variety is endless as are the profferred explanations as to use. Many were probably not utilitarian at all but rather either purely symbolic or the expressions of primitive artists. It is futile to call these hard-to-classify objects anomalous; they nust remain merely curious and interesting to us who are removed from their milieu by centuries or several millennia.

It goes without saying that we have amassed only a small sample of these lithic enigmas, but we have nonetheless been fascinated by what we have found and wish to display what we have collected so far.

Any rigorous classification is impossible. We have filed some according to their basic geometries (X1-X6) and place the rest in a catch-all entry (X7).

X1. Stone spheres. Geometrically accurate spheres are difficult to fashion from obdurate stone. Besides being a manufacturing challenge to prehistoric man, what practical purposes would precision stone spheres have? Besides, roughly spherical stones of various sizes can be picked up in quantity along many river edges and seashores. This is probably why we find that only a few ancient cultures that took the time and effort to make high-precision artificial stone spheres. And we must wonder how and why they made the effort, which was often far from negligible.

Costa Rica. The most renowned human-made stone spheres of antquity are those of southwestern Costa Rica. There one finds hundreds of superbly crafted spheres laboriously carved from tough granite. They measure from 1 to 8 feet in diameter. Many were discovered accidently and exhumed during the 1930s when banana plantations were being prepared. The purpose of these geometrical stone masterpieces is unknown. For an extensive treatment of this major archeological enigma, see MSO2 in Ancient Infrastructure.

Malta. The remarkable stone temples on the Maltese islands are roughly 3,500 years old. Besides the many other Maltese archeological enigmas, a hundred or so stone spheres of varying diameter have been found in one of the temple chambers at Tarxien. Additional spheres appear in one of the temple courtyards. Purpose(s) unknown. (See also MSB7 in Ancient Structures)

North Dakota. In 1998, a road crew came across a near-perfect stone sphere in a gravel pit in Wells County, North Dakota. The sphere is sandstone and about 2 feet in diameter. It is so precisely formed that it seems artificial. But Nature can be a good craftswoman, so we suspect she may have been at work here for there is no evidence of other human activity. (See also: MSO2-X5 in Ancient Infrastructure)

New Zealand. In the exploration of the Pelorus Sound region of New Zealand, the natives were found to worship natural, symmetrical, egg-shaped stones. These hold no interest for the anomalist, but in the same area are found stone spheres as large as 26 inches in circumference. These may be artificial. About these, J. Rutland wrote in 1903:

> These stones have the appearance of waterworm boulders, but how such a number of boulders so nearly alike were obtained it is difficult to conceive. I have repeatedly questioned both Maoris and Europeans, but have not been able to obtain any satisfactory explanation of these curious relics. (R19)

Zimbabwe. The Mumbwa Caves of northern Zimbabwe have yielded many Stone Age artifacts. Among these are a number of stone balls. (R33) No additional information given in the reference.

Some rough stone spheres may only be the byproducts of ancient implement factories.

> Battered quartz and limestone spheres, each about the size of a tennis ball, litter Stone Age archaeological sites dating from about 1.8 million to 40,000 years ago. For more than a century, investigators have granted that the stones served as a major

class of prehistoric tools and assigned them all sorts of speculative titles, including bone smashers, club heads, plant grinders, and bolas, which some hunters still tie to thongs and throw to trip up and bring down game. (R54)

These spheres are unequivocally the product of human effort. A recent theory holds that they are merely incidental to the manufacture of stone flakes; that is, the more workers chip off flakes from a chunk of rough quartz, the more rounded it becomes.

Natural stone spheres. It is pertinent to mention here some of Nature's spherical stones, some of which have been claimed to be artificial.

•Spherical concretions, such as coal balls, roof balls, and sandstone spheres. The latter are found in sand quarries and may be 30 inches in diameter and surprisingly uniform. (See ESA3 in Neglected Geological Anomalies.)

•The famous spherical boulders at Moeraki Beach, New Zealand. These are actually clay concretions. (See ESM1-X7 in Neglected Geological Anomalies.)

•Spheroids in the ash of volcanic calderas.

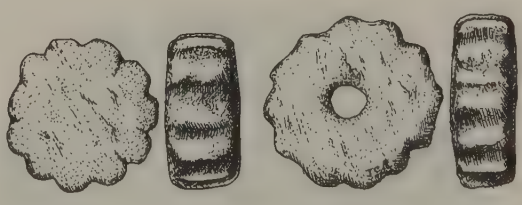
•Rolled and tumbled stone spheres in glacial debris, i.e., the so-called "drift," and along fast-running rivers and storm-tossed shores.

In general, we have to say that only a very few ancient cultures bothered to manufacture precision stone spheres. The Costa Rican spheres are the main exceptions. Nature's spheres usually sufficed for sling ammunition and other primitive applications.

X2. Cogged stones and notched discs. Plain stone discs (discoidal stones) are rather common at North American archeological sites. (See X4 below.) Cogged and notched disks, however, are quite rare and considerably more perplexing.

Cogged Stones of Southern California. These cogged stones are stone disks roughly 2-6 inches in diameter and 1-2½ inches thick. The cogs around the edges vary in number from 3 to 22. The distribution is very limited, as described in the following abstract of a 1961 paper in American Antiquity by H. Eberhart.

> Cogged stones are one of the few classes of artifacts which are limited in occurrence to the "middle" period of southern California's prehistory. They are stone discs 6½ inches or less in diameter, characterized by grooves or indentations in the edge. On the basis of the nature of the latter and of the presence or absence of perforation they are described in four types. Some of the variations may have historical significance, but this cannot be proven with the data at hand. Few specimens have been excavated under controlled conditions. The distribution is virtually limited to the coastal drainage south of Ventura County and appears to center along the Santa Ana River Valley. According to the interpretation of coastal chronology employed, cogged stones were made during the period 6000-3500 B.C. Their use is unknown, but the absence of any pattern of wear and the conjunctions of certain of the specimens suggest that they served some vital function. (R38)



Two cogged stones from California. (R38)

The southern California cogged stones may be related in some way to the much more numerous discoidal stones covered in X4, which were employed mainly in various games and, therefore, had no "vital" function.

Chile. Chilean archeologists have come across cogged stones in the Province of Coquimbo, where they are rather common

along the coast. Called "geometrical stones" by the Chilean workers, they bear a startling resemblance to those of southern California, except that some are triangular and hexagonal rather than circular. They seem to be about the same age as those farther north and might represent an example of ancient north-south diffusion along the coast. As in the case of the California cogged stones, those in Chile seem to have had no discernible purpose. (R39)

Southeastern United States. The notched and scalloped disks of the U.S. southeast are of the same size and general geometry as the Californian and Chilean cogged stones; that is, they are discoidal with indentations around their peripheries. These artifacts are characteristic of the Moundbuilder culture circa 1,200-1,600 A.D. Scalloped tablets were also made during this period. (R58)

Obviously, several millennia separate the California cogged stones from the notched and scalloped artifacts of the Moundbuilders. Both sets of artifacts, though, are enigmatic. One clue to the purpose of the Moundbuilders' circular artifacts may be found in their association with the priest-chieftain class. In other words, they may have been of symbolic value---perhaps badges of rank--- rather than objects used in games.

A notched disk from the Mississippi Valley. Width: 10 cm. (R44)

X3. Giant flints. Some flints manufactured by the Native Americans had no obvious practical purpose. The so-called "eccentric flints" of weird and fanciful design are also in this "impracical" class, but taxonomically we consider them to be an art form and catalog them in MGP in another volume. Here, we attend to the several caches of giant flints that have been discovered down the years. Although they usually resemble useful tools and weapons, they are much too large for practical applizations, just as the microliths (MMS4) were too small to be of any every-day use.

> One of the greatest archaeological puzzles in out country is the large flaked flints, usually called leaf-shaped implements. They are from 4 to 9 inches in length, 3 to 5 wide, and about half an inch thick, round at the base, and very obtusely pointed at the opposite extremity, the apex being slightly to one side. They show no signs of use whatever, and are found in masses from a few to many hundreds. Mr. Thomas Rhodes, of Akron, Ohio, has lately discovered a cache of these objects about three miles west of that town, under an old tamarack stump, about two feet below the surface, in peat or muck. There were 197 in the nest. The largest is 8½ inches long by 3½ wide; the smallest is about 2½ inches long. (R12)

The caches of giant stone flints are analogous to the caches mentioned in MMS2 and MMS4. Only the size and nature of the artifacts are different. One notes immediately that the contents of buried caches are usually stone objects of little if any practical use. In fact, many cached stone objects show no wear whatsoever.

We should add here that virtually all human cultures manufacture "impractical" objects, such as all those modern "collectibles" advertised in the newspapers and magazines. Sometimes these are assembled in large numbers, such as Barbie-doll and baseball-card collections. However, they are not buried these days!

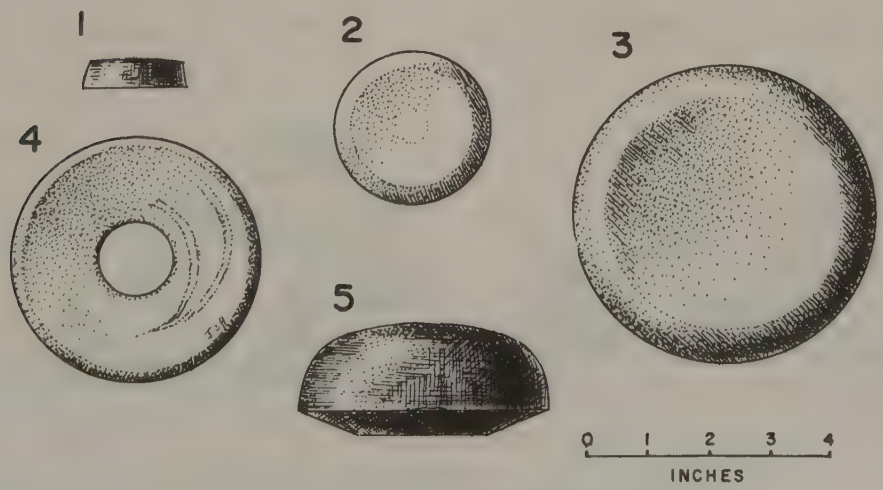
X4. Discoidal stones. East of the Rocky Mountains, discoidal stones attracted the attention of the early settlers. They were common about the long-deserted Indian villages and the great earthen edifices of the Moundbuilders. Notice of these peculiar stones attracted scientific attention as early as 1846 in the American Journal of Science, the country's first major science journal. There, S.G. Morton wrote as follows:

> I shall close this communication by a notice of certain discoidal stones occasionally found in the mounds of the United States. Of these relics I possess sixteen, of which all but two were found by my friend Dr. Wm. Blanding, during his long residence in Camden, South Carolina. These disks were accompanied, as usual, by earthen vessels, pipes of baked clay, arrow-heads and other articles... The discoidal stones, adds Dr. Blanding were found at the foot of different mounds, not in them. They seemed to be left, where they were no doubt used, on the playgrounds.
>
> The disks are from an inch and a half to six inches in diameter...These disks are made of the hardest stones, and wrought with admirable symmetry and polish, surpassing any thing we could readily conceive of in the humbler arts of the present Indian tribes; and the question arises, whether they are not the works of their seemingly extinct progenitors?
>
> .....
>
> What was the use of the disks in question? Those who have examined the series in my possession have offered various explanations, but the only one that seems in any degree plausible, is that of my friend Dr. Blanding, who supposes them to have been used in some game analogous to that of the quoits of the Europeans. It is a curious fact that discoidal stones much resembling these have been found in Scandinavia, whence I was first led to suppose it possible, especially in consideration of their apparently circumscribed occurrence in this country, that they might have been introduced here by the Northmen; a conjecture that seems to loose all foundation since these relics have been found as far west as the Mississippi. (R2)

Below, we shall see that the distribution of abandoned discoidal stones actually stretches west all the way to California, south to Chile, and far out into Oceania.

E.G. Squier responded to Morton's article by affirming the use of the discoidal stones in games, adding that he had never found any of them within the mounds themselves.

Squier at this time (1846) was the country's authority on the works of the Moundbuilders. In 1848, just two years later, he published along with E.H. Davis the first really significant American archeology book: Ancient Monuments of the Mississippi Valley. (R4) In this



Five examples of discoidal stones. (R4)

book, Squier and Davis devoted a few pages to the discoidal stones, stating that they have been found on the surface of the ground from the Ohio Valley to Peru, Chile, and even Denmark. They added that most of the discoidal stones they examined were highly symmetrical, well-polished, and formed from various types of rock, such as granite, greenstone, porphyry, jasper, and quartz. (R4)

The surprising connection with South America remarked by Squier and Davis (Chile and Peru) was extended to Argentina by J.B. Bird in a 1970 paper in American Antiquity.

> Four discoidal stone objects in southern Chile and Argentina can be attributed to the Paleo-Indian occupation of the region. Two were clearly associated with extinct horse and sloth and have a radiocarbon age of over 11,000 years. The other two are judged to be part of the same cultural complex. (R42)

The radiocarbon date of 11,000 B.P. is a surprise, because the discoidal stones found in eastern North America are only 1,000-2,000 years old, sometimes less. Obviously, there could have been no direct connection.

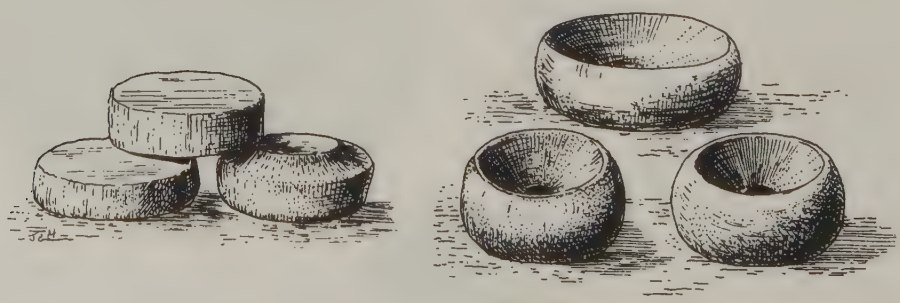
In the American Southwest, though, the discoidal stones seem to be much older than they are in the east as we shall now see.

Transferring our attention to the North American Southwest and Pacific Coast, we quote from a 1971 paper by J.R. Moriarty, III, and R.S.D. Broms.

> Some discoidals are found in a great number of archaeological horizons in the United States. Regrettably, many stone discoidals are mistakenly classified as manos. Even when they are recognized, these artifacts are just as often dismissed and problematical or "ceremonial" objects. This practice continues, although even a cursory examination of the literature reveals well supported evidence that in most cases they were gaming stones. Unfortunately, few discoidals have precise dates assigned to them. In San Diego County, however, recent finds in sites having chronologically controlled stratigraphic levels have permitted the dating of some straight to convex variety discoidals. These specimens are 5,000 to 6,000 years old. (R43)

The above authors went into great detail regarding discoidal stones, noting that they were also called, for example, "chunkey stones", "bowling stones", "tchukge stones", and "rolling stones". The types most common in the Southwest are shown in the accompanying sketches. Sizes vary from 3-6 inches in diameter, and ½-3 pounds in weight. (R43)

Stones used in games, even if well-wrought, are usually of little import to the anomalist. However, Moriarty and Broms remark that discoidal stones have been observed on Samoa, the Cook Islands, Hawaii, and elsewhere in Oceania. This fact, coupled with their presence along the entire west coast of the Americas does speak to the possible past diffusion of the games played with discoidal stones across the Pacific into the New World---or, less likely, vice versa.

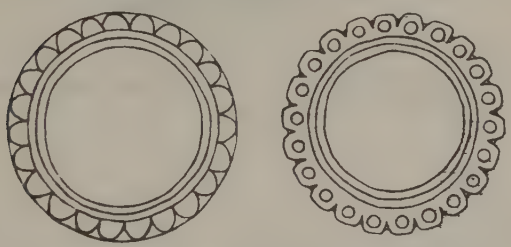


"Chunkey" stones from Tennessee, a variety of discoidal stone. (R3)

Another point made by Moriarty and Broms is that discoidal stones are very common in comparison to the cogged stones, which are also found in southern California. (X1) For some unknown reason, though, cogged stones are rarely found in direct association with discoidal stones. (R43) The two species of artifacts may have had different purposes and different makers.

Concluding our sketch of discoidal stones, we must mention two other types of stone discs found in North America. They cannot be physically confused with the afore-mentioned cogged and discoidal stones, but their geometries are similar.

In the Mississippi Valley and southeastern United States, the Native Americans also wrought elaborate, decorated stone discs, some with scalloped edges and engraved images. (See illustrations.) (R35)These objects are classfied as art in this catalog and are duly treated in Chapter MGP in another volume.



Two decorated stone disks discovered in the southeastern United States. (R35)

Finally, and much farther off our general theme, are the large sandstone discs manufactured by the Anasazi in the American Southwest. These discs are about a meter in diameter and 10 centimeters thick. The discs are structural elements that were stacked like coins beneath columns in large buildings, such as those at Chaco Canyon. (R56)

X5. Stone rings. Some of the discoidal stones (X4) were concave in their centers. It was but a short step to make these into stone rings.

Mississippi Valley. Indeed, Squier and Davis did mention that some of the discoidal stones they examined did have holes in them. (R4) This variation of the more-or-less standard discoidal stones was also mentioned by W.F. Hoffman in the American Naturalist of 1878. (R11)

The supposition is that the stone rings were---like their unholed analogs ---employed by the Native Americans in various games. Lewis and Clark, in fact, reported seeing games employing stone rings being played when they visited the Mandans. The Creeks also used stone rings in their games as did the Arikara of Louisiana. (R4)

Britain. Stone rings were also manufactured by the ancient inhabitants of Britain, but we had little notion of their age or purpose. A subscriber to the English Mechanic submitted the following description of such rings in 1870.

> I enclose you the only one I have left of these ancient stone discs, trusting you, or some of your correspondents, may be able to throw some light as to the purpose for which so much trouble has been bestowed on them; they are only found in one field on the farm, but were much more plentiful forty years ago than now; at that time, we used to suppose they had been made by children, as wheels for toy carts. One of my ploughboys, about this time last year, picked up about a dozen of them; he brought four or five home, throwing the others away. The one I forward is much the smallest, and the thickest. I am sorry to say the others are all lost; the one I send is much more carefully made than any of the others were. None of them were the same size or thickness; some of them showed saw marks very distinctly; they have been sawn out of cylinders of different sizes; the holes through have been bored after each disc was cut off, some of them quite oblique, but all rimmed from each side as this is; they were all thick in the middle, though none were so much rounded off as the one side of this, neither had any of them the perfectly flat side you see in this one. I do not know of any stone in the neighbourhood that at all resembles this they are made of. (R6)

The saw marks are, of course, of

special interest here. And where did ancient Britons find stone cylinders and the vises to hold them while they plied their saws, which were presumably made from bronze?

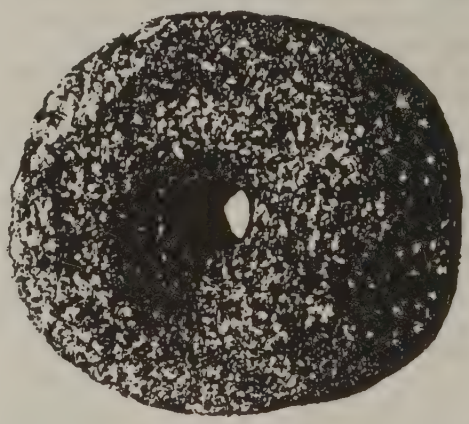
Undoubtedly, the British archeologists have more information than the foregoing, very old quotation provides.

Caribbean Islands.

> Among the problematic archeological objects from the West Indies none is more characteristic of Porto Rico than the so-called stone collars or rings. They are practically limited to Porto Rico and the immediately adjacent islands, and the eastern end of Santo Domingo, for they have not been reported from Cuba, Jamaica, or the continent. There are approximately one hundred of these objects in the museums of Europe and the United States, and a few still remain in Porto Rico....
>
> The use and meaning of the stone rings have given rise to much speculation, since historical records give no satisfactory clue to their function. These objects were apparently not mentioned by any chronicler contemporary with their use, and, indeed, they escaped notice until a little more than fifty years ago---three and a half centuries after the Indians had disappeared.
>
> It has been conjectured that they were bandoliers worn by the caciques [chiefs] as insignia of rank, but some of them are too small for such purpose and others to heavy for a man to bear on his shoulders. The author believes that they were idols, and has therefore included them among the zemis. (X7) As an interpretation of what the objects represent, it is suggested that they are images of the coiled bodies of serpents or reptilian monsters which personated some great nature power, possibly a sky or wind god. (R21)

Perhaps the Porto Rico stone rings figured in games like the discoidal stones on the mainland, although they seem to be rather large for use in games! They may be related in some way to the stone yokes of Central America and the Caribbean. (X6)

California. The auriferous gravels of the Sierras have yielded many mortars and pestles, stone sinkers, strange double-headed stone axes, and enigmatic stone rings, such the one that is pictured here. (R53) No one has suggested what these were used for or why they and the mortars exist in such concentrations in the great gravel deposits in the Sierras.

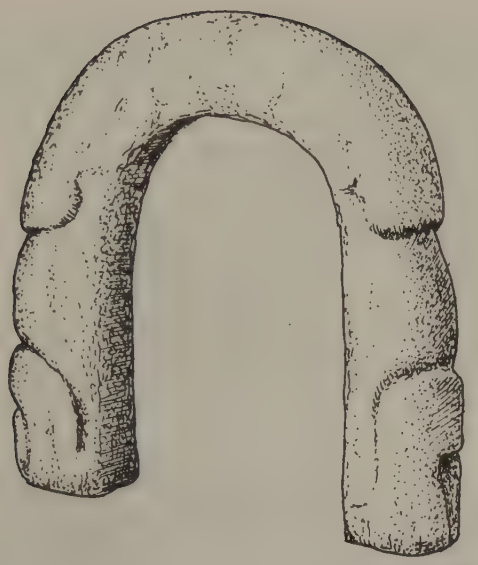


A doughnut-shaped object recovered from California's auriferous gravels.

X6. Stone yokes. Precolumbian stone yokes or "collars" exist in much of Mesoamerica including the islands of the Caribbean. The name "yoke" is appropriate for this stone objects look like the yokes worn by oxen. The word "collar" is a bit confusng because they resemble horse collars not human collars. In any case, they were apparently worn by humans only and then only around their waists!

Stone yokes were carved from single pieces of stone. Most were beautifully finished and polished and often displayed various sorts of ornamentation. Those collected on Puerto Rico were 19-23 inches long and 15-17 inches wide. Interestingly, the stone yokes were often made in matching pairs, as determined by the mirrored placement of the ornamentation. (R15)

Effigies and figurines from Central America occasionally show stone yokes around human waists, but the surviving native manuscripts are mute on their purpose. Suggestions include their use



X7. Enigmatic ancient stone objects. Many artifacts from the past 20,000 years or more fit the title of this entry. These stone objects resist classification according to their morphology or possible application, so we succumb and catalog them by the locations in which they were discovered.

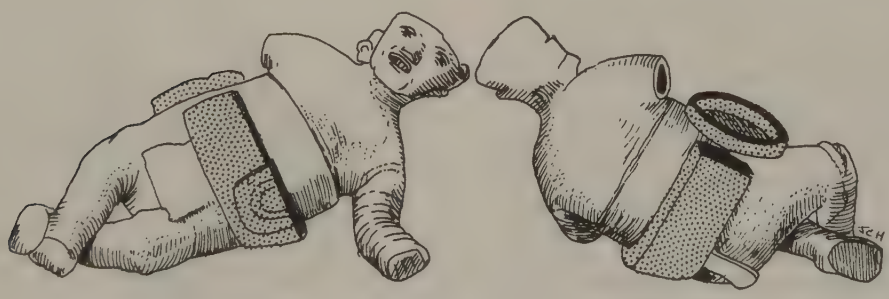
It should be realized that what follows is merely a sampling of what can be found in the literature.

North America

Connecticut. Here follows a letter to the editor of the American Antiquarian in the year 1900 from a W.A. Chapman relative to a "peculiar relic of prehistoric workmanship," that had been described in an earlier issue of the journal by F.H. Williams.

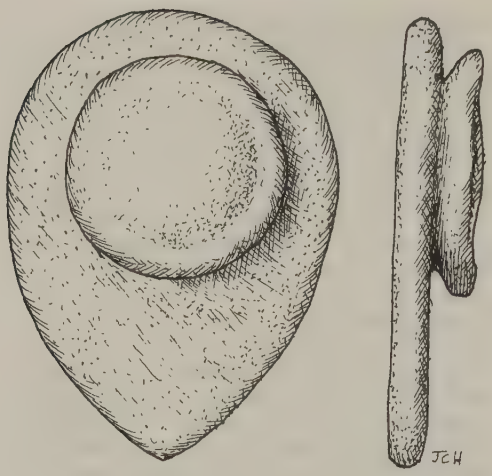
A stone yoke from Vera Cruz, Mexico. These yokes were also made of wood. (R25)

Stone yokes were often made in matching pairs as seen in these Mexican figurines. They were worn about the waist, not the neck. (R34)



in burials (to defy devils trying to remove the body), in human sacrifices, and in games of some sort. The latter application is presently the favored one. The stone yokes seem to have served no utilitarian purpose. They also seem to have been rather heavy to wear during games of any sort. (R15, R24, R25, R28, R34)

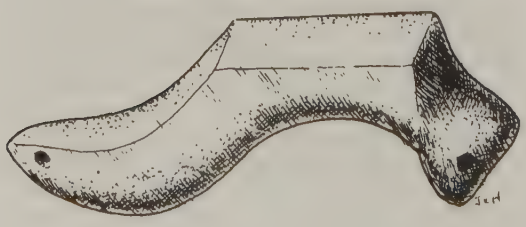
In my cabinet I have an almost exact duplicate, and singularly enough, it was found in the same county (Hartford County, Conn.), exact locality not known, about 1854, and has been in my possession over forty-two years. I enclose a drawing, front view and cross section, size (about 2 inches high). It is, apparently, made from a dark-colored, hard, and fine-grained sandstone, with edges nicely rounded, and a well-marked groove between the circular part and the main section, as seen in the cross section. The back is slightly convex,



as is the center of the circular front. It is of fine workmanship, nearly symmetrical, and has the appearance of a greasy polish over almost the whole surface. (R17)

Vermont. The enigmatic object described and sketched here was presented in the 1871 issue of the American Naturalist.

> [The object] seems to be a badge of office, amulet, or something of the sort. It is made of a very pretty breccia composed of light and dark material. It is finely wrought and very smooth, though not polished. The upper side is worked to a sharp edge, from which the sides round outwards towards the rectangular base, which latter has a hole at each end running obliquely through the ends. The length of the relic is 4.5 inches and the height nearly 2 inches. This was found about a mile north of Burlington, Vt. (R7)



The purpose of this stone artifact from Vermont remains obscure. (R7)

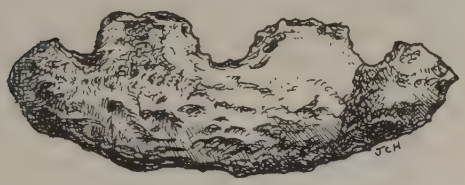
Missouri. Some of the arrowheads collected along the Mississippi Valley are curiously beveled on both edges as shown in the figures. In contrast, the overwhelming majority of the arrowheads in actual use display sharp edges and the convex-convex cross sections, as one normally expects in a practically designed arrowhead. If the strange beveling had a practical purpose, it has escaped all of the archeologists who have seen the beveled blades. Such blades are impractical for hunting or warfare. In fact, none show any signs of use of any kind. Actually, they represent too much time and labor to risk in everyday applications.

Usually, the beveled blades were crafted from colorful stone and represent the finest workmanship. In this context, the best theory is that they are works of art possesssing value in commerce and gift-exchanges. In these respects, they could be classed along with the microliths (MSS4), the giant flints (X3), and the incredibly ornate "eccentric" flints (MGP in another volume). (R37)

Beveled arrowheads from Missouri. Most practical arrowheads have convex-convex cross sections. (R37)

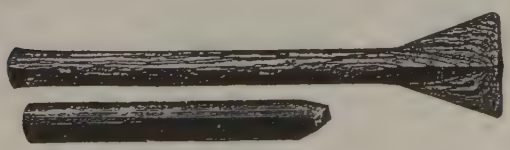
California. The archeologists who have examined the illustrated artifacts collected from the San Dieguito plateau were duly puzzled and, as seems routine in such obscure cases, classified them as "ceremonial objects." M.M.J. Rogers wrote of them as follows:

The very paucity of these stones would seem to preclude a utilitarian purpose for them, and all speculation to such an end. No ethnological information in regard to the use of such stones has been found in California, and if they are of a ceremonial nature, they represent a cultus long extinct. Wardle believes them to be scarifiers, and there is some record of scarifying having been practiced by shamans and individuals of various Pacific Coast tribes, but no evidence of so elaborate an implement having been used. (R29)



Classified as a "ceremonial object," this crude artifact was collected on the San Dieguito Plateau, California. (R29)

Ohio. Squier and Davis in their monumental tome (R4) figured two remarkable stone tubes. These must have been very difficult to drill out without metal tools. We quote their description of the top tube shown in the accompanying figure.



Difficult-to-make stone tubes from Ohio mounds. Purpose debatable. (R4)

Not among the least remarkable and interesting relics, obtained from the mounds, are the stone tubes...They are all carved from fine-grained materials susceptible of receiving a polish and of being made ornamental, as well as useful. The finest specimen yet discovered, and which can scarcely be surpassed in the delicacy of its workmanship, was found in a mound in the immediate vicinity of Chillicothe. No. 1 is a greatly reduced sketch. It is composed of a compact variety of slate; the ground is brownish or leaden green, interstratified with veins of pure black, of variable thickness, from a line to the fourth of an inch. ...The tube under notice is thirteen inches long, by one and one tenth in diameter; one end swells slightly, and the other terminates in a broad, flattened, triangular mouthpiece (so called for want of a better designation,) of fine proportions, which is carved with mathematical precision. It is drilled throughout; the bore is seven tenths of an inch in diameter at the cylindrical end of the tube, and retains that calibre until it reaches the point where the cylinder subsides into the mouthpiece, when it contracts gradually to one tenth of an inch at the end...The carving, in this instance, is very fine, and much superior to anything of which the Indians of this day are known to be capable. (R4)

Wisconsin. The American Anthropologist of 1878 contains a description of what seems to be an ancient mill for grinding grain. The design is surprisingly complex, and the whole machine is precocious in both design and the use of metal---unless it is actually an unrecognized colonial artifact. This seems unlikely for these mill stones were located at a depth of four feet below the surface during the excavation of a barn's foundation. If truly of Native American origin, the mill is highly anomalous. We quote from the article.

There is in the rooms of the Historical Society of Wisconsin a curious relic of the stone age. [sic] It is a "quern," or stone corn mill, and of undoubted antiquity. The lower stone is nearly twenty-three inches in diameter, and about seven inches thick. In the center is a hole one inch in diameter, extending through the stone. The stone is cut away to the depth of three quarters of an inch for nearly its whole size, simply leaving a rim of about one and a half inches in width. At one side a small channel is

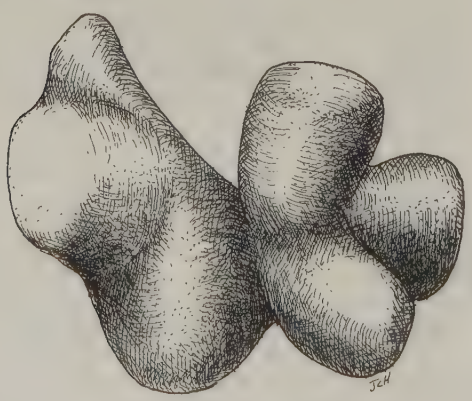
cut to allow the crushed grain to escape. The upper stone has a diameter of twenty inches, and the upper surface is convex having a thickness of two inches at the edge, and five inches in the center, where a hopper shaped opening with a diameter five and one-half inches. Near the edge are three holes, equidistant, intended to put in sticks or something of the sort, for the purpose of turning. In the underside of the upper millstone is a rectangular slot three by eight inches and three-fourths of an inch deep. A copper disk, eight inches in diameter, carrying on one side a projection which exactly fits this slot, was found in the immediate vicinity, and doubtless formed a bearing upon which the stone revolved. The material of the mill is greenish basalt, a variety of trap. It shows the effect of long use, the grinding surfaces being worn smooth. This unprecedented discovery was made in Washington county, while digging away a mound in order to lay the foundation for a barn, and at a depth of four feet below the surface. (R10)

Michigan. In her book Michigan Prehistory Mysteries, B. Sodders provides photographs of several curious Indian stone artifacts that have been collected from various parts of her state. Many of these are called "birdstones" although there is little avian to be seen in them. We reproduce two of these here. If they have a purpose, we have seen no notice of it. (R52)

New Jersey. C.C. Abbott applied the term "twisting stones" to the flat, neatly drilled stones in the accompanying sketches. About these he wrote:

> Associated with the various forms of stone implements and weapons found upon the fields of New Jersey are certain flat, quadrangular plates of stone of varying density, having one, two or more holes drilled through them. The outlines of these stone plates vary considerably, as may be seen by the references to the drawings given by Squier and Davis, in Ancient Monuments of the Mississippi Valley, p. 237, Fig. 136; and the position of the holes will also be seen to vary to a considerable extent. Of the two-holed specimens found by the writer, in the neighbourhood of Trenton, N.J., the majority are about six inches in length by one and one-half inches in breadth; and the perforations are in most instances an inch from either end. Such specimens as these are by many archaeologists considered "twisting stones," or "for condensing the raw hide or sinews used as bowstrings." We have, however, looked upon them as "breast plates;" using that term not to designate a protective covering, but as an ornament that was suspended by a cord so as to rest upon the breast; or by the perforations, sewed or fastened securely to the skin mantle of the red man. (R8)

Abbott's musings (above) occurred in 1873. Over a century later, C.B. Currer, Jr., pondered further on these strange



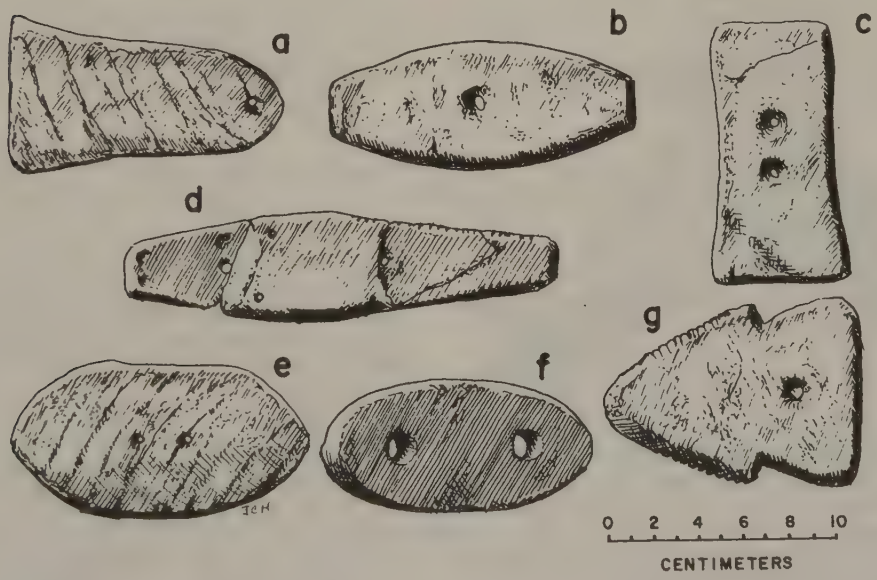
Two so-called "bird-stones" from Michigan. Many of these stones have avian features, but these two do not. (R52)

artifacts. Obviously, they are still enigmatic to some extent.

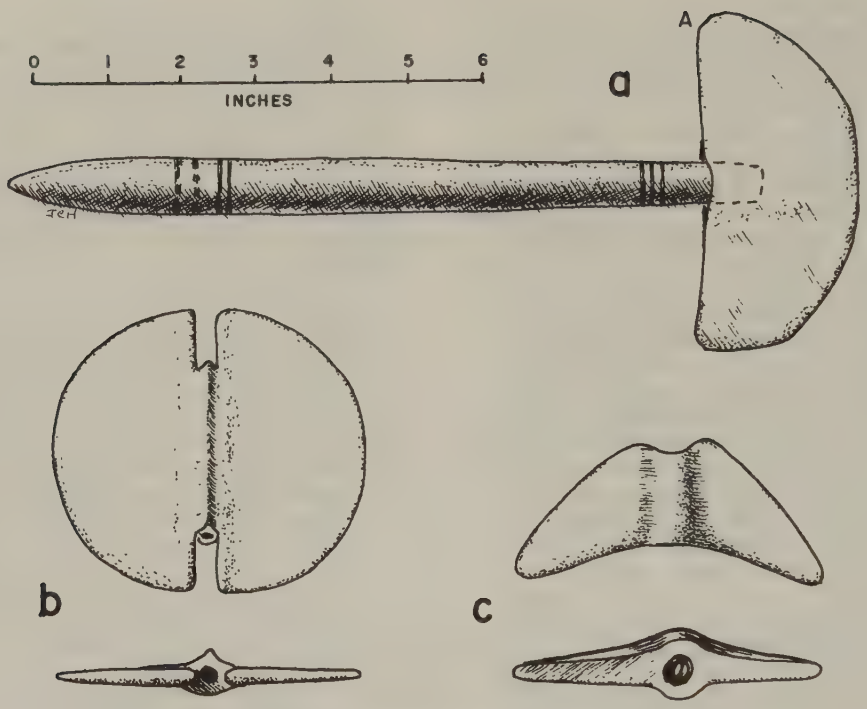
> Certain artifacts, which are relatively flat, variously shaped, ground, and polished slate, limestone, greenstone, hematite, or steatite, many times with one or two holes drilled through their breadth, have had a variety of labels attached to them: "stone gorgets," "bannerstones," atlatl weights," and "forearm bowguards." Some were found in burial associations which seemed to indicate each of these labels at one time or another. However archaeologists in general are still puzzled today by these objects of prehistoric Indian design. Morphological considerations, however, may indicate that these objects were ceramic tools. (R46)

Eastern United States. Just as enigmatic as the twisting stones described above by Abbott and Curren are the "bannerstones" so-named by the same C.C. Abbott. Like the twisting stones, the bannerstones were abandoned all over the eastern U.S. for us to puzzle over. The bannerstones may look like axes, but as J.L. Baer relates below, they were obviously unsuited to this application.

> For the past half century American archaeologists have been amazed at the beauty and puzzled over the use of certain problematical forms left by primitive men about their camp sites and buried with their dead in eastern North America. From Ontario to Florida, from Maine to the Mississippi Valley, have been found hundreds of



Various stone gorgets from eastern North America. (a, e) Adena gorgets; (b, c, f) Woodland Period gorgets; (d, g) Woodland Period gorgets from Tennessee. (R46)



Bannerstones from: (a) North Carolina; (b) Pennsylvania; (c) Florida. (R23)

beautifully wrought and highly polished pierced objects of stone somewhat resembling the drilled stone axes of the Old World. Here, however, these artifacts are usually of too soft a material and of too delicate workmanship to be weapons, tools, or implements of practical use. The carefully selected material, the elegant and symmetrical shape, and the high polish of these relics have led many to believe that their use was of a ceremonial nature. (R23)

Thus the bannerstones join a large company of artifacts that, for lack of precise knowledge, are relegated to the cabinet as mere ceremonial objects!

Puerto Rico. Besides the stone yokes (or collars) introduced in X6, Puerto Rico is also home to so-called "elbow stones" and "Zemi stones," both of which have escaped explanation by the archeologists.

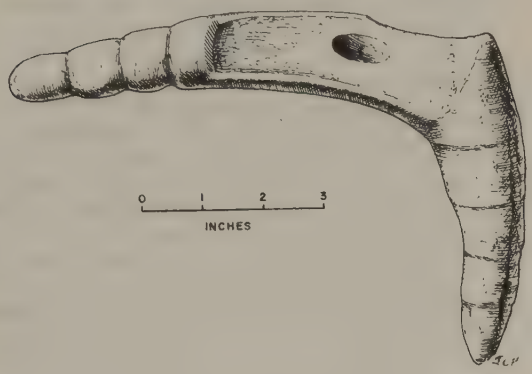
We use here a rather dense description of elbow stones by R.W. and S.K. Lothrop from the journal Man.

Elbow stones apparently form part of composite collars [yokes] made of both wood and stone. The normal type (see figure) corresponds in a general way to the shoulder of the slender type of collar, although the decorative details are not always displayed in identical fashion on the collar and elbow stone. Both ends of the elbow stone are often cut by a longitudinal trough encircled by small transverse grooves.

.....

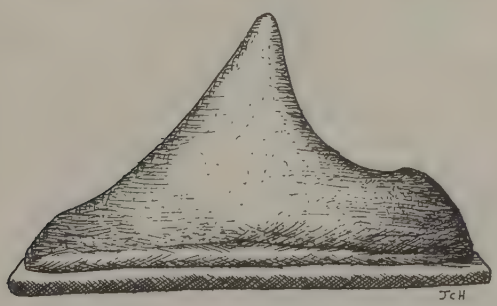
We have presented the specimens depicted not with the purpose of adding to the already multitudinous theories concerning their use, but to make them available to students. It seems probable that the questions raised by the mysterious products of

Porto Rican archaeology will eventually reach solution through interpretation of such aberrant and highly specialized examples rather than through further scrutiny of normal types. (R28, R20)



A Puerto Rico "elbow stone." These were apparently used in conjunction with the stone yokes. (R28)

The Zemi or "tri-pointed" stones of Puerto Rico come in a wide range of sizes and elegance of design. (R20, R55) As the illustration shows, some are quite ornate, but others are devoid of complex sculpture. Some Zemi stones are only an inch long and obviously of no practical use. One might think they are charms of some sort.

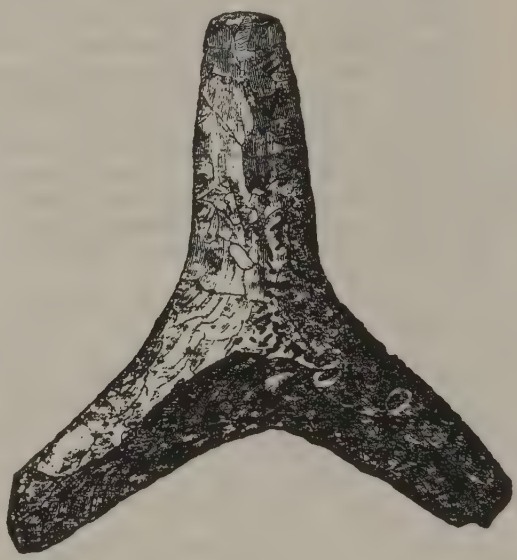


A Zemi stone from Puerto Rico. Some of these tri-pointed objects are only an inch long and have no discernible purpose except, perhaps, decoration. (R55)

Mesoamerica

Mexico. Stone yokes much like those from Puerto Rico appear the archeological record of Mexico, especially, and other countries of Central America.

Honduras. Resembling in form the finely worked stone yokes of Puerto Rico and Mexico is the pictured flint artifact. It was acquired in the early 1800s in Honduras by a British naval officer. It is only about 5 inches high and certainly could not fit around the waist of any normal-size person. We have nothing further on this unusual flint object. (R9)



One can only speculate about the purpose of this flint artifact from Honduras. (R9)

South America. The ancient city of Tiahuanaco, high in the Bolivian Andes poses many questions for the archeologist with its Akapana mound, the Gate of the Sun, and the jumbled, curiously wrought stones at Puma Punku. Rarely mentioned, though, are some strange stone objects described as follows by A.H. Verrill.

> ...it has always been held that no ancient American race ever discovered the wheel. But last year, while carrying on investigations at Tiahuanaco, I

> discovered two immense stone disks that might well have served as wheels. Both of these were at Tunca-puncu [Puma Punku?]. One was concealed beneath a fallen mass of stone, the other was partly covered with a fragment of a slab and was deeply embedded in the earth. They were approximately seven feet in diameter by eighteen inches in thickness, and were pierced with square holes in the centers. At first sight they might have been mistaken for Spanish mill-wheels, or arastras, but as far as known no Spanish mill ever was situated near the spot, and there is no reason why one ever should have been there. Moreover, they differed materially from any mill-wheels I have ever seen, and they were of the same stone and the same class of workmanship as the structure itself. (R30)

Verrill favored a "wheel" explanation for the large Tiahuanacan stone discs. Their dimensions, though, imply multi-ton objects that would probably have required a hard road surface of which there is no evidence.

Europe

Britain. Kimmeridge "coal money" consists of flat, circular pieces of bituminous shale with precisely beveled edges. Sizes of the "coins" vary from 1¼ to 2½ inches in diameter and from ¼ to 5/8 inch in thickness. They appear to have been cut on a lathe.

Most of the Kimmeridge coal money was dug up in the neighborhood of Kimmeridge and Worthbarrow, Dorsetshire. Burial depths were shallow---only 5 to 18 inches. The discs were admixed with pottery fragments dating from the Roman occupation.

In fact, investigation suggested that the discs were cut on lathes by Roman artisans who were manufacturing stone armlets for human decoration. The coal money was the discarded centers of the armlets. The Kimmeridge coal money may be 2,000 years old, but it is worthless to the anomalist since it poses no mystery. It is, however, admittedly interesting to virtually any archeologist. (R2)

A more remarkable and more anomalous stone object was excavated from beneath the glacial drift but just above the stratum of London Clay near Ipswich. Being below the Ice Age deposits suggests that it may be of Paleolithic age.

> The object was discovered in 1926, but beyond being labelled, was not specially noted until attention was directed to its remarkable character by the Abbe Breuil, who, on examining it, pronounced it shaped by the hand of man. In shape it is like an elongated egg with one end slightly blunter than the other. At each end is a small depression or punctuation, and similar marks are visible on other parts---in places four or five being grouped together as a rhomboid or as straight lines. It is possible that these may be due to decomposition of crystalline grains. The whole surface has been scraped with a flint, so that it is covered with a series of facets running faintly regularly from end to end. From each one is made up a number of longitudinal striations of unequal depth; a number of fine concentric incisions are visible at one of the poles. The specimen is of a greyish-brown colour, weighs approximately ½ ounce, and measures at its greatest length 1 6/16 in., and at its greatest depth 14/16 in. The exact nature of its material is in doubt. The Abbe Breuil compares it with the steatite sling stone of New Caledonia. (R31)

Unfortunately, we do not have a sketch of the object described above and it is difficult to appreciate its archeological value. In any case, the systematic markings on an artifact of (apparently) Paleolithic age are worth noting.

Easier to comprehend, if not explain definitively, is a puzzling flint object discovered on Britain's Isle of Wight. The three-pronged artifact measures 9½ inches from the end of the upper prong to the bottom of the left prong. The flint artifact is about 2½ inches thick. Use: unknown. Age: believed to be Paleolithic. (R9)

The most famous stone artifacts in Britain are, of course, the stones of Stonehenge. Stonehenge as a major megalithic site is treated in depth in Chapter MSH in Ancient Infrastructure. An unusual feature of these massive stones is their acoustical properties, of which we now take notice.

Scientists at Southampton University

have discovered that the 3,500-year-old stones at Stonehenge have uncanny acoustic properties and would have acted as giant amplifiers for drums during festivals.

They say the stones' flat faces accumulate then deflect sound over a wide area, while the nearby barrows produce extra "oomph", similar to whistling over a bottle. (R57)

Such deliberate acoustic effects have also been noted in other Neolithic structures and also Mayan sites in the New World. Since the stones comprising Stonehenge have not been artificially shaped to any significant extent, they must have been selected and positioned to achieve the reported acoustical phenomena. (Of course, the stones did not "collect" sound; they only reflected it instantaneously.

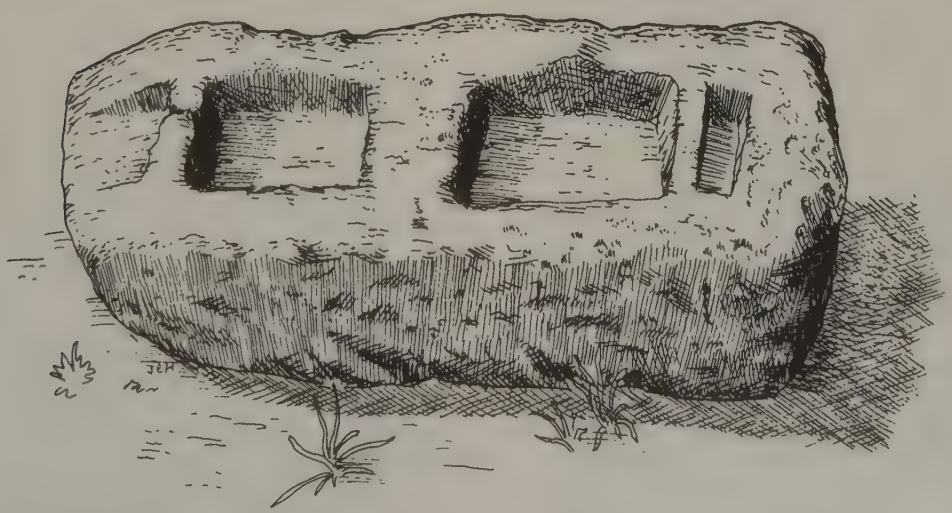
Crete

During the past fifty years the French excavators at the Minoan site of Mallia have been turning up a kind of object unmatched anywhere else in Bronze Age Crete. Found in the ruins of the great palace, and in houses and small shrines as well as other buildings, these enigmatic objects have been noncommittally called auges or "troughs" by their excavators. But their real significance and function have never been determined despite the fact that, all told, some forty of them have been uncovered to date.

These auges are made from a common local sandstone and are rather roughly finished. They measure, with few exceptions, from two to three feet in length, from one and a half feet in width, and from six inches to a foot and a half in thickness. Sunk into the upper surface of each is a pair of holes, more or less equal in size and roughly circular or rectangular in form. These depressions are accompanied in seven instances by two smaller holes, square or oblong, one at each end of the auge. (R45)

The objectives of the Minoan auges has never been agreed upon by the archeological community. Indeed, a follow-up article by J.W. Graham, the author of the foregoing quotation, cites the many utilitarian suggestions sent to him after publication of his description of the auges. These included: fish ponds, ant traps, and receptacles for receiving the blood of sacrificed bulls. (R47)

Russia. Ancient Skies is a fringe publication dedicated to demonstrating the existence of ancient astronauts. One favored type of proof for the past visits of extraterrestrials is any artifact that seems to be alien to human manufacture. In an 1989 article, V.V. Rubtsov de-



A typical auge from Crete's Bronze Age. Purpose uncertain. (R45, R47)

scribed three such discoveries. Two of these (the Gurlt or Wolfsegg cube and the Vashka cylinder) are metallic and relegated to Chapter MMM. The third object is nameless and referred to only as a "black ball." However, it is of glassy constitution and logically belongs here. We quote Rubtsov.

> Finally, the "black ball", which was discovered in 1975 in Western Ukraine at a clay quarry at a depth of 8 metres. The age of the clay bed was about 10 million years. An excavator saw the object, picked it up and hit it on the edge of a bucket. The ball-shaped object did not split, but a piece broke away, exposing a black glass-like substance.
>
> For some time the object was kept at the local village museum, but then a relative of the museum's curator arrived there from Moscow and took an interest in the find. He took the ball to Moscow where, in 1979, scientists of several prestigious institutes investigated it. A very detailed and sophisticated research program was elaborated, but only a small part of it was in fact performed, because a week later the owner of the ball demanded that it be returned to him. Nevertheless, the results which were obtained are rather interesting.
>
> The investigation was unofficial and unexpected. I did not participate in the investigation, but I did read the final report and consider it to be of a high scientific level. The "ball" is slightly egg-shaped, with the length of the greater axis 87.5 millimetres and the diameter of the largest cross section, perpendicular to the axis, 84.7 millimetres. An X-ray study discovered within the ball an inner core, shaped like a half of an egg. Apparently, the blunt part of the ball, situated over the butt-end of the core, is a hermetic lid. The core absorbs X-rays 4 times less intensively than the shell. (R51)

Rubtsov admits that the ball has not been proven to be artificial. So, caution is advised here. Natural concretions can be very deceptive.

Asia

China. Circa 1895, a French scientific expedition returned from China having collected---among many archeological treasures---some finely wrought and polished flint objects in the shape of chisels or ax heads. These Chinese stone "chisels" provide the opportunity to mention "celts," which are often called "thunderstones."

A celt is just another name for a chisel-shaped stone. Some celts were true tools but others were made with extraordinary skill and never intended to be utilitarian. Like the giant flints, microliths, and eccentric flints, some celts apparently possessed intrinsic value for their beauty and workmanship.

A "thunderstone," on the other hand, could in principle be virtually any odd stone that was found on the ground immediately after a thunderstorm or which was otherwise associated with thunder and lightning. It seems that many celts were, for some reason, classified as thunderstones by many cultures of antiquity. In the quotations that follow, it will be seen that this association was nearly universal and remained persistent from Neolithic to modern times. The celt-thunderstone association is not per se an anomaly, but its global occurrence in ancient times may be.

The Chinese flints mentioned above provide some interesting background.

> These flints are finely worked and polished, and if found in Europe would have been attributed to the Neolithic period of the human race. At present there is no way of estimating their age, which may be comparatively modern as compared with that of the similar implements found in Europe or America. It is very remarkable that the forms of these flint implements are practically the same in whatever part of the world they may be found. The prehistoric man of Cochin, China, worked the lumps of flint into the same forms, and probably by the same process, as did the men who settled in northwestern Europe after the melting of the glaciers, or those mysterious progenitors or predecessors of the American Indians, whose remains are so abundant in this country.
>
> A still more curious fact is that all over the world the same origin is attributed to these stones by the people of the present day. The name of thunderstones is universally applied

> to them by the savage races of the East Indies, the South Sea Islands, Africa and South America, as well as by the more civilized people of China and India, and the ignorant peasantry of Europe. In Italy alone a curious exception occurs in some localities, where the long, flat implements are known by the remarkable name of "the tongues of St. Paul". All recollections of the people who made them, or the use for which they were designed, seems to have been lost; and this would either indicate their great antiquity or that they were fashioned by another and different race before the immigration of the present inhabitants of the countries where they occur. (R16)

The anonymous author of the above quotation certainly implies the ancient worldwide diffusion of celt manufacture and their identification with thunderstorms. Our second quotation elaborates on the thunderstone-celt connection.

> The most favourite form of thunderbolt is the polished stone hatchet or 'celt' of the newer Stone Age men. I have never heard the very rude chipped and unpolished axes of the older drift men or cave men described as thunderbolts: they are too rough and shapeless ever to attract attention from any except professed archaeologists. Indeed, the wicked have been known to scoff at them freely as mere accidental lumps of broken flint, and to deride the notion of of their being in any way deliberate human handicraft. These are the sort of people who would regard a grand piano as a fortuitous concourse of atoms. But the shapely stone hatchet of the later Neolithic farmer and herdsman is usually a beautifully polished wedge-shaped piece of solid greenstone; and its edge has been ground to such a delicate smoothness that it seems rather like a bit of nature's exquisite workmanship than a simple relic of prehistory man. There is something very fascinating about the naif belief that the Neolithic axe is a genuine unadulterated thunderbolt. You dig it up in the ground exactly where you would expect a thunderbolt (if there were such things) to be. It is heavy, smooth, well-shaped, and neatly pointed at one end. If it could really descend in a red-hot state from the depths of the sky, launched forth like a cannon-ball by some fierce discharge of heavenly artillery, it would certainly prove a very formidable weapon indeed; and one could easily imagine it scoring the bark of some aged oak, or tearing off the tiles from a projecting turret, exactly as the lightning is so well known to do in this prosaic workaday world of ours. In short there is really nothing on earth against the theory of the stone axe being a true thunderbolt, except the fact that it unfortunately happens to be a Neolithic hatchet. (R59)

India. Sited in southern India, the temple of Chiliambrum is thought to be as old as the pyramids at Giza. This temple contains stonework much more impressive than the finest celt.

> The interior of this temple is decorated by festoons of chains, descending from pilasters; each of these chains was wrought out of a single piece of granite, sixty feet long, the links, twenty in number, having been carved, intersecting each other, and highly polished; indeed they retain their polish to this day. Each link is thirty-two inches diameter, and I am told, only one is broken. (R5)

Africa

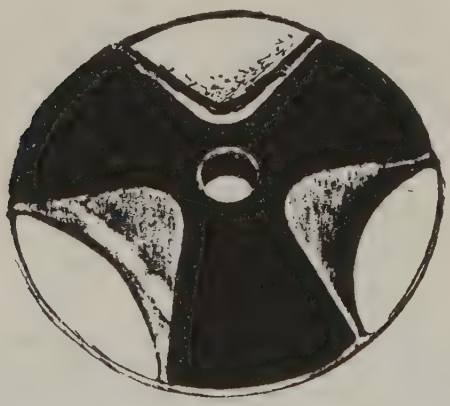
South Africa. In 1931, C. van Riet Lowe described in Nature the implements of a newly recognized Paleolithic culture in South Africa. Among the usual points and scrapers was a novel and unusual stone artifact.

> It is an implement shaped like the quarter of an orange. The flat surfaces meet to form a more or less straight cutting-edge, and there is a strongly curved upper surface away from the cutting edge, coarsely flaked and retaining a portion of the original surface untouched in the middle. The implement may be regarded as a giant crescent. The specimen originally described came from the Kasougu River and was unassociated; but similar and finer specimens are now associated with a definite industry, the present collection coming from Mazeppa Bay. The average size for five specimens is 9.65 cm. by 1.73 cm. (R32)

Egypt. The ancient Egyptians are renowned for their ability to create fine vases and other complex objects from solid stone. The artifact pictured here in not only complex but it also appears to be part of a mysterious machine, the rest of which has never been located.

The object is carved from a brittle schist---a difficult material to work with ---and was found in northern Saqqara to the south of Giza. Dated from the Fourth Millennium B.C., it looks something like an impeller from a pump. Strangely modern in appearance, it is 24 inches in diameter and a maximum of 4 inches thick. The hole in the center suggests that it was mounted on a shaft. (R48)

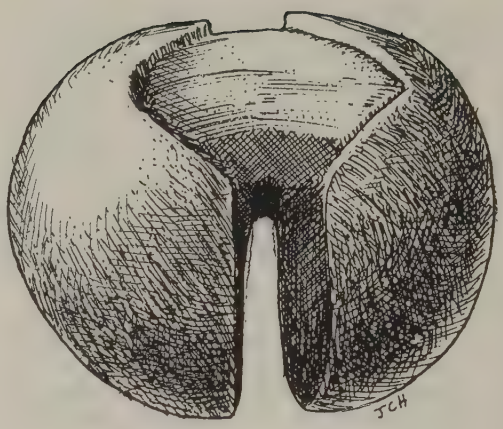
Those promoting the "ancient astronaut" theory use such artifacts as proof of extraterrestrial visitations in the deep, dark past.



This complex Egyptian artifact comes from the Fourth Millennium B.C. With a central hole for an axle (?). It resembles a piece of a modern machine. (R48)

Oceania

New Zealand. A peculiar stone object, apparently of Maori manufacture, was unearthed during a drain-digging operation in the Waverly District. Refer to the accompanying figure.



Apparently of Maori manufacture, this enigmatic stone object was discovered in New Zealand's Waverly District. (R26)

This carefully worked stone measures two-and-three-eighths by two inches, the material being a close-grained black stone termed kara and korora-iki by the Maori, apparently greywacke. The illustrations show the form of the object, the deep, narrow slot, and the lozenge shaped design deeply incised on one side. The slot or cleft is one-and-one-sixteenth inches deep. All surfaces carry a smooth finish, including the sides of the slot. (R26)

Considerable labor must have been expended on this object, but no one knows its purpose.

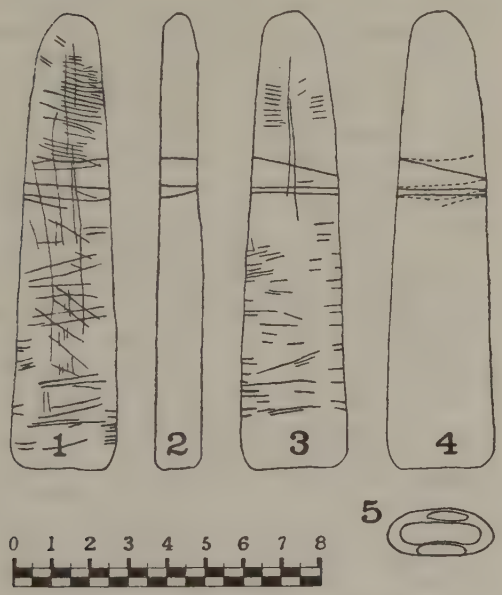
Hawaii. According to D.H. Childress (R50), there is on the island of Kauai a unique type of artifact fashioned out of vesicular black basalt. No illustration is provided in the reference so we do not know what these so-called "block grinders" looked like or how they might have been employed in Hawaii's unremembered past.

Australia

New South Wales. Before the Australian aborigines were "civilized" by the Europeans well over a century ago, their stone workers in New South Wales carved the "ceremonial stones" now described.

The stones in question vary in length from about six inches to as much as two feet, but the more common lengths range from eight to fifteen inches.

They are widest at the base, gradually decreasing in dimension towards the other end and terminating in a blunt point. They consist of different material, including sandstone, quartzite, clayslate, kaolin and such other kind of stones as might be available. (R22)

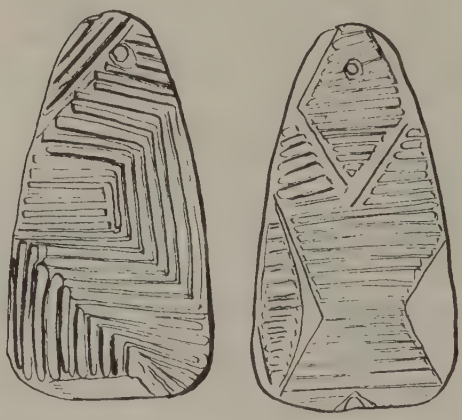


These strongly scratched stones may have carried messages between the aboriginal tribes of Australia. (R22)

When the above paragraph was written in 1909, the subject stones had long been abandoned by the aborigines. The meaning of the scratchings had been lost. The only application an elder could recall was that they were carried by messengers to far-flung members of the tribe as signals that a festival was in the offing and that they should assemble at a specific place.

Western Australia. More sophisticated and more embellished ceremonial stones were made by the aborigines of Western Australia. Sometimes called "churingas" they were usually carved from wood, rarely slate was used. The present-day aborigines have no knowledge of the churinga-makers or the purpose of the decorated stones. Archeologists find churingas widely distributed in Western Australia and believe that they are of fairly recent origin---despite the aborigines' lack of knowledge about them. (R36)

The significance of the varied patterns engraved on the slates---if any---has eluded everyone so far. The churingas may merely be an art form now forgotten by the aborigines.



Australian aborigines carved these stone "churingas." They might have been used as "bull-roarers"; i.e.; sound generators. (R36)

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MMT HIGH-TECHNOLOGY ARTIFACTS

Key to Phenomena

MMT0 Introduction

In the context of the ancient world, we define high technology as the recognition and application of engineering and scientific principles at levels that greatly surpass those accepted by mainstream anthropology for the cultures involved.

In reviewing the voluminous pertinent sources, two generalizations have become obvious:

(1) Ancient technological expertise, especially in chemistry and metallurgy, is underestimated; and

(2) Many of the claims for the existence of ancient high technology, especially by popular writers, are greatly exaggerated or false;

Further, two types of "processing" anomalies must be highlighted:

(1) The ability of ancient artisans to work expertly with very tiny objects (microliths) and produce almost invisible text (microengraving); and

(2) The ability to work with very obdurate materials despite the lack of hard metal tools.

Finally, the ancients made at least three important technical discoveries pertinent to high technology:

(1) They recognized the existence of an unseen, natural, directional force that could be used in navigation; i.e.; the geomagnetic field;

(2) The existence of electrochemical reactions; i.e., in electroplating; and

(3) That astronomical phenomena could be simulated mechanically; i.e.; the Greek analog simulator or Antikythera device.

MMT1 Ancient Chemistry

Description. The precocious development of various chemical processes requiring very high temperatures and involving obscure and/or challenging chemical reactions. The chemical compositions and/or production methods used in manufacturing some ancient artificial materials remain unknown.

Data Evaluation. Virtually all sources are from science journals and magazines. The data evaluations are the first figures in the ratings below.

Anomaly Evaluations. Eleven potential anomalies have been identified, as listed and evaluated below. The anomaly evaluations are the second figures in the ratings.

- "Mayan blue" paint incorporated chemical-cage structures and nanoparticles (X1). Ratings: 1/2.
- The very early formulation of resinated wine in the Middle East (X2). Ratings: 1/3.
- The manufacture of artificial basalt in Mesopotamia (X3). Ratings: 1/2.
- The unknown composition and manufacturing process for murrhine (X3). Ratings: 3/3.
- The hafting of tools and weapons with mastic circa 35,000 years ago (X4). Ratings: 1/2.
- The claimed "mystery cement" used in the Great Pyramid (X5). Ratings: 2/3.
- The casting of the Great Glass Slab of Galilee (X6). Ratings: 1/2.
- Ancient Mesoamerican rubber manufacturing (X7). Ratings: 1/2.
- Wet-chemistry and synthesis in ancient Egypt (X8). Ratings: 2/1.
- Chemical etching by the Hohokam Indians 1,000 years ago (X9). Ratings: 1/2.
- Claimed "stone softening" by the Incas (X10). Ratings: 3/1.

Possible Explanation. Modern humans, even 35,000 years ago, were highly intelligent and experimented aggressively with natural substances. So did the Neanderthals on occasion.

Similar and Related Phenomena. Ancient metallurgy (MMT2); ancient medicine (MMT3).

Entries

X1. High-tech "Maya blue." Humans have been painting cave walls and pottery for tens of thousands of years, but even jaded archeologists have been astonished at the dazzling blue paint the Maya applied to their murals and ceramics. Unlike the blue paints employed elsewhere in the world a millennium ago, Maya blue is more brilliant and, more significantly, does not fade like other blues based upon the indigo plant. Even after 15 centuries, Maya blue still maintains its vivid brilliancy.

Somehow, the Maya paint chemists were able to combine indigo molecules with needles of polygorskite clay to create a chemical cage-like structure that protected the enclosed indigo particles from fading. Then, by adding nanoparticles (1 nanometer = 10^{-9} meter) of metal, they made the paint more brilliant. M. Jose-Yacaman et al remarked in techical terms:

> The combination of an intercalated clay forming a superlattice and the metallic and oxide nanoparticles supported on an amorphous substrate makes the ancient Maya blue look like modern nano-structured materials. (R12)

We have to suppose that this precocious chemistry was hit upon by accident after many fruitless trials.

X2. Paleolithic resinated wine. Archeological evidence (grape seeds) tells us that wild grapes were consumed and probably pressed for their juice at least 8,000 years ago. These facts are hardly surprising, neither is the likelihood that some of that Paleolithic grape juice was left alone for a few days and consequently fermented naturally into wine.

Unfortunately, in the Middle East at least, the high temperatures quickly turned the wine into vinegar. But as early as 5,400 B.C., our ancestral oenophiles learned (we don't know how) that their valued wine could be preserved much longer by adding a resin to it.

Chemical analysis of Iranian pottery of the period 5,400-5,000 B.C. turned up traces of resin from the Pistacia tree. The addition of stoppers to the wine containers helped preservation, too. (R11)

X3. Ancient artificial stone

Basalt synthesis, Mesopotamia. Basalt is a blackish volcanic rock that is hard and durable. In nature it sometimes occurs in long prisms of hexagonal cross section. In fact, ancient Micronesians quarried multiton basalt prisms to build their fantastic megalithic complex of 92 artificial islets at Nan Madol. (See MSS6 in Ancient Structures.)

The inhabitants of ancient Mesopotamia had no basalt quarries at hand. Indeed, building stone of any kind was exceedingly scarce. What the Mesopotamians of the second century B.C. did have in abundance was alluvial silt. From this unpromising material they were able to make their pottery, writing tablets, and art objects. However, for grinding grain and engineering structures they needed something harder and stronger. Their innovative solution was: artificial basalt made from silt. They simply melted the silt and let it cool slowly.

Sounds simple, but three remarkable intellectual and technical advances were required:

(1) The Mesopotamians first had to recognize that silt could be melted. This could not have been obvious in 1,000 B.C.

(2) Next, they had to develop high-temperature (1,200°C) smelters that were much larger than those they were using for metallurgical purposes.

(3) Finally, they had to discover that slow cooling was needed for the growth of large crystals in the cooling melt. (Of course, they had no microscopes to see the crystals. So, it had to have been something learned from experience.)

That the Mesopotamians were able to synthesize basalt can be seen at Mashkan-shapir about 80 kilometers south of Baghdad. Slabs of this artificial rock---flat and smooth on some sides from the molds ---are abundant. In fact, some 100 cubic meters of the man-made stone have been found. (R14, R15)

Pouring the Great Pyramid, Egypt. Highly controversial is the claim of J.

Davidovits that some of the massive stone blocks of the Great Pyramid were manufactured artificially by combining crushed limestone with a geopolymer, thereby bypassing the laborious quarrying, transportation, and shaping of natural limestone. For the pros and cons on this theory, which is vehemently rejected by mainstream archeologists, see MSP6-X2 in Ancient Structures. (R7)

Murrhine vases, Egypt. In his book The Pyramids, J. Davidovits discusses the possibility that the famed and beautiful murrhine vases of the ancient world were made artificially from naturally occurring natron (hydrated sodium carbonate) and other minerals. According to ancient texts, a liquid mixture of unspecified minerals was first melted. This naturally solidified into murrhine. The murrhine objects differ from porcelain in the variety of colors they exhibit as light plays on them. Davidovits offered no further details on murrhine chemistry. (R7)

The Encyclopedia Americana, however, states that the murrhine vases that were so highly prized in antiquity were made from a rare Oriental precious stone called "murra" about which little is known. If such was the case, murrhine was certainly not an artificial substance.

Our file on this subject seems to be incomplete. More about ther origin of murrhine must be known by now.

X4. Early tool-hafting with mastics. Mastics are glue-like materials made from plant pitch or natural bitumen (e.g.; asphalt). The use of such materials is rather surprising because high temperatures are needed to apply these materials and produce strong bonds with the stone tools.

Bitumen hafting. Two stone artifacts from the Syrian desert display traces of bitumen at locations where such materials would have been applied for hafting. These tools were extracted from a deposit just below sediments dated at about 36,000 B.P. It is therefore estimated that they could be almost 40,000 years old.

They demonstrate that Stone Age people possessed greater technical skills than commonly thought. For example, the raw bitumen (asphalt) had to be heated to more than 350°C.

The tool-hafters could have been either modern humans (Cro-Magnons) or Neanderthals. (R8-R10)

Birch-pitch hafting. Besides using natural bitumen, some European Neanderthals synthesized a glue from birch pitch to affix wooden handles to their flint knives. Preparing plant pitch requires higher temperatures (up to 400°C) than asphalt and, in addition, necessitates the exclusion of oxygen from the process. Apparently, the Neanderthals of, say, 35,000 years ago, were defying their general reputation as bumbling hulks. (R22)

X5. Great Pyramid "mystery" cement. In his book The Giza Powerplant, C. Dunn lays out a potential mystery concerning the casing blocks of the Great Pyramid:

> Fitted together, the blocks maintained a gap of 0 to 1/50 inch (0.02), which might be compared with the thickness of a fingernail. Inside the gap was cement that bonded the limestone so firmly that the strength of the joint was greater than the limestone itself. The composition of this cement has been a mystery for years. (R16)

With the expertise of modern chemistry, we wonder why the composition of this cement still remains unknown.

That the ancient Egyptians knew how to make good cement is not surprising. Humans had been making cements for 5,000 years before the foundation of the Great Pyramid was prepared. For example, the lime mortar used in the construction of Jericho 9,000 years ago is still intact. Further, according to J. Davidovits, the ancient Egyptians made extraordinary cements:

> Cement found in various parts of the courses of the Great Pyramid is about 4,500 years old, yet it is still in good condition. This ancient mortar is far superior to cements used in construction today. The modern portland cement used to repair ancient Egyptian monuments has cracked and degraded in only about 50 years. (R7)

We do not know if the cement cited by

Davidovits is identical to Dunn's "mystery" cement.

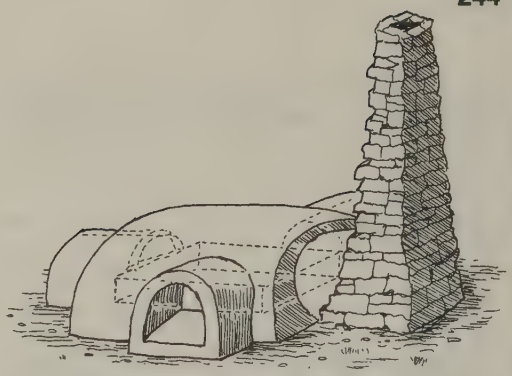
Davidovits outlines two cement-making processes easily available to the Egyptians. The easiest one employed the limestone of the Giza Plateau. To a slurry of this limestone, only lime, natron and water had to be added to begin a geopolymeric reaction leading to cement. (R7)

X6. The Great Glass Slab of Galilee. Ancient humans always had natural glass from volcanic outpourings from which to fashion tools and weapons, but this substance was not easy to acquire in many areas. In consequence, artificial glass making was invented as early as 2,700 B.C., as demonstrated by a small glass cylinder uncovered near Baghdad in the 1930s. (R1)

While we cannot ignore the technical sophistication required for this innovation, the most interesting ancient glass mystery was long hidden in a cave, once used as a cistern, 12 miles southeast of Haifa, Israel. This artifact from late Roman times was first noticed when a bulldozer struck it when clearing the large cave for the construction of a museum. Even then, the object---a large slab, 6 x 10 feet in area and 20 inches thick, was not recognized as glass. It was just a convenient flat rock upon which an exhibit was built. Finally, some Israeli archeologists realized that the slab was not natural rock but rather a glass of some sort.

In 1964, a team of American glass experts led by R. Brill was called in to study the slab. They confirmed that it indeed was ancient glass---8.8 tons of it, that had been cast in place in a mold long since removed. In fact, in 1964, it was the third largest piece of glass ever cast, being surpassed only by the huge mirrors cast for American telescopes in 1934. To Brill, it was a marvelous technological feat for 1,500 years ago. He wrote:

> We must in the meantime commend its unknown makers for their engineering skill. They brought over 11 tons of raw materials to a temperature in excess of 1000°C for several days, and produced a glassy consolidated mass. This was a considerable technological feat, and I know of no similar accomplishment in the metallurgical or other pyrotechnic arts in ancient times. (R4, R6)



To cast the Great Glass Slab a mold of limestone blocks was coated with a thin clay lining. (X6)

The salient question, though, concerned the slab's purpose. A clue lay in its color: a purplish-green created by the addition of manganese to the melt. The Great Glass Slab was perhaps destined to be broken up for distribution to local village artisans. However, the slab was so full of bubbles, cracks, and other defects that it was probably considered unsuitable for such use. It was, apparently, abandoned as a bad job.

A second possibility was that the slab was planned as the floor of a structure that was never built. Perhaps a masssive floor of colored glass had some sort of mystical significance. This thought is not as far-fetched as it sounds when one recalls the massive sheets of mica in the Pyramid of the Sun at Teotihuacan, near Mexico City. (See MSP4 in Ancient Structures.)

X7. Rubber manufacturing in ancient Mesoamerica. The 16th.-Century Spanish invaders of Central America were entranced by the fast-paced, sometimes bloody, ball games of the natives. Most amazing to them, though, were the high-bouncing balls employed in the games. The Spaniards were used to playing games only with comparatively lifeless pigskin balls.

The Mesoamerican ball games were invented at least 3,400 years ago, and balls fashioned from elastic rubber were

already in use. This rubber was also used in religious figurines, in incense, and in the hafting of tools.

The basis of Mesoamerican rubber was, as today, the latex from the tree Castilla elastica. But latex is a sticky white liquid that becomes brittle when dry. The rubber makers 3,400 years ago somehow learned how to coagulate the latex into raw rubber by mixing it with the sap from a species of morning glory vine---certainly not an obvious way to make rubber balls! We do not know if this discovery was accidental or the result of a series of intentional experiments. (R18)

F. Bates, a polymer chemist, freely admitted:

> It's a marvelous example of technology demonstrated at an incredibly early stage...They probably had a pretty good R&D team. (R17)

X8. Wet-chemistry synthesis in ancient Egypt. The ancient Egyptians applied cosmetics copiously to themselves. Upper-class women (perhaps men, too) favored green, white, and black makeup. Their cosmetic powders, dating from 2,000 B.C., have been exceptionally well preserved in their original vials made of alabaster, ceramics, and wood. A team of French chemists led by P. Walter was not surprised when their analyses of these powders found them to contain crushed galena and cerussite (two ores of lead). However, they nearly dropped their test tubes when they also found chemical compounds that are extremely rare in nature; specifically, laurionite (PbOHCl) and phosgenite ($Pb_2Cl_2CO_3$). In fact, these compounds are so rare in nature that the Egyptian powders must be artificial. P. Walter et al wrote:

> Taken together, these results indicate that laurionite and phosgenite must have been synthesized in Ancient Egypt using wet chemistry. The Egyptians manufactured artificial lead-based compounds, and added them to the cosmetic product. The underlying chemical reactions are simple, but the whole process, including many repetitive operations, must have been quite difficult to achieve.

It had been recognized earlier that the Egyptian chemists had used fire-based technology 500 years earlier (2,500 B.C.) to manufacture blue pigment. Wet chemistry represented another forward technological step. (R19, R20)

X9. Chemical etching. About 1,000 A.D., centuries before European artisans came across the process, Hohokam Indians of the American Southwest were chemically etching designs into seashells. (R3)

D.B. Adams elaborated on this Native American precociousness in the December 1983 issue of Science 83.

> Perhaps the most unusual Hohokam art objects are the acid-etched shells. They are of a species from the Gulf of Mexico, suggesting that the Hohokam traded with tribes a thousand miles to the east. Artists marked their designs on the shells and then covered certain portions with tar or pitch. The shell was then soaked in acetic acid made from fermented cactus juice. The acid etched away areas not protected by the tar, leaving the design in relief. (R5)

X10. Stone softening. A notorious claim of fringe archeology states that the old engineers of the New World knew of a way to soften stone through the use of the juice of a native plant. They ask, "How else could the Inca masons have fitted their huge stone blocks together so precisely?" (MSB3 in Ancient Structures.)

In Mexico, we actually see some support for this apparently wild claim.

In the 1930s, J.O. Outwater, Jr., an engineer from the University of Vermont, made a study of Mayan construction techniques. One of the buildings he examined was a temple at Mitla, in Oaxaca. This temple is ornamented by about 300,000 thin, flat pieces of stone. These tile-like pieces were derived from trachyte, a dense, durable rock that does not split easily like slate. How did the builders at Mitla ever obtain 300,000 fine, thin tiles from this obdurate material? Outwater suggested

that the trachyte was softened before it was shaped!

> What he feels is probably an important clue is a big stone cauldron more than four feet in diameter carved out of a boulder and completely immovable. The cauldron was found located near a quarry which must have been a major source of the Mitla stone.
>
> Mr. Outwater reasons that the ancients must have dipped their stone into a softening agent, let it soak there until it was soft and then cut it to size, using a nearby stream to carry off the waste. (R2)

Outwater was not able to identify a probable softening agent. His experiments with vinegar, potash, and urine were negative.

This is interesting, especially in view of X3 and X9, but it is nevertheless only circumstantial evidence.

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R3. Haury, Emil W.; "First Masters of the American Desert," National Geographic Magazine, 131:670, May 1967. (X9)

R4. Brill, Robert H.; "A Great Glass Slab from Ancient Galilee," Archeology, 20:88, 1967. (X6)

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R18. Hosler, Dorothy, et al; "Prehistoric Polymers: Rubber Processing in Ancient Mesoamerica," Science, 284:1988, 1999. (X7)

R19. Walter, P. et al; "Making Make-Up in Ancient Egypt," Nature, 397:483, 1999. (X8)

R20. Anonymous; "First Chemists," New Scientist, p. 27, February 13, 1999. (X8)

R21. Seitz, R., et al; "'Olmec Blue' and Formative Jade Sources...," Antiquity, 75:687, 2001. (X1)

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MMT2 Ancient Metallurgy

Description. Unexpected advances in the Ancient World in the obtaining and use of such metals as platinum and aluminum, the formulation of useful alloys, the development of gilding and plating techniques, and the inventions of soldering and welding. Altogether, twelve metallurgical advances are sufficiently remarkable in terms of history and geography to catalog here.

Data Evaluation. The great majority of the sources come from science journals and magazines. The data evaluations are the first figures in the ratings below.

Anomaly Evaluation. The anomaly evaluations are the second figures in the twelve ratings listed below.

- The use of platinum in ancient Egypt, suggesting Precolumbian diffusion from the New World (X1). Ratings: 3/1.
- The use of aluminum during the Jin Dynasty, China, (265-420 A.D. (X1). Ratings: 2/1.
- The appearance of bronze in ancient Egypt (X2). Ratings: 1/3.
- The addition of bismuth to bronze in South America (X2). Ratings: 1/2.
- Unexpectedly early appearance of steel in Europe (X2). Ratings: 2/3.
- The gilding of copper by 1,000 B.C. in South America (X3). Ratings: 1/2.
- The silver plating (not overlaying) of copper in North America (X4). Ratings: 4/1.
- The plating of copper with antimony in ancient Egypt (X4) Ratings: 1/1.
- The use of electroplating anywhere in the Ancient World (X5). Ratings: 3/1.
- The silver-soldering of copper in Precolumbian South America (X6). Ratings: 1/2.
- Copper-welding in Precolumbian South America (X7). Ratings: 1/3.
- The fabrication of long metal drainage pipes in the Ancient World (X8). Ratings: 1/2.

Possible Explanations. With the development of high-temperature, forced-air furnaces, the accidental discovery of various alloys and metal-joining and plating methods was to be expected given native human inventiveness and curiosity. However, the fact that Precolumbian South American metallurgy was so advanced is rather amazing and suggests the technological talents of early South Americans have been underrated.

Similar and Related Phenomena. Ancient metal artifacts (MMM); ancient mining (MSE5 in Ancient Infrastructure; the Baghdad battery (MMT9-X2); the general diffusion of science and technology (MAS in another volume).

Entries

X1. Ancient use of rare and difficult-to-win metals. Potentially anomalous artifacts made of copper, iron, and bronze were discussed in Chapter MMM. We now examine artifacts made of either platinum or aluminum. The former metal can be found in relatively pure form in nature, but it is widely asserted that aluminum is never found in a free state.

Platinum. Platinum is a soft, ductile, noble metal like gold. Also like gold, it occurs in relatively pure nuggets and grains in some placer deposits. This metal is notably absent in artifacts from the Old World. However, platinum was well-known in ancient South America. Conventional history states that it was the Spanish conquerers of South America who first introduced the Old World to this metal in the form of a dense, hard-to-melt alloy called platina---not to be confused with today's zinc-copper alloy of the same name.

A possible anomaly was introduced circa 1900 by P. Berthelot, when the famous French chemist claimed to have discovered platinum in an ancient Egyptian artfact, thereby upsetting conventional history.

> Professor Berthelot reports in a recent number of the Comptes Rendus that on a metallic box from Egypt, covered with inscriptions, he found a portion of one of the characters made of platinum. The mass was too small for a complete analysis, but from its behavior toward aqua regia, it appeared to be native platinum. The date of the box was about 700 B.C. From two standpoints this discovery is of more than passing interest. It has been a much disputed question whether platinum was known to the ancients. Passages from the classics have been quoted which appear to some to be references to platinum, but this application is in every case very doubtful. A much stronger argument against the probability of platinum being known more than a few centuries ago is that, until this discovery of Berthelot's, no trace of the metal has been found in any ancient remains. Had platinum been known, it is hardly conceivable that specimens of it should fail to be found somewhere among the multitudinous remains of [Old World] antiquity. (R4)

Naturally, the anomalist asks whether a nugget of platinum from South America might not have found its way to Egypt by 700 B.C. via Phoenician or other adventuresome voyagers; that is, via "reverse" Precolumbian diffusion.

While the diffusionist's explanation of ancient Egyptian platinum is problematic, there is no doubt that the Precolumbian metallurgists of South America knew platinum quite well. Not only did they fashion small objects from nearly pure platinum nuggets, but they learned how to amalgamate platinum and mercury in order to make platinum-plated jewelry. They first made a mercury-platinum paste with which they coated objects to be plated. Then, they drove off the mercury in the amalgam with heat. With a little burnishing, an attractive platinum-plated ornament was created. (R12)

Aluminum. Although aluminum is the most common metallic element in the earth's crust, both of the encyclopedias consulted insist that it is never found free in nature. It must be won from its ores by chemical means or, more commonly, by electrochemistry. Accepted history claims that it was not until 1825 that H.C. Oersted finally chemically separated relatively pure aluminum. Consequently, it would be highly anomalous, if metallic aluminum were found to have been available in ancient times. Nevertheless, two such claims are herewith cataloged.

The scene of the first tale is ancient Rome during the reign of Tiberius (41 B.C. to 37 A.D.). The writer Petronius tells us a tale in his Satyricon (circa 60 A.D.) involving a substance that might have been aluminum metal. A Roman workman is said to have presented the Emperor Tiberius with a cup made of unbreakable "glass" that looked like silver but was much lighter. The workman claimed he had extracted the substance from clay. The Emperor threw the cup to the floor but it did not break, although it was dented. Whereupon the workman took out a small hammer and repaired the dent, suggesting metallic ductility. Upon being questioned, the worker admitted that only he knew the secret of the "glass." Tiberius, fearing that the mass production of such a remarkable substance from common clay would make gold and silver worthless,

had the workman beheaded immediately. (R5, R7)

It is a great story that is perhaps apocryphal but also possibly the first indication of the discovery of a light, silvery metal common in the earth's crust; i.e., aluminum.

In a 1903 number of Knowledge, A. Duboin made the above tale sound more plausible.

> A few years after the discovery of aluminium, a memorandum from M. Chapelle appeared in the Reports of the Academy of Sciences, tending to prove that by heating a mixture of chloride of sodium, clay, and charcoal, a multitude of metallic globules are obtained, which would be aluminium. (R7)

Duboin also mentioned other chemical methods for winning aluminum from clay. Could the Roman workman have accidentally have hit upon one of these formulas?

It is, therefore, not totally impossible that a second story about aluminum, from China this time, might also be true.

This tale arose in 1952, when a tomb from the Jin Dynasty (265-420 A.D.) was opened for the first time. In it lay an undisturbed skeleton encircled by a belt consisting of about 20 pieces of metal. Four of these pieces are reported to be made of nearly pure aluminum. Assuming no hoax, it would appear that the Chinese had somehow isolated aluminum from its ores 1,500 years before the Europeans! (R24, R31, R32)

Much has been made of the so-called Nanjing belt. No vague tale from antiquity, the tomb and belt were thoroughly studied by modern archeologists and chemists. The latter vouched for the existence of aluminum. A hoax was deemed highly improbable. Where, then, did the aluminum come from?

Two possibilities seem in play:

(1) The Chinese metallurgists of the Jin Dynasty, who had high-temperature furnaces, accidentally hit upon one of the several ways to chemically win aluminum from one of its several ores.

(2) Contradicting the encyclopedias, Chinese geologists reported in 1985 that they had found grains of native aluminum in Guizhou Province. Could the Jin Dynasty metallurgists have collected enough of these grains to make the aluminum sections of the Nanjing belt? Did they hammer the grains together or perhaps melt them. The melting point of pure aluminum is only 1220°F. This temperature might not been out of reach 1,500 years ago.

Belt buckle from the Jin Dynasty (265-420 AD) reported to be made from Aluminum. (X1)

X2. Early alloys, especially bronze. Copper containing a few percentage points of tin is more fusible than pure copper and, even more important, is harder and less malleable. This alloy is called bronze, and bronze was much better than copper for making tools and weapons in antiquity.

Conventionally, the Bronze Age began in Iran, where bronze implements have been dated to 3,500 B.C. (MMM1-X5) However, this date was pushed back to 3,600 B.C. in 1976 with the discovery of a bronze spearpoint firmly dated by radiocarbon. (R19) Perhaps more astonishing than the earlier date is the spearpoint's location: Thailand. Evidently, the Middle East was not the only "cradle of modern civilization"!

In reckoning when the Bronze Age began in various parts of the planet, it should be recognized that naturally occurring copper often contains a bit of tin; sometimes enough to make it a "natural bronze." To be sure that a bronze is an artificial alloy, the archeologist must show that the makers of "artificial" bronze had access to tin and used it to enrich their relatively pure copper. This distinction has not always been easy to make.

In addition to the surprisingly early Thai bronze just mentioned, we have assembled some other interesting facts concerning the early development and use of bronze.

Egypt. Archeologists see little evidence that the ancient Egyptians made much use of bronze, even though it had been produced in nearby Iran a millennium before the start of the Great Pyramid. Were the pyramid-builders not hampered by having only soft copper tools at their disposal? (See MSP6-X1 in Ancient Structures)

The Egyptian workmen apparently did harden their copper by hammering. They also added arsenic, sometimes zinc, sometimes tin. In fact, the oldest Egyptian tools contain notable amounts of arsenic. The addition of zinc makes brass, which is an attractive alloy but not especially useful in tool-making. Copper alloyed with tin, though, made the bronze that archeologists have long supposed was unknown to the ancient Egyptians. A paper in Nature in 1898 by J.H. Gladstone left little doubt that bronze was definitely in the ancient Egyptian tool kit although perhaps not widely used. Gladstone wrote:

> As to the mixture of tin, It is well known that bronze, the alloy of copper and tin, is stronger than pure copper. The extent of this depends upon the proportion of the two metals, and probably on other circumstances. The oldest supposed occurrence [in ancient Egypt] of an admixture of tin is in a bronze rod found by Flinders Petrie in a mastaba at Medom (sic), probably of the fourth dynamsty, which I found to contain 9.1 per cent. of tin. It seemed so improbable that tin should be employed at so remote a period, and that in sufficient quantity to make what we call gun-metal, that I was suspicious of its genuineness, notwithstanding the very circumstantial account of its discovery; but M. Berthelot has since found in a ring from the tomb at Dahshur, believed to be not much later than the third dynasty, 8.2 per cent. of tin; and in a vase of the sixth dynasty, 5.68 per cent. of tin. (R2)

So, bronze was known to the pyramid-builders, but they used it so sparingly as to be declared nonexistent by later archeologists. Perhaps they were content with their arsenic alloy of copper and their hammer-hardened copper tools. They certainly had little trouble slicing through limestone with their copper saws when they added slurries of quartz sand to promote the cutting.

Africa. In the Transvaal, long before the arrival of whites, an unknown people mined and smelted tin with which to make bronze. The unusual composition of this African bronze---its high nickel content---combined with its geographical distribution suggests that it was made in ancient times, as implied below.

> In regard to the presence of nickel in the bronze, there is at Blaauwbank a nickel lode carrying at the outcrop masses of apple-green 'nickel-bloom' which remotely resembles malachite. The accidental introduction of this material may have led to its continuous inclusion intentionally when its special qualities had been appreciated. The point is one of considerable archaeological interest, as it is stated that no other ancient mines are known that could have furnished in one locality the ores for producing a nickeliferous bronze, and a nickel-bronze was known and in use in early Mesopotamia and Egypt. (R10)

Summarizing, we have here an unidentified ancient race of bronze-makers in South Africa who apparently also had long-distance trade ties with both early Egypt and Mesopotamia.

South America. Prehistoric Peruvian burials include many bronze ornaments and tools. Surely, the Inca knew how to make bronze, but their predecessors at Tiahuanaco, Bolivia, a city ascendant 600-1,000 A.D., apparently did not. We suspect this because the metal clamps the Tiahuanaco engineers used to link their megalithic stones together were made of pure copper, not bronze. (R9)

Our present sources do not pinpoint a date and place for the first bronze-making in South America. The discovery might have been accidental, for there is much tin in the ores mined in the Andes.

We do know that the Inca metallurgists were innovative because some bronze artifacts recovered from Manchu Picchu contained 18% bismuth in addition

to tin. Bismuth in bronze facilitates casting and represents an interesting metallurgical advance. (R22) However, we do not know if the Incas actually purified bismuth; it may have occurred naturally in their copper ores.

Other unusual alloys were mixed in prehistoric South America. For example, when the European looters of South American gold objects had them assayed, many were found to be made from alloys containing considerable copper and were, therefore, much less precious than originally imagined. (R14, R23)

Europe. In 1905, two French scientists announced the excavation of a huge, prehistoric mass of metal with the chemical properties of steel. This discovery was reported in Nature.

> G. Arth and P. Lejeune give some interesting particulars of a prehistoric mass of metal found near Nancy at a depth of 4½ metres below the surface. The mass weighs about 300 kilograms, and is accompanied by fragments of charcoal and slag. It appears to have been the base of an ancient hearth in which the metal had been subjected to repeated and prolonged heatings. The metal contains, in addition to iron, 1.212 per cent. of combined carbon, 0.038 per cent. of graphite, 1.670 per cent. of silicon, 0.026 per cent. of sulphur, 0.013 per cent of phosphorus and 0.180 per cent. of manganese. It is thus a steel containing a higher percentage of silicon than is now usual. The microscopic examination shows that it belongs to Guillet's first group of silicon steels, pearlite steels consisting of a solid solution of Fe_2S in iron. (R8)

The dating of this metal mass is vague. It is hard to imagine prehistoric metal workers deliberately making steel.

X3. Gilding. Gilding is the application of a thin layer of gold to an object--usually made of copper in ancient times---to give the highly desirable appearance of pure gold. Today, gilding is done in many ways: by chemical deposition, by sputtering, by the evaporation of gold in a vacuum, and by several other methods far out of the reach of metallurgists even just a few centuries ago.

Nevertheless, the Precolumbian metal workers in South America were skilled and innovative, producing spectacularly beautiful gilded objects.

The oldest examples of South American gilding found so far come from Mina Perdida, just south of Lima, Peru. There, R.L. Burger and his colleagues discovered fragments of gilded copper foil that date back to about 1,000 B.C. It appears that both the copper and gold had been beaten into thin sheets and then united by some sort of unidentified adhesive, probably aided by the application of heat. (R28-R30)

It has been speculated by modern metallurgists that South American gilders might have used mercury to bond gold to copper. This process involved making mercury amalgams on the surfaces of both the gold and copper. Then, the surfaces were pressed together, and the mercury was driven off by heat, leaving the two metals intimately bonded. However, no traces of mercury have so far been found in South American gilded copper. (R13)

Two other gilding techniques may have been employed instead, the first has been described by P. Bergsøe.

> Gilding must have been done by dipping the copper into a melted gold-copper eutectic (gold with about 20 per cent copper), the melting point of which is some 200° C. lower than that of copper; or possibly, the gold-copper alloy was applied to the copper and kept at red heat on charcoal by means of a blowpipe. The alloy will then fuse without the use of flux being necessary, the reducing flame securing a flowing surface free of oxide. (R13)

In the second suggested technique gold acted as a sort of solder, as described by H. Maryon.

> The two sheets, one of gold, the other of the platinum-gold alloy, would be laid one upon the other on the charcoal, or possibly on a terra-cotta slab. Heat would be applied sufficient to cause the gold to run, and the two sheets would become fastened together; the gold again acting as a cement. As a result, a plate, one side of which was of gold, the other of the platinum-gold alloy,

white in color, was obtained. (R14)

Both of the gilding methods suggested above required considerable metallurgical expertise. The Spaniards were duly impressed by the brilliant gilded artifacts that had been produced by the Chavin and Moche cultures on the west coast of South America.

Before leaving the subject of gilding, we refer the reader the the El Dorado legend. El Dorado = "the gilded man" in Spanish. It also the name of a long-sought-for lost city of gold. But the gilded man is pertinent here. Briefly, when the Guatavita people of Precolumbian Columbia chose a new leader, this person was ceremonially anointed with a sticky resin and then covered with gold dust. Voilá, a gilded man! (See details in MSS1-X2 in Ancient Structures.)

X4. Plating with metals other than gold

North America. As the Indian mounds of North America were opened by amateurs and, more rarely, men of science, a few copper ornaments apparently plated with silver came to light. (R1, R17)

The word "plating" implies an intimate bond between the metal coating and the base metal. It was questioned by many whether these artifacts from the mounds were truely plated or simply overlain with silver. Some prominent scientists of the 19th. Century, such as E.G. Squier, opined that the silver-copper junctions he observed had probably required the use of heat to obtain the intimate junctions he observed. But a careful study by F.W. Putnam demonstrated that such was not the case. He wrote as follows.

> The plating has been done simply by covering the outer surfaces of the objects with thin sheets of the overlaid metal, which were closely united with the copper simply by pounding and rubbing, and by turning the edges over and under the slightly concave edge of the copper foundation...These ear-ornaments exhibit a degree of skill in working with the native metals of copper, silver, and iron, simply by hammering, which is conclusive evidence of the advance made by early American tribes in ornamental art. (As quoted in R17)

Europe. A more advanced sort of metal plating has been observed on a nicely manufactured bronze axe plowed up in Hampshire, Britain. This axe bears the traces of tin plating and in its uniqueness poses problems in explanation.

The axe dates from the Bronze Age in which gilding and plating with silver and arsenic were already well-developed. Tin-plating was something new.

The axe's plating of tin was a well-defined layer distinct from the bronze underneath, which eliminated any explanation based upon "tin-sweating" during the cooling of the bronze. The axe's plating was mostly tin but included some copper content. This meant that the ax had not been simply dipped in pure molten tin to acquire its plating. The best guess of the experts was than a foil of tin had been laid over the bronze axe followed by the application of intense, prolonged heating. (R21)

Africa. In 1933, C.G. Fink, Columbia University, announced that some 5,000-year-old Egyptian copper vases were coated with a thin layer of antimony.

> To explain the existence of the antimony-coated vessels, we must conclude that the Egyptians knew the secret of electro-chemical exchange, a secret later lost and not rediscovered until the last century by Faraday...The Egyptians must have dipped their copper vessels in a solution of antimony sulphide, vinegar and salt (sodium chloride). When this is done and electrochemical exchange takes place---the copper goes into the solution and the antimony becomes deposited on the vessel's surface. (R11)

Note that this proposed process does not require the use of external electricity and is, therefore, not truly electroplating. However, the procedure outlined by Fink nonetheless represents considerable metallurgucal sophistication by the ancient Egyptians.

X5. Electroplating. Evidence in our files for the electroplating of metals in the ancient world is not impressive.

South America. The Moche culture that

flourished in Peru 100-700 A.D. exhibited amazing metallurgical prowess, but did they employ electroplating? M. Dempsey states, without citing sources, that the Moche did electroplate copper with gold in a 1992 issue of New Scientist. (R26) We have not seen confirmation of this claim elsewhere.

Iraq. In MMT9-X2, the famed Baghdad battery is discussed---pro and con. If this artifact was really a battery, its most probable use was in electroplating. (R27) But this is an inference based upon a controversial artifact. Nevertheless, many fringe-literature sources assert firmly that electroplated artifacts have been found in the Baghdad area. (R20) We have seen no confirmation of this contention in the professional literature.

X6. Ancient soldering. The only example of precociously early soldering comes from a copper whistling-arrowhead made in Precolumbian Ecuador.

> The arrow-head is a 21.5 centimetre copper rod with a hollow bulb-like distention just behind its middle. On this hollow bulb a fine seam is discernible. Professor Hultgren was requested to try to determine how the arrow-head had been made. Briefly, the examination led to the following findings. The point and the tang consisted of copper only. The hollow bulb was coated with a fine film which proved to consist of silver. The joint was visible in a six-fold magnification. High magnification (1500 times) confirmed that the bulb consisted of copper, and that the seam was filled with an alloy. This consisted of a fine-grained silver-copper alloy...This bulb had been heated and the crack soldered with either a silver-copper alloy or silver alone. This is a soldering technique hitherto unknown in South America. (R15)

X7. Ancient welding. Continuing with the article quoted directly above:

> Professor Hultgren once examined a little prehistoric copper rattle from Supe on the Peruvian coast and now in the Ethnographical Museum of Gothenburg. To a 150 millimetre copper handle is affixed a slightly oblong hollow head containing two five-millimetre copper pellets and made of two bell-shaped halves of 0.5-millimetre copper sheeting. These two halves are expertly welded together in a virtually perfect joint, no seam whatsoever being visible in the metal itself although the joint had opened along some thirty millimetres. (R15)

No specific archeological date was mentioned for the welded rattle.

The welding of the just-mentioned Peruvian artifact joined two copper sheets. The following example from Europe involves dissimilar metals and therefore represents a more difficult metallurgical task. Very likely, it preceded the Peruvian example by several centuries.

> An ancient axe belonging to the Hallstatt period, 800 to 400 BC, has recently been found in Poland. Metallurgical examination has shown that the socketed head of the axe was forged from a block which had been formed by welding together two dissimilar metals. This proves that the iron workers of 2,500 years ago must have been able to distinguish between two different iron alloys and it presupposes a high degree of metallurgical knowledge. (R16)

X8. Advanced metal fabrication.

Ancient Egypt. The Valley Temple at Abusir contains an underground drainage system consisting of copper pipes more than 1,000 feet long. (R25)

Ancient Syria. Discovered nine feet under the ruins of Ugarit (or Ras Shamra) was a modern-looking sewer system. Streets dating to 2,000 B.C. were built with lead drains. (R20)

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MMT3 Ancient Surgery and Dentistry

Description. The skeletal and artifactual evidence that remarkable surgical and dental procedures were carried out in pre-Roman Europe and the Precolumbian New World.

Data Evaluation. The skeletal and artifactual evidence described in science journals, magazines, and books are robust. Rating: 1.

Anomaly Evaluation. The collected literature suggests three potential anomalies. The anomaly evaluations are the second figures in the ratings.

- Difficult, successful trepannations and amputations were performed in Neolithic times, indicating unexpected surgical skills and knowledge of the human body (X1). Ratings: 1/2.

- Specialized intruments for abortions appear in South America's archeological record (X2). Ratings: 1/2.

- Elective, cosmetic dentistry similar to that practiced in Asia appeared in Precolumbian Mesoamerica suggesting trans-Pacific diffusion (X3). Ratings: 1/2.

Possible Explanations. None required.

Similar and Related Phenomena. Many trepanned skulls worldwide (MMB7); the cannibalism signature (MMB8).

Entries

X0. Introduction. Humans have been trying to repair their damaged bodies and decaying teeth for at least tens of millennia. New medical and dental instruments and procedures have been invented throughout human history. The problem faced in this book is defining what is anomalous or at least interesting enough to include. The decision that has been made is that only pre-Roman instruments and procedures from the Old World should be included; in the New World the temporal dividing line is the arrival of Columbus.

X1. Skeletal evidence of ancient surgery. The only positive, "hard" evidence we have of surgery performed prior to 2,000 B.P. comes from surviving skeletons. Surgery may have been done on soft body parts, as in circumcision and ear removal, but the evidence is now gone.

Trepanning. Neolithic skeletons reveal a surprising number of skulls with surgically incised holes. These skulls are described in some detail at MMB7 along with other potentially anomalous skeletal phenomena. Trepannation was virtually worldwide and provides indisputable evidence for amazing surgical prowess 10,000 years ago.

Amputations. For millennia, human body extremities have been removed for medical reasons, punishment, and ritual purposes. In fact, the hands of thieves are still removed in some countries.

One type of surgical amputation that stands out in the fossil record is that of finger removal. Skeletons from Africa, Oceania, North America, and South America occasionally have missing digits. That this non-medical surgery was also practiced in Europe in the Upper Paleolithic is suggested by the many cave paintings of hands with one or more missing fingers. (R7)

An extreme example of medical amputation is seen in a Neanderthal skeleton from Shanidar Cave in Iraq. In this case, an entire arm seems to have been cut off, perhaps because of infection. The

first part of such a major medical procedure would have been rather easy for a Neanderthal physician equipped with razor-sharp stone tools and considerable practice in butchering slain animals for food. (R7) How the resulting blood was staunched we do not know; perhaps this patient didn't make it!

X2. Ancient surgical tools.

South America. The medical prowess of the inhabitants of Precolumbian South America is not adequately appreciated, as suggested by the following anonymous item from Nature from 1968.

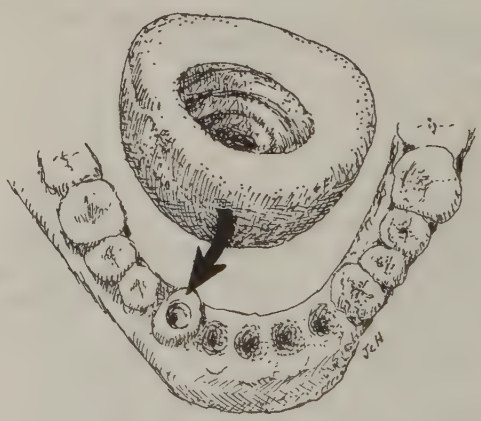
> A set of surgical instruments which was used to carry out abortions in ancient Peru is described in the latest issue of Antiquity (42:233, 1968). The instruments were found, among scalpels, needles, forceps and bandages, in burial grounds dating from the Chimu period (about AD 450-750) and have been described by Dr. Oscar Urteaga-Ballon of the National University of San Marcos and Dr. Calvin Wells of the Castle Museum, Norwich. There are four dilators and five curettes which closely resemble the modern instruments used to scrape a uterus in order to produce or complete an abortion. (R3)

Europe. Some 2,000-year-old surgical tools came to light when archeologists excavated a tomb near Colchester, England. Although the Roman invasion had recently occurred, these instruments probably belonged to a Celtic surgeon. Such is indicated because they were made from iron rather than bronze, the latter metal being typical of Roman medical instruments.

> The medical kit suggests that an ancient British healer practiced a wide variety of surgical techniques, including perhaps operations on tonsils, hemorrhoids, and even cataracts. (R6)

X3. Skeletal evidence of ancient dentistry. Dentistry was practiced for two reasons in ancient times: (1) removal of tooth decay; and (2) insertion of ornaments. The latter purpose is, of course, consistent with the age-old practice of filing teeth for cosmetic purposes. We can assume, too, that decayed teeth were routinely extracted by Neolithic dentists.

North America. In sorting through the bones taken from early Indian shelters in Rio Blanco County, Colorado, T. White came across a jawbone holding a canine tooth that had been deliberately drilled---probably to remove decay. The neat hole was examined under a microscope. The striations caused by the drill, probably made of obsidian, were obvious. Age range of the tooth: 800-1,200 A.D. (R5)



Top of a drilled canine tooth from the American Southwest circa 800-1200 A.D. Traces of an abcess exist at the bottom of the cavity. (X3)

Mesoamerica. An interesting bit of evidence for Precolumbian diffusion from Asia is seen in cosmetic dentistry.

> Among the interesting objects brought from Copan last year by Messrs. Saville and Owens, of the Peabody

> Museum of American Archaeology and Ethnology, are several incisor teeth, each of which contains a small piece of green stone, presumably jadite, set in a cavity drilled on the front surface of the teeth. The museum had before received from Yucatan human teeth filled in a peculiar manner, and now it has teeth from Copan filled in the same way. This is of particular interest in adding one more to the several facts pointing to Asiatic arts and customs as the origin of those of the early peoples of Central America. (R1)

Of couse, some dental drilling was done simply to remove decay.

> Mayan Indians who lived in Central America more than 1,000 years ago practiced dentistry and knew something about the technique of drilling holes in teeth and filling up the cavity with metal. Two teeth containing circular holes filled with iron pyrites are among the discoveries reported by J. Eric Thompson, leader of the Captain Marshall Field Archaeological Expedition to British Honduras, which has recently returned to the Field Museum of Natural History. (R2)

Europe. Danish researchers have found Neolithic teeth neatly drilled for some unspecified purpose, probably to remove decay. (R5)

Asia. Apparently, the earliest example of a tooth drilled for the removal of decay comes from an 8,000-year-old skeleton from Pakistan. A molar still firmly fixed in its jawbone shows a tiny, perfectly round hole which under a microscope shows the concentric grooves left by a drill. The top of the hole is rounded by chewing, indicating that the patient survived. (R9)

X4. Protheses and reconstructive surgery

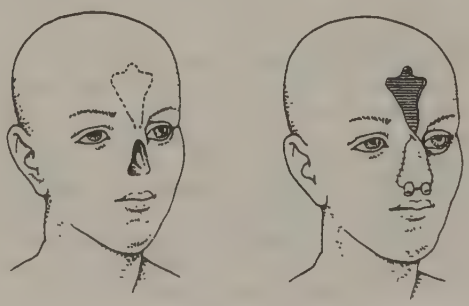
Africa. A 3,000-year-old mummy from Thebes, Egypt, carries a wooden big toe. The artificial toe is carefully shaped and provided with a realistic toenail. It is attached to a socket made from two pieces of wood that fit around the sides of the foot. (R8)

Asia

> In ancient India, nasal amputation was a common form of punishment for adulterers, creating a broad need for nasal reconstruction. In a remarkably detailed and rational book written at the time of Vedic medicine, perhaps 1,000 B.C., the Sushruta Samhita, nasal reconstruction using tissue flaps either obtained from the face or forearm is described. (R10)

More details of one version of this surgical procedure---also derived from the same Vedic text---is to be found in Ancient Inventions by P. James and N. Thorpe.

> A leaf-shaped flap of skin is cut from the forehead, twisted over, lowered over two small tubes (usually bamboo) inserted to act as nostrils, and attached to the face. The most difficult part of the operation is to twist around the flap without constricting the blood vessels at the tip of the "nose." (R4)



Nasal amputation---a common punishment in ancient India---was sometimes surgically repaired using a flap of tissue from the forehead. (X4)

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MMT4 Micro-Work: The Magnification Conundrum

Description. The widespread existence of large numbers of very tiny, finely crafted stone and metal artifacts, often precision-drilled and engraved, that are beyond the unaided, visual capabilities of the normal human eye.

Data Evaluation. We do not have in hand detailed scientific studies of these tiny artifacts we call "micro-work." However, the remarks in the sources we do possess leave no doubt that many incredible examples of ancient micro-work exist in the world's museums. Rating: 1.

Anomaly Evaluation. The magnification conundrum can be resolved in at least two ways: (1) Ancient artisans fashioned magnifiers from clear, natural crystalline materials, such as quartz; and (2) Some of these artisans were "myopes"; that is, they were very near-sighted and could see fine detail without artificial aids. No one really knows how micro-work was done, but there are two, possibly more, reasonable explanations. Rating: 3.

Possible Explanations. See above. Note that magnification using the pin-hole effect is judged to be impractical in micro-work. (R2)

Similar and Related Phenomena. Ancient optical instruments (MMT8); the drilling and machining of very hard materials (MMT5); microliths (MMS4).

Entries

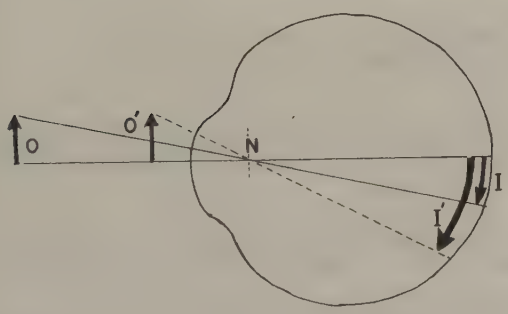
X0. Introduction. Some artifacts handed down from ancient times display workmanship at dimensions so minute that it seems one must assume the artisans had either optical help long before glass lenses were invented or they possessed eyesight of incredible acuity.

This magification conumdrum was clearly defined by L. Gorelick and A.J. Gwinnett in their inquiry into how such ancient "micro-work" may have been accomplished without optical help.

> It should also be remembered that clear glass was not invented until Roman times, thousands of years after many artifacts with minute detail had been produced. (R2)

Gorelick and Gwinnett favored the idea that such "micro-work" was carried out by myopes; that is very-short-sighted individuals who could see and do very close work! In this regard, see MMT8 for potential ancient optical devices.

Unhappily, we have found very little in the literature about specific artifacts displaying such "micro-work."



Normal eyes focus an object (O) on the retina as an image (I). Very near-sighted people ("myopes"), however, can focus a much-closer object (O') as a much larger image (I'). (X0)

X1. South America. In his America's Ancient Civilizations, A.H. Verrill wrote about "microscopic" artifacts from Precolumbian Ecuador.

> It was in their metal work that the Manabis accomplished the most astounding results. Not only did they manufacture beautiful objects of gold of ordinary size, but they produced ornaments of gold of microscopic dimensions. In the Museum of the American Indian, Heye Foundation, in New York are many tiny particles of gold which appear to be natural grains or small nuggets. But when viewed through a magnifying glass they are revealed as most perfectly and beautifully wrought beads. Many are elaborately engraved or chased, others are built up of several almost invisible pieces welded or soldered together, and all are pierced. It seems impossible that such minute objects, many times smaller than the head of a common pin, could have been produced by human beings without the aid of a lens. The only solution seems to be that the Manabis actually made use of crude lenses fashioned from crystal, or else they had eyes that possessed the power to see microscopic objects and more adept and delicate fingers than any other race of men. (R1)

Verrill did not recognize that some people (myopes) do posssess unusually good eyesight for fine work. His mention of crystal lenses is very relevant since Precolumbian cultures in South and Mesoamerica did know how to carve rock crystal---as seen well in the several, duly famous crystal skulls that were carved in that part of the Precolumbian world. (See MGP in another volume.)

X2. The Old World. As for ancient Egypt and the remainder of the ancient Old World, J. Davidovits and M. Morris wrote:

> Small scarab amulets made of diorite date from early times and bear no tool marks. In other parts of the ancient world, tiny stone beads with

ultrafine holes for threading defy explanation. Only the most current technology is capable of piercing holes of comparable minute size in stone. (R3)

This very general statement suggests that a deeper search of the literature would provide descriptions of many more examples of "micro-work."

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MMT5 Artifacts Fashioned from Very Hard Materials: The Tool Conundrum

Description. The existence of artifacts demonstrating the ability to carve and drill very hard materials, such as rock crystal, that exceed the hardnesses of the tools known to have been available to the associated cultures.

Data Evaluation. Abundant beads, vases, and art items made from recalcitrant materials have been reliably reported from Egypt, Mesoamerica, and Australia. Rating: 1.

Anomaly Evaluation. The subject artifacts imply that the associated cultures possessed advanced cutting tools, perhaps fitted with diamond cutting surfaces. Such tools have never been found. Rating: 2.

Possible Explanations. The appropriate tools will eventually be found. It is remotely possible that stone-softening agents were known or that some artifacts were molded.

Similar and Related Phenomena. The shaping of the hard granite blocks in the Great Pyramid (MSP6-X4, MSP6-X5); claimed existence of stone-softening agents (MSB4-X4); the claimed molding or "pouring" of Egyptian pyramid structural blocks (MSP1-X6).

Entries

X0. Cross reference. The Precolumbian inhabitants of South and Mesoamerica displayed great skill in carving rock crystal (clear quartz) into skulls and statuettes. (R7) Quartz is a very hard material and the famed crystal skulls could logically be cataloged here, but these quartz artifacts are also works of art. Taking the latter view, our choice is to treat them in chapter MGP in another volume of this catalog.

X1. Africa. Three modern popular amateur investigators, who have visited Egypt and searched through the huge accumulations of artifacts from dynastic times, have all been amazed at the profusion of narrow-necked vases with wide hollowed bottoms. How were these vases machined so precisely from solid masses of diorite and other hard rocks, given the tools the ancient Egyptians are believed to have had available? (R4-R6)

Hancock wrote:

> During my travels in Egypt I had examined many stone vessels---dating back in some cases to pre-dynastic times---that had been mysteriously hollowed out of a range of materials such as diorite, basalt, quartz crystal and metamorphic shist. (R5)

More than 30,000 such vessels were found in chambers under Zoser's Step Pyramid at Saqqara. Age: at least 2,650 B.C.

> Whether they were made in 2500 BC or in 4000 BC or even earlier, the stone vessels from the Step Pyramid were remarkable for their workmanship, which once again seemed to have been accomplished by some as yet unimagined (and, indeed, almost unimaginable) tool. (R5)

C. Dunn and others have opined that L-shaped cutting tools might have been "snaked in" through the mouths of some jars to do the hollowing.(R6) The Egyptians were adept with tubular drills, which they used with quartz or diamond grit when cutting obdurate stone. But these tools, even with L-shaped attachments, would have had difficulty with vases with long, thin necks.

J. Davidovits pointed to the apparent difficulty of machining such hard materials into long-necked vases. He used these artifacts as proof that the Egyptians must have actually molded them using liquid artificial stone---a theory he also applied to some of the huge limestone blocks used in the construction of the pyramids at Giza. (R4)

X2. Australia. Two conundrums are posed by a rusty coffee can full of clay and garnet nodules purchased by J.H. Cornwall from an Australian opal prospector. Upon cleaning his purchase, Cornwall discovered that 53 of the water-worn garnet nodules, which averaged only 2.7 carats apiece, were neatly drilled with holes for stringing. Cornwall expanded as follows:

> The occurrence of obviously drilled beads, along with many rounded garnets of the same composition, not native to that section [of Australia], all resting some eight feet beneath hard layers of rock having a probable age of at least millions of years, raised the question of how many years have elapsed since the (obvious) graveside ceremony of a race sufficiently civilized to produce perfectly drilled beads. How much geological time produced the solid rock cover? (R3)

If the opal prospector's description of the location of his find is correct, an age anomaly certainly exists. The timeline for the first humans in Australia begins under 100,000 ago (64,000 years at Lake Mungo).

The second anomaly---the one pertinent to this section---resides in the beads themselves. The holes are perfectly cylindrical. To Cornwall, a lapidary, this means that they were drilled from one side only and then by a diamond drill. The Australian aborigines apparently knew nothing of this advanced technology. (R3)

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R4. Davidovits, Joseph, and Morris, Margie; The Pyramids, New York, 1988, p. 7. (X1)

R5. Hancock, Graham; Fingerprints of the Gods, New York, 1995, p. 333.

(X1)
R6. Dunn, Christopher; The Giza Power-plant, Santa Fe, 1998, p. 169. (X1)
R7. Morton, Chris, and Thomas, Ceri Louise; The Mystery of the Crystal Skulls, Santa Fe, 1997. (X0)

MMT6 Ancient Musical Instruments

Description. The discovery of ancient musical instruments that appear to be either too advanced technically for the cultures involved or seem to represent premature transoceanic cultural infusion.

Data Evaluation. Our data sources are unsatisfactory, being either too vague, unconvincing, probably erroneous, or obviously fraudulent. Rating: 4.

Anomaly Evaluation. Neanderthal musical instruments, such as bone flutes, and the Precolumbian trans-ocean diffusion of knowledge of musical instruments would both be modestly anomalous. Rating: 2.

Possible Explanations. None required.

Similar and Related Phenomena. Rock gongs and xylophones (ESP6 in Anomalies in Geology).

Entries

X0. From crickets to symphony orchestras, animals are prolific noise-makers. One cannot doubt that early hominids beat on hollow logs and whirled sticks through the air to make pleasing humming sounds. For this section, though, we must set our sights higher. Musical "instruments" require a much higher technology.

Simple music-makers were discovered early. Flutes probably came first in the time range 15,000-25,000 B.P.; then, bull-roarers circa 14,000 years ago. By 3000 B.C., cave art portrayed a wide spectrum of the simpler instruments. (R4)

The question here is: Are any of these primitive musical instruments anomalous, say, in terms of precocious innovation (X1) or, possibly, suggestive of the unexpected geographical diffusion of hominids? (X2) Finally, some claimed instruments may be of great age, surprising sophistication, and/or of mysterious cultural provenance.

X1. Possible Neanderthal musical instruments

The Divje Babe-I bone "flute." In 1995, in a Slovenian cave (named Divje Babe I), archeologists uncovered the thigh bone of a juvenile bear that was perforated with four regularly spaced holes that had apparently been drilled artificially. This perforated bone looked much like a section from one of the bone flutes that had been discovered earlier at sites in Europe and Asia dating back to 22,000-35,000 years ago. The Slovenian object, however, came from a Neanderthal dig that was estimated

to be from 43,000-82,000 years old. That the Neanderthals appreciated music and knew how to make flutes was deemed beyond their accepted cultural level. The Divje Babe-I flute was, therefore, reported widely in rather sensational terms. (R5-R7)

Doubts concerning the artificiality of this potential flute surfaced quickly. It was hypothesized instead that the bear thigh bone had been punctured by the teeth of a large carnivore. After a careful examination, such was, in fact, the conclusion of the experts. (R9-R11)

There is no anomaly if this evaluation is sound.

A German "tuba"? Another potential Neanderthal instrument was unearthed in 1996 in Germany. Estimated to be 50,000 years old, it preceded the entry of modern humans (H. sapiens) into Europe. This artifact is a regularly perforated mastadon tusk. Called a "tuba" by O. Todkopf, its discoverer, it bears no resemblance to the modern band instrument of the same name.

> Sixteen carefully aligned holes dot the surface of the six-foot-long tusk. "I think a Neanderthal master craftsman must have used a stone awl to hollow out the tusk and to punch the holes," says Todkopf. The number of holes, he says, suggests that the Neanderthals used an octave scale. (R8)

We have seen nothing further in the literature, but suspicions are aroused by the tone of the report, especially the last paragraph. (R8)

> Todkopf theorizes that the Neanderthal's fondness for music may explain why they vanished some 30,000 years ago. "Maybe their music scared away all the game. They would have produced an awful racket oompah-pahing all over the place. The Neander Valley was alive with the sound of music." (R8)

Incidentally, R8 is the April 1997 issue of Discover! Also, todkopf = dead-head in German.

Despite the false lead of the Neanderthal "flute" and the April-Fool potential of the German "tuba," it remains likely that the Neanderthals did make some sort of music with whistles and rasps. (R12)

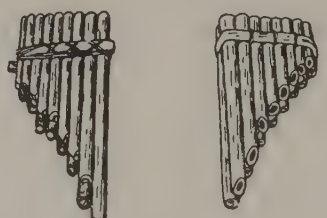
X2. Musical instruments suggesting trans-Pacific diffusion.

Wooden flutes. The bamboo flutes of the Murut tribe of Borneo are "precisely" similar to the cane flutes of the North American Indians. Archeologists had long supposed that the unique geometry of the North American flutes was a New World innovation. However, the Borneo flutes are so much alike that E.H. Hawley was obliged to comment as follows:

> This is another interesting connecting link between Malaysia and the west coast of America, because of these two identical instruments in regions far apart. A search for the cause of this identity will be interesting to ethnologists. (R1)

Pan pipes. Pan pipes belong to the flute family, being simply tubes tied together that are tuned to different notes. They do, however, represent a higher level of technical and musical sophistication. Therefore, the appearance at archeological sites in South America, Mesoamerica, Oceania, and the Old World of pan pipes of similar design does raise the spectre of global diffusion. (R3, R4)

This thought is countered here by the very real possibility of independent invention. After all, the pan-pipe idea does not really represent a very high degree of innovation.



The technologically simple pan pipes diffused widely or were invented many times. Examples from: (left) Solomons Islands; (right) Bolivia. (X2)

X3. A mysterious stone xylophone. G. Condominas, a French ethnologist was doing research in Viet Nam when he learned about some curious gray stones that had been exposed by road-builders.

> Condominas visited the site and found eleven stone plates, which had either been buried naturally or covered over by man a long time ago. The biggest of them was forty inches long, six inches wide and two inches thick. It weighed about twenty-five pounds. The smallest was twenty-six inches long and approximately in proportion.
>
> He struck one of the plates accidentally when he was examining it, and found that it emitted a musical "ping" and vibrated strongly in his hand. The others also rang loudly when struck. Seven were found to be pitched in a complete pentatonic scale. Three other plates apparently formed part of another scale and were probably part of another instrument. The eleventh stone was broken. (R2)

Taken to Paris for further study, the stones were said to constitute a massive stone marimba; i.e., xylophone. The French assigned the instrument to the Neolithic Period circa 5,000-6,000 years ago.

Unfortunately, the supposed marimba was not excavated under controlled conditions, and its age is uncertain.

One might add that "ringing rocks" are very common in nature. It is really quite easy for just about anyone to select stones for the construction of a passable xylophone. (See ESP6 in Anomalies in Geology.)

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R2. Anonymous; "The Stones of Ndut Lieng Krak," New Scientist, 1:8, January 10, 1957. (X3)
R3. Bailey, Jim; Sailing to Paradise, New York, 1994. p. 90. (X2)
R4. James, Peter, and Thorpe, Nick; Ancient Inventions, New York, 1994, p. 592+. (X0, X2)
R5. Anonymous; "Neandertal Noisemaker," Science News, 150:1996. (X1)
R6. Folger, Tim, and Menon, Shanti; "Strong Bones, and Thus Dim-Witted?" Discover, 18:32, January 1997. (X1)
R7. Wong, Kate; "Neanderthal Notes," Scientific American, 277:29, September 1997. (X1)
R8. Anonymous; "And a One and a... Uh. Uh...," Discover, 18:19, April 1997. (X1)
R9. Bower, B.; "Doubts Aired Over Neandertal Bone Flute," Science News, 153:215, 1998. (X1)
R10. d'Errico, Francesco, et al; "A Middle Palaeolithic Origin of Music," Antiquity, 72:65, 1998. (X1)
R11. Wills, Christopher; Children of Prometheus, Reading, 1998, p. 141. (X1)
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MMT7 Potentially Anomalous Toys and Models

Description. Artifacts that are ostensibly toys or models but which suggest either precocious technical knowledge or anomalous cultural diffusion.

Data Evaluation. We have had to rely primarily upon popular articles and books in this section. The data evaluations are the first figures in the ratings below.

Anomaly Evaluation. Three potential anomalies stand out in this Catalog category. The anomaly ratings are the second figures in the ratings.

- The ancient Egyptians made toy gliders or, alternatively, models of aerodynamically sound aircraft (X1). Ratings: 3/2.
- Mesoamerican wheeled toys were inspired by Precolumbian cultural diffusion from India (X2). Ratings: 2/1.
- A Mesoamerican model boat including figurines with Japanese features indicates Asian contacts with the New World over 2,000 years ago (X3). Ratings: 2/1.

Similar and Related Phenomena. Legends and myths of ancient flying machines (MMT11); gold figurines from Precolumbian South America vaguely resembling modern aircraft (MGP in another volume); many Precolumbian New-World sculptures revealing Old-World features (MGP in another volume).

Entries

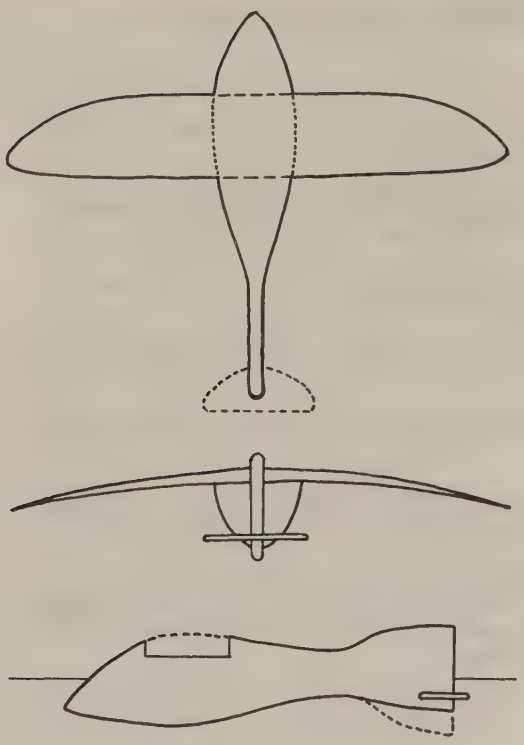
X0. Introduction. To qualify as potential anomalies, toys must somehow transcend the simple pleasures children derive from them. And, since this chapter deals with advanced technology, these toys should also suggest technological advances beyond those conventionally assigned to the cultures involved. We have found three classes of toys that seem to meet these requirements. Interestingly, all are concerned with transportation.

It should be remarked that these toys were selected from a wide spectrum of ancient articles and devices that are not too different from some of today's simple toys, such as dolls and various objects thrown in games of skill. Many such nonanomalous toys from the past are described by P. James and N. Thorpe in their book Ancient Inventions. (R6)

X1. Possible toy or model airplanes. Circa 1972, a wooden artifact looking very much like the model of a modern airplane was retrieved from a box in the basement of a Cairo museum. The box was labeled "Wooden Bird Models." this artifact and others in the box had come from an ancient Egyptian tomb at Saqqara. The "airplane" had been discovered originally in 1898, but since airplanes had not yet been invented, its potential significance was not recognized. The age of the supposed airplane toy or model is difficult to determine; 200 B.C. has been published as the best guess. (R2)

The rediscovery of the little "airplane" was made by K. Messiha, who was struck by the object's aerodynamic properties when examining the box of artifacts. In other words, he thought the artifact looked like a modern aircraft or, perhaps, a child's toy glider---not a bird as advertised on the box's label.

> The model is made of sycamore wood, weighs 39 gms., as has a wing span of 18 cm. Seen from the front the wing tips droop slightly. The fuselage is heart-shaped in section (8 mm. in greatest thickness) and assumed a compressed ellipse shape towards the tail. As will be seen from the [sketch], there is a vertical rudder at the tail exactly as in modern aircraft---but



Possible toy glider or model aircraft from ancient Egypt. (X1)

more than this, it seems that there is a groove into which was originally inserted another component (now missing) corresponding with a modern airplane's elevator!...It certainly looks that whoever built this model knew something about aerodynamics. We gather that the model is as airworthy as any contemporary balsa-wood scale model airplane. (R3)

There is no evidence that anyone has thrown this ancient artifact (or a replica of it) to see how it flies. Sycamore is not nearly as light a wood as balsa, so that rather than being an operational toy, the object might instead have been a model of something the Egyptians planned to build. We can only speculate as to what the Egyptians had in mind. Finally, this enigmatic artifact might coincidentally "look like" a modern plane and be just what the box label stated: a bird model. (Note that some birds do keel their tails in flight to look like rudders.)

Naturally, fringe publications inevitably opt for the airplane interpretation, sometimes implying that aliens helped the Egyptians with the idea!

X2. Wheeled toys in the New World. Anthropologists regularly emphasize that the natives of the New World were so backward that they never even invented the wheel. Certainly carts and wagons were not in use before the Spanish Conquest, but there were wheeled toys, especially in Mesoamerica. The natives of this region knew about wheels but they apparently never used them for transportation and may not have appreciated their value in moving people and goods. But these assertions are merely surmise.

Actually, the Maya and the Inca had marvelous road networks (See Chapter MSR in Ancient Infrastructure.) But, except for some roads, such as the long, flat Mayan causeways, most roads transited precipitous terrain unsuited to wheeled vehicles. Beasts of burden (llamas) were the most practical movers of commerce in most cases.

The wheeled toys of Mesoamerica reported in the literature were rather crudely constructed. Their axles seem to have been simply glued into place with asphalt. One wonders if they could really roll across the floor like modern toys. The mainstream interpretation of the Mesoamerican wheeled toys is seen in the following quotation from a 1948 number of Science News Letter.

> Toys on wheels probably were a pure discovery or invention that was not put to practical use. A spindle with its whorl may have given someone the idea of the use of a wheel on a vehicle and he may simply have made a workable model of clay in the form of an animal. The crude workmanship of the wheels eliminates the possibility of these discs having been used in spinning. (R1)

A recent and decidely heretical view of Mesoamerica's wheeled toys comes from G.R. Kearsley, who maintains that the concept was not invented in the New World at all but came instead from Precolumbian contacts from Asia. The wheeled

A typical wheeled toy from Precolumbian Mexico. (X2)

toys were part of a transferred culture that also included the game of Patolli and large body of iconography. Kearsley, obviously a strong diffusionist, wrote of this hypothesized cultural diffusion as follows:

> The most famous aspect of similarity are the wheeled toys found from the Pacific Coast of El Salvador through to the Gulf Coast of Vera Cruz far to the north in Eastern Mexico. The time band in which they appear in Mesoamerica fully formed, and with no visible development of evolution which suggests the invention of the wheel, is very short in about the 7-9th. century A.D. This would indicate that it was an imported product and was in fact a religious item of the exact type found with a long continuous history in Northern India from the early Vedic civilization of the 1st. millennium B.C. through into the present century. The prototype of the Indus wheeled "toy" had a long period of development as a votive vessel among the early Aryan tribes, and Scythians of Central Eurasia, and was particularly related to, and probably derived from the form of wagon developed by them at least as early as the 4-3rd. millennium B.C. (R7)

Summarizing Kearsley, the wheeled toys of Mesoamerica were not invented in the New World. They were not even toys. Instead, they were items used in religious ceremonies, which were brought across the Pacific about a millennium ago by Indian voyagers---a radical view to be sure.

X3. Anomalous ship models. A. von Wuthenau, a professor at the University of the Americas in Mexico City, has long been a strong proponent of Precolumbian diffusion of cultures to the New World. This predilection is more than obvious in his popular book Unexpected Faces in Ancient America.

In 1985, von Wuthenau personally gave his theory a boost when he discovered in the Guerrero region of Mexico the model of a most unusual ship. He provided the details of his find at a 1985 conference with the highly appropriate theme "Quest of the Ancent Mariners."

> He [von Wuthenau] presented slides of a foot-long terra cotta boat model containing 10 human figurines with what he described as distinctly Japanese faces. He said the artifacts were discovered in a burial site along with a number of other figures which had features of other cultures as well as Asians. He estimated the find dated back to 500 years before Christ. (R5)

The model ship thus predates the so-called "wheeled toys" (X2) by more than a millennium. With this discovery, Wuthenau had still more "unexpected" faces to add to his already impressive collection.

References

R1. Anonymous; "Toys on Wheels Made in Mexico Long Before Carts," Science News Letter, 53:7, 1948. (X2)
R2. Anonymous; "The Little Wooden Airplane," Pursuit, 5:88, 1972. (X1)
R3. Anonymous; "Imhotep's Glider?" INFO Journal, #10, p. 30, 1973. INFO= International Fortean Organization. (X1)
R4. Ferryn, Patrick; "Les Petits 'Avions' en Or du Musée de Bogota," Kadath. #46, p. 31, Summer 1982. (X1)
R5. Anonymous; "Sailors in a Model of an

Ancient Ship Found in Mexico Have Asian Features," Boston Sunday Globe, November 10, 1985. Cr. J. Whittall. (X3)
R6. James, Peter, and Thorpe, Nick; Ancient Inventions, New York, 1994.
R7. Kearsley, Graeme R.; Mayan Genesis, London, 2001, p. 301. (X2)

MMT8 Ancient Scientific Instruments

Description. Artifacts demonstrating precocious innovation and applications to devices employing scientific principles considered unusually advanced for the cultures involved.

Data Evaluation. Since scientific principles and instruments are the subject of this section, more than half of our sources come from science journals and magazines. The remainder are from miscellaneous fringe publications which are sometimes of dubious value. Our data evaluations, the first figures in the ratings below, reflect this split nature of the sources.

Anomaly Evaluation. Seven primitive scientific instruments are deemed suitable for cataloging. Their evaluations are the second figures in the ratings below.

- Chinese "light-penetration" mirrors (X1). Ratings: 1/4.
- The application of rock-crystal lenses for magnification rather than kindling fires---a significant controversy in anthropology (X2). Ratings: 1/3.
- The construction of a pre-Galileo telescope (X3). Ratings: 2/3.
- The Viking use of birefringent crystals ("sunstones") for navigation (X4). Ratings: 2/2.
- Primacy of the Olmec lodestone compass over that of the Chinese (X5). Ratings: 2/2.
- The astronomical utility of the Chinese Pi (X7). Ratings: 3/2.
- Chinese seismograph in the Second Century A.D. (X8). Ratings: 2/2.

Similar and Related Phenomena. Claimed ancient use of electricity (MMT9); the existence of sophisticated ancient calculating devices (MMT10); claims of ancient flying machines (MMT11).

Entries

X1. Remarkable mirrors. Optical reflections had to be among the earliest human experiences with the laws of physics. Of course, nonhumans also observed reflections but made little use of them.

Reflection phenomena are ubiquitous in the natural environment. Still-pond surfaces, sheets of ice, and shiny mineral surfaces, such as those of mica, all suffice. The urge to emulate nature and fashion artificial mirrors for rituals and purposes of vanity probably arose early.

But how could the flat, shiny surfaces of nature's mirrors be duplicated? Glassmaking, metallic sheets, and liquid mercury were not available ten thousand years ago. The only materials suitable for mirror manufacture were glassy minerals like obsidian (volcanic glass). Unfortunately for mirror-makers, obsidian is a very hard, obdurate material.

Nevertheless, about 8,000 years ago, Stone Age artisans at Catal Huyuk, in Turkey---usually billed as the "first" city of H. sapiens---somehow ground and polished pieces of obsidian into remarkably good mirrors. (R33)

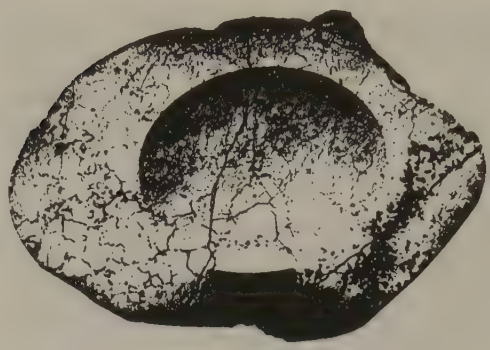
As now related by O.C. Shane, archeologists are still uncertain as to how these first known human mirrors were really made.

> How these mirrors were ground and polished is not known. Their exceptional planar surfaces are highly polished and reflect a sharp image. Obsidian (hardness 5.5) can be ground by quartz (hardness 7.0), and polished with charcoal (i.e., carbon-hardness 10). (R25)

After the Catal-Huyuk workers found the right materials for grinding and polishing, a major problem still remained: obtaining a good planar surface with only hand operations. It is this part of the Catal-Huyuk mirror-making that we do not understand well.

Several millennia later, in Precolumbian America, the Incas and Aztecs also made acceptable mirrors from obsidian. They also worked with pyrites and reflecting sheets of metals, which by then had become available. These were probably used mainly for ritual and magical purposes.

More technically challenging and mysterious-as-to-purpose were the concave mirrors fashioned from magnetite by the earlier Olmec culture in Mesoamerica. How



An extraordinarily highly polished concave mirror of magnetite made by Olmec artisans. Apparently, these mirrors were worn as pendants. (X1)

did the Olmecs ever precision-grind and polish such exact, three-dimensional, symmetrical surfaces? And what was the purpose of mirrors that reflected only distorted images? Nor was their curvature sufficient for starting fires or any other known practical purpose. Again, one has to fall back on the hackneyed explanation of ritual/magical applications.

At least eight concave, pendant-style, magnetite and ilmenite mirrors have been found at the Olmec center of La Venta, Mexico. The double-mystery of these remarkable objects has been emphasized by I. Bernal.

> Even though the dimensions and focal distances vary, probably depending upon the original block, all the mirrors are similar and therefore represent a culural tradition. Their polish is so extraordinary that it reaches the limit of possible perfection. This was not accomplished with the use of abrasives, for the microscope does not reveal traces that these would necessarily have left. The excellent study that I have summarized here indicates that the radius of curvature becomes progressively greater as one nears the edge of the mirror; the curve in all these examples is very similar and so perfect that it is not possible to reconstruct the technique employed to fabricate these concave mirrors. Perhaps they could serve as a camera obscura...Undoubtedly they show one of

the most notable technical advances of the Olmecs. (R10)

Concave mirrors with varying radii of curvature! What practical or magic application could they serve? And how were they made without abrasives?

Magic mirrors. Myth and legend describe two sorts of "magic" mirrors that we can dispose of with minimum comment. The first is what one might call a "telescopic" mirror. It sounds like something out of a science-fiction story.

> The famous mirror of Ptolemy Evergetes caused to be placed in the Pharos at Alexandria belongs to this first class. This mirror is stated by ancient authors to have represented accurately everything which was transacted throughout all Egypt, both on water and on land. Some writers affirm that upon its surface an enemy's fleet could be seen at a distance of 600,000 paces; others say more than 100 leagues! (R2)

The second "magic" mirror is of the "X-ray" variety! It is even "wilder" than the telescopic mirror.

> The Chinese have several accounts concerning metal mirrors which would light up the interior organs of the human body. The emperor Ts'in Shi (259-210 B.C.) is credited with the possession of such a mirror which was styled "the precious mirror that would illuminate the bones of the body," or "the mirror illuminating the gall." (R7)

There exists, however, a third sort of magic mirror that does exist and which flummoxed Western scientists for a full century. This mirror was apparently invented by the Chinese about 1,200 years ago, but it was not known to the Western World until 1832. It was not adequately explained scientifically until 1932. The Chinese called it a "light-penetration" mirror.

The reflecting side of this particular magic mirror appears perfectly normal. It is made of bright, polished bronze, and it reflects images properly. The mirror's back is also made of bronze and displays various patterns and Chinese symbols. However, if this mirror is held in bright sunshine, one seems to be able to "mysteriously" see through its reflecting surface. In addition, reflections cast upon a dark wall project the patterns and symbols on its back. The manner in which these startling effects are achieved represents high degrees of ingenuity and skill for the artisans of 1,200 years ago.

> The basic mirror shape, with the design on the back, was cast flat, and the convexity of the surface produced afterwards by elaborate scraping and scratching. The surface was then polished to become shiny. The stresses set up by these processes caused the thinner parts of the surface to bulge outwards and become more convex than the thicker portions. Finally, a mercury amalgam was laid over the surface; this created further stresses and preferential buckling. The result was that the imperfections of the mirror surface matched the patterns on the back, although they were too minute to be seen by the eye. But when the mirror reflected bright sunlight against as wall, with the resultant magnification of the whole image, the effect was to reproduce the patterns as if they were passing through the solid bronze by way of light beams. (R22)

The British scientist W. Bragg discovered the secret of these Chinese magic mirrors in 1932. In actuality, the design on the cast-bronze back of these mirrors was duplicated on the polished front surface in a way so subtle that it was not apparent until magnified by reflection. The manufacture of these magic mirrors obviously required great skill.

Burning mirrors. Concave mirrors have been used for starting fires for centuries. (R2) They are not normally anomalous. Of course, this statement would have to be amended if there exists any substance to the old tale that Archimedes designed huge concave mirrors to set fire to the sails of the Roman ships at the siege of Syracuse. This oft-mentioned array of giant mirrors of Archimedes seems to be in the legendary class along with the "X-ray" mirror described above. But at least the mirrors of Archimedes would be compatible with the accepted laws of optics. They are of interest here only because of their great size.

X2. Magnifying and burning lenses. In contrast to reflectors (X1), nature offers few natural magnifiers. One can see some magnification in spherical drops of water hanging from leaf tips, but little else in the wild leads to the idea of optical magnification via lens-shaped materials. Even so, nature does provide transparent solids, such as crystalline quartz, that make good lens materials. Crystalline quartz also had ritual and decorative value to most ancient peoples, and it is very likely that, as early artisans worked with quartz for its nonoptical characteristics, they also recognized its magnifying properties. It was probably just a short conceptual step from a rounded quartz jewel to a practical lens.

A second potential route to a magnifying lens could have been through small water lenses. A drop of water suspended on a wire circle 8 millimeters in diameter gives one a magnifying power of 5X. The same result can be obtained with a small hole in a dished metal sheet. (R6)

The earliest potential lenses were glass spheres reported from ancient Egypt and Mesopotamia circa 3500 B.C. How these glass spheres---natural or artificial---were obtained or fabricated is unknown. (R8) Furthermore, it is only supposed that said glass spheres were employed for magnification; they may have only been ornamental in purpose. However, their use in microengraving is certainly not out of the question,

The Egyptian transparent spheres would have introduced considerable image distortion if they were used as optical aids. Therefore, further innovation, probably more accidental than planned, was required before more practical disk-shaped lenses made their appearance.

The first incontrovertible lenses appeared in the Middle East around 3000 B.C. (R30) They were ground out from rock crystal. Crete is often mentioned as an early producer of rock-crystal lenses, with first dates varying widely from 2000 B.C. (R11) to 1200 B.C. (R8)

These first dates have not been as contentious in archeology as the first use of lenses. The standard first and primary lens application claimed in the textbooks has been as "burning glasses"; that is, the lenses were used only for starting fires. (R33) The fact that many lenses are found with holes in them for thongs for carrying them about the neck supports this contention. The use of lenses for magnification is not supposed to have become common until the 12th. century A.D. (R11)

In MMT4-0, where ancient microengraving is discussed, a strong case is made that ancient microengravers could not have produced their tiny, barely visible, inscriptions without optical help. But some historians counter this claim with the acknowledged visual capabilities of myopes---very-short-sighted people---who could get so close to their work that lenses were not needed. One intuitively doubts the myope explanation of microengraving but L. Gorelick and A.J. Gwinnett make a good case for this practical value of myopia! Some even surmise that a "guild" of myopes might have been created through selective breeding!

X3. Ancient telescopes. Refracting telescopes require two good lenses properly aligned in a tube. That such an arrangement of two pieces of ground glass results in a highly useful "spyglass" is not intuitively obvious. In other words, the invention of the telescope was considerably more challenging than discovering basic optical magnification.

Conventional history assures us that it is Galileo (1564-1642) who should be credited with making the first practical telescope. There are, however, hints that Galileo may not have been first.

- Chinese Emperor Chan, circa 2283 B.C., is reputed to have arranged two magnifying glasses for observations of the planets. (R5)

- Pliny stated that the Roman Emperor Nero watched the games in the Coloseum with a magnifying device. (R33)

- Some 500 years before Galileo, the Vikings were in possession of rock-crystal lenses of sufficiently high quality to make a telescope. But did they? (R28)

- More damaging to Galileo's reputation is the tale that the Flemish spectacle-maker J. Lippershey may actually have constructed a working telescope, reports of which reached Galileo, who then made one for himself and received all the credit. (R33)

Thus, we have some vague challenges to the accepted history of the telescope. We cannot really be certain who first discovered its optical principles.

X4. Sunstones. Before the discovery of the magnetic compass, navigators who dared sail beyond the sight of land employed a wide range of devices to guide them. Of course, the stars, the sun, and an accumlated knowledge of oceanic currents were part of any deep-sea navigators' repertoire. To this were added portable sundials, the so-called knife-compass, and various "bearing discs." (R31, R32) These instruments, though rather clever, cannot be considered high-tech enough to dwell upon here. An exception is the Norse "sunstone."

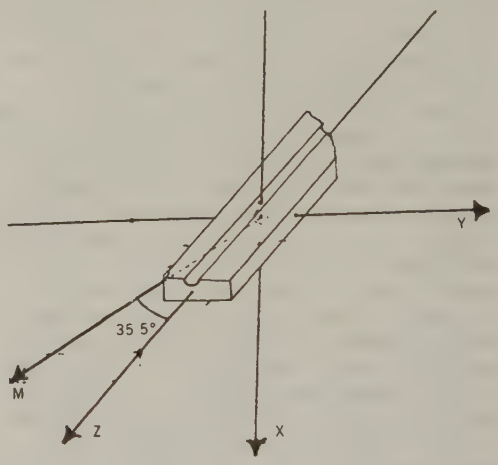
Norse mariners often sailed at high latitudes where the sun was frequently obscured by fog and clouds. To find the direction of the sun under such conditions, the Norse navigators held aloft their sunstones, which yielded not the direction of the sun itself but the direction perpendicular to it. Sunstones were pieces of birefringent crystals that detected polarized sunlight scattered by the atmosphere. Given a little blue sky or thin areas in the clouds, the sunstones could establish the direction of the sun ---even if it was a few degrees below the horizon. Two minerals were apparently used by the Norse: Iceland spar (calcite) and cordierite (a magnesium aluminum silicate). (R31, R32)

The Norse doubtless knew nothing about the optical principles involved, but they knew how to use the sunstones. Exactly who first noticed the utility of these two natural navigating aids is unknown.

X5. Lodestone compasses. We do not know who discovered the first lodestone, but that piece of rock (magnetite) must have been perceived as being inhabited by a spirit or imbued with magic. The Chinese certainly knew of the lodestone's strange directional proclivities about 2,000 years ago. Rather than applying the lodestone to navigating the briny, the Chinese used it to site and orient their buildings. In other words, the first compasses seem to have been used in geomancy rather than navigation. (R13)

Apparently the first navigational application of lodestones took place underground rather than at sea. Iranians, circa 5,000 years ago, are reputed to have used lodestones to guide themselves through tunnels! (R11)

Eventually, lodestones were floated on a fluid or suspended by a cord and put to use in marine navigation. But even here, we see nothing really anomalous. The primary archeological/anthropological puzzle associated with the lodestone is to be found in Object M-160. This lodestone, carefully worked into bar-form and grooved, was located at the early Olmec site of San Lorenzo, Vera Cruz, Mexico. When floated, M-160 would have made a passable compass. But, like the Chinese, the Olmecs seemed to have used M-160 for geomancy; that is, siting and arranging their buildings in accordance with natural forces, which in this case is the unseen but mysteriously present geomagnetic field.



The Olmecs fashioned a lodestone into this grooved bar which, when floated, made a passable compass. X, Y, and Z are the bar's axes; M is its magnetic moment vector. (X5)

The anomalousness of M-160 lies in its age: 1450-1000 B.C. It was perhaps a thousand years earlier than the "first compass" attributed to the Chinese. (R13, R15, R33)

There could be more to the lodestone story than primacy of compass-invention. There are several other strong Chinese-Olmec affinities; such as Chinese features on Olmec sculptures; Chinese-style in Olmec art; and Chinese writing on Olmec artifacts. (See MAP, MGP, and MGW in another volume) The following possibilities come to mind:

(1) The Chinese may have made and used lodestone compasses for navigation much earlier than now believed and brought the compass to the Olmecs in the Precolumbian New World perhaps 3,000 years ago!

(2) Or, the Chinese sailed to the New World without the lodestone compass and picked up the idea from the Olmecs, who were its true inventors.

The implied Precolumbian diffusion in either direction across the Pacific is, of course, anathema to mainstream science and highly anomalous.

X6. Two problematic navigational devices.

A suggestive cave drawing. On the wall of a cavern, Irian Jaya, Indonesia, there exists a drawing resembling the medieval torquetum, an instrument used for studying the motions of the planets and also capable of determining latitude at night. This drawing was discovered by the Frobenius Expedition of 1937-1938. The probable date of the drawing is about 232 B.C., several centuries earlier than the analogous European instrument. (R12)

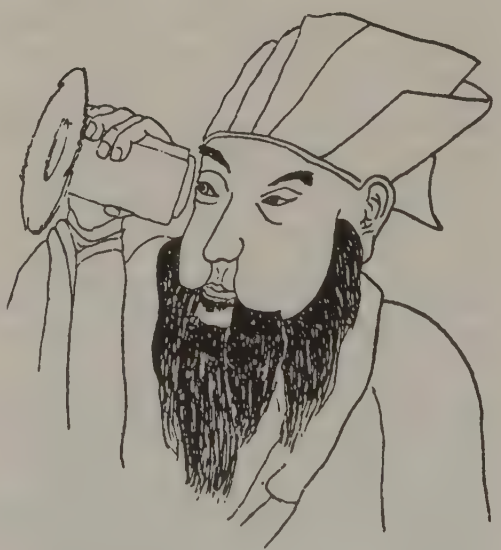
Unfortunately, suggestive ancient cave drawings do not constitute good evidence.

The "abacus" of the Basques. Although the name is the same as that of the age-old calculating device, the Basque abacus was a navigational aid of unknown design. According to A.E. Rothovius, it must have been very effective.

> The Basques also developed an abacus-like device for reading the true number of their lekus (from whence the later term "league") at any latitude, giving them superior navigational ability for traversing the open ocean. This system was the source of the highly accurate portolan charts that came from the Basque and Catalan map-makers starting in the 13th century, and to thich the key has long been vainly sought. Used meridianly (north-south), the leku had a fixed length of 3/70ths of a degree of longitude. (R23 based on R24)

We cannot imagine what an "abacus-like" navigational instrument would look like!

X7. The Pi: astronomical, decorative, or something else? The Pis are jade discs first crafted in China sometime before the Shang Dynasty (circa 1500-1100 B.C.). From 10 to 15 centimeters in diameter, the disc-shaped Pis possess a central hole that fits onto a hollow handle through which one can view the stars---assuming the Pi was really used as an astronomical instrument. The circular rim of the Pi is broken by wedge-like notches and small projections. The number and placements of the wedges and projections vary considerably on surviving examples.

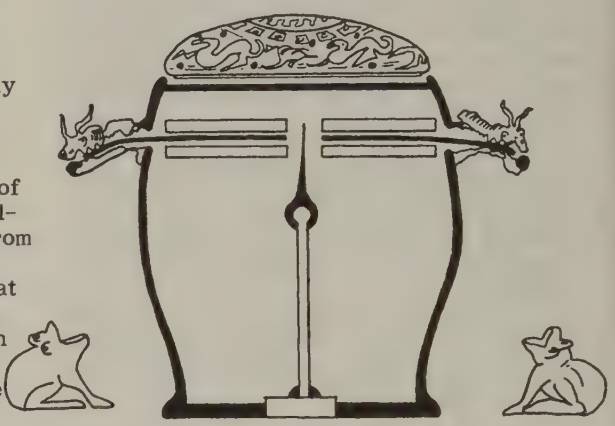


Ancient Chinese astronomers "may" have used the notches on the rim of the Pi to locate prominent circumpolar stars and thereby determine true north. (X7)

In 1947, H. Michel proposed that the Pi was used by the ancient Chinese to locate true north, which in their time was not occupied by a prominent star. The observer simply lined up certain bright circumpolar stars with precalibrated notches and projections on the rim and the instrument would necessarily be aligned to true north. (R14, R16)

Michel's theory sounds reasonable enough, but B.E. Schaefer, in 1983, questioned the Pi's utility as a locator of true north. He claimed that the variability of the notches on the rims of Pis from the same time period negated Michel's hypothesis. Schaefer also contended that the rims of the Pis did not in fact line up with stars that were prominent when the Pis were supposedly in use. Michel defended his hypothesis in a 1986 issue of Kadath. (R34)

The Pis, in fact, might not have been scientific instruments at all. Some have suggested that they were simply decorative. However, the Pis' notches and projections seem to be purposeful and are hardly artistic in appearance. We may not have yet identified the real purpose of the Pis.



Sketch of Heng's Second Century A.D. seismograph. An earthquake would dislodge one of the balls which would then fall into the mouth of one of a circle of waiting frogs, thereby providing the direction of the epicenter. (X8)

X8. Ancient seismographs. The first known seismograph, like so many other inventions, is of Chinese origin. It first appeared in the Second Century A.D., when the polymath Chang Heng presented the Emperor and his court with a device that would supposedly not only detect distant earthquakes but also indicate the approximate direction of their epicenters. The court's sages scoffed at first but were startled when the device unexpectedly registered a quake northwest of the capital. No tremors had been felt at the capital, but messengers soon confirmed the event.

The exterior of Heng's seismograph has been pictured many times, but its innards remain a mystery. One theory puts an inverted pendulum on the axis of the seismograph. When earthquake waves pass, the internal pendulum sways, hitting and pushing outward one of eight horizontal rods. The rod thus nudged knocks a ball out of the mouth of one of the eight dragons mounted on the outside of the instrument. The dislodged ball is caught (hopefully) by one of the gaping frogs below, thereby indicating the direction opposite that of the quake epicenter. (R11, R33)

As a Second Century A.D. inventor, Heng showed considerable geophysical insight as well as mechnical ingenuity.

X9. Ancient weights and measures. One measure of the level of a civilization is its establishment of standardized weights and measures for use in commerce and instruments based upon them.

The Indus Valley. The Harappan culture of the Indus Valley peaked about 4,000 years ago, boasting about 1,000 cities and towns sprinkled across Pakistan and northwestern India. Its writing system remains undeciphered, but we do know that it had a system of standard weights. The basis of this system was a graduated series of stone cubes, each a multiple of a basic unit of weight. This is a sophisticated concept to impose over such a huge area some 4,000 years ago. (R29)

The Inca Empire. The Inca Empire stretched along almost the entire western side

of South America and longitude-wise from the Andes to the Pacific. Commerce flowed up and down this continent upon the famous Incan roads and along the coast on huge balsa rafts. Such commerce could not operate successfully without standardized weights and measures plus accurate instruments.

Some of the balances of the Inca are sufficiently curious to merit inclusion here.

> In the Archaeological Museum of Madrid there are two pairs of balances and four beams, from sepulchers of the Incas at Pachacamac, Peru... A flat strip of bone suspended edgewise by a cord midway forms the beam. To the ends of the beam are hung, by short cords, slings of network made of fine thread, the free edges being strengthened by cord.
>
> One of these balances is plain, while the beam of the other is elaborately fretted and engraved with circles-and-dots, and curves outlining the fretted spaces. Red paint has been rubbed in these incisions. The long suspending cord is strung alternately with a row of small beads of turquoise and red-and-white shell and a large, flat, oblong piece of shell pierced through the axis. The string is terminated by the figure of a bird and a fret ornament of shell representing a seated human figure with head-dress. Three small pendants of beads and shell hang below this, and the whole forms an ornate and striking specimen. (R4)

This device seems to have been a rather sophisticated functional balance marked with indicies of some sort.

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MMT9 Claims of Ancient Knowledge of Electricity

Description. The generation and use of electricity for practical applications, such as electroplating and illumination, in pre-Roman times.

Data Evaluation. Virtually all sources dealing with these improbable anthropological phenomena are to be found in the publications of amateur archeologists. The evaluations for the two selected claims are the first figures in the ratings below.

Anomaly Evaluation. Two claims of ancient electrical apparatus are recognized. The anomaly evaluations are the second figures in the ratings below.

- Temple reliefs seem to show that the ancient Egyptians generated and used electrical energy for illumination (X1). Ratings: 4/1.

- Artifacts from the Parthian culture (circa 250 B.C.) resemble electrical batteries and were probably used for electroplating (X2). Ratings: 3/2.

Similar and Related Phenomena. Chemical etching (MMT1-X9); possible examples of ancient electroplating (MMT2-X5).

Entries

X0. Introduction. Modern humans are intrigued, sometimes annoyed, by the effects of static electricity. It is quite likely that hominids 100,000 years ago also wondered about the sparks generated by stroking animal fur. It seems certain that the ancient Egyptians, given their sere climate, observed a variety of curious electrostatic phenomena. The point is, of course, that ancient humans were well aware of electricity even if they didn't understand it.

The question here is: Did they do anything of a practical nature with this strange natural force even though they knew nothing about electrons, volts, and amperes?

St. Elmo's fire and lightning are more vigorous manifestations of electricity. Nothing practical can be done with the former, but the destructive effects of the latter may have encouraged the ancient Egyptians to observe this phenomenon more assiduously and to undertake protective measures against it; that is, they might have erected lightning rods on their key buildings. The evidence that they actually did this is sparse.

> The only evidence is that given by the flag-staffs which were placed in front of the propylae of the Egyptian temples. These staffs were capped with a sheath of copper, and were about one hundred feet high. There are inscriptions, which date at the time of the Ptolomies---323-320 B.C.---describing the staffs at Edfu, which read as follows: "At the main entrance of the life-giving horn, there is a pair of tall posts to cut the lightning out of the sky." The staffs are made from the wood of the ash tree. Now it is from evidence of this kind that some of the Egyptologists maintain that lightning-rods were used by the Egyptians. (R1)

Actually, this evidence is highly suggestive, especially the inscriptions. If correct, they imply that the Egyptians of almost 2,000 years ago had learned that lighting was attracted to tall objects and that it could be diverted from buildings by metal conduits connected to the ground. These observations, if correct, reveal that perhaps there was a Ben Franklin among the pyramid builders! (Actually, it is not clear from the quotation that the staffs really were completely encased in copper and well-grounded.)

Fringe archeologists, however, postulate that the ancient Egyptians actually knew much more about electricity than lightning's natural predilections. They assert that Egyptian workers made use of electrical lighting when working in the dark bowels of the pyramids and subterranean passageways.

The reasoning goes as follows: the sunless interior surfaces deep inside many buildings of ancient Egypt show no evidence whatsoever of soot from torches and oil lamps, even though many of the structures involved required years to hew out of solid rock and decorate with paintings and reliefs All of this meticulous labor required good lightning. It is argued that either the Egyptians laboriously scrubbed all of the accumulated soot from the walls and ceilings or they used smokeless sources of light---possibly electricity! (R8, R14)

Of course, electrical lightning was not the only possible solution. Systems of mirrors could have brought sunlight into the dark rooms and tunnels, but no mirrors suitable for lighting the interiors of the huge, labyrinthine structures adorning the banks of the Nile have ever been found.

Yet, electrical illumination 4,000 years ago does seems too anomalous even in the context of the marvels of the Great Pyramid. Nevertheless, in addition to these skimpy inferences, there are other (very tenuous) hints that ancient Egypt might have harnessed electricity.

X1. A depiction of some ancient Egyptian electrical apparatus? Fringe archeologists have read a great deal into the accompanying sketch of a relief existing in Hall 5 of the Dendera Temple, which was built as a sort of museum during the Greco-Roman period of Egyptian history. Advocates of ancient Egyptian electricity see in the sketch two enormous light bulbs each containing a snake-like filament, and each supported by what appear to be high voltage electrical insulators. Furthering the electrical interpretation are long cables connecting each "bulb" to a central power source! One has to admit that a flavor of high technology pervades this

1,800-year-old scene preserved in the Dendera Temple. (R5, R6, R8, R11)

But there is other symbology in the Dendera relief that is hardly high-tech: tiny people adopting odd poses, a baboon brandishing a knife, and undeciphered symbols adorning the walls.

Countering the "electrical" interpretation are alternative explanations of the Dendera scene: In ancient Egypt, granite "snakestones" were placed as guards at doorways, and that is what the bulbs are. The "insulators" are really djed pillars, which are well-known symbols of stability in ancient Egypt. There are probably conservative interpretations of everything in the Dendera relief that are compabible with the religious beliefs of the Egyptians and have nothing to do with advanced technical capabilities.

Unquestionably, most damaging to the claim of ancient Egyptian electricity is the dearth of supporting relevant artifacts; that is, artifacts that can be clearly interpreted as electrical hardware---say, an obvious power source. In situations like the Dendera scene, where radical theories are proposed, a piece of the claimed 2,000-year-old electrical cable is worth a thousand reliefs!

From the sources at hand, it seems that the high-tech interpretation of the Dendera Temple relief began with a 1964 book in Swedish by I. Troenig, entitled Kulturer Fore Istiden ("Culture before the Ice Age"). According to the author, any ancient Egyptian knowledge of electricity is left over from a Golden Age that prevailed some 20,000 years ago.

In today's fringe thinking, this Golden Age or, perhaps equivalently, the Age of Atlantis, was initiated and coaxed along by extraterrestrials. When the ETs left and humans had to fend for themselves, everything went downhill until ancient Egypt arose and the human race again began the trek upward, helped in part by remnants of technology surviving from the Golden Age or Atlantis! This is a popular theme these days but also obviously very far off science's mainstream. However, we must recognize that the Golden Age scenario bears some resemblance to some religious histories of the human past.

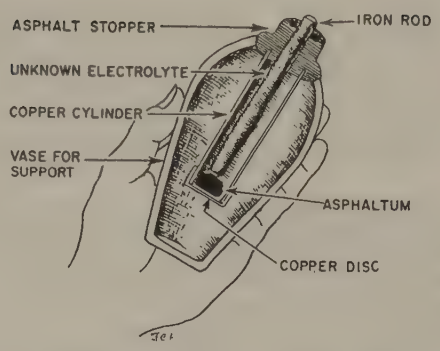
This relief from ancient Egypt's Dendera Temple seems to portray various sorts of electrical apparatus, most notably "insulators" and "cables." (X1)

X2. The Baghdad battery. A more significant staple of those who claim that the ancients used electricity for practical purposes is the famous Baghdad battery plus several very similar artifacts found in the same part of the world. With the Baghdad battery we have genuine artifacts in hand rather than merely suggestive depictions on a temple wall. Even with hardware to analyze, it is difficult to prove that these "batteries" were really electrical devices. They may "look like" batteries, but other interpretations are possible.

The first Baghdad battery was excavated at Khuyut Rabbou'a near Baghdad in 1936 by W. Konig. Though a painter by profession, Koenig was at the time the Director of the Iraq Museum in Baghdad. The "battery" story has been told many times in the popular-science literature, with emphasis always on an electrical interpretation. (R2, R3, R7, R9-R13)

Here are some basic facts and interpretations relating to Koenig's original discovery:

> It consisted of a vase made of clay, about 14 cm. high and with a largest diameter of 33 mm. Inside this vase a cylinder made of sheet copper of high purity was found, the cylinder being 10 cm. high and having a diameter of about 26 mm.
>
> The lower end of the copper cylinder was covered by a pieces of sheet copper of the same thickness and quality as the cylinder itself. The inner surface of the round copper sheet, the surface that formed the inner bottom of the hollow cylinder, was covered with a layer of asphalt, 3 mm. in thickness. A thick and heavy plug of the same material was forced into the upper end of the cylinder. The center of the plug was formed by a solid piece of iron, now 75 mm. long and originally a centimetre or so in diameter. The upper part of the iron rod shows that it was originally round, and, while the lower end has partly eroded so that the rod is now pointed at the lower end, it might be safely assumed that it was of uniform thickness.
>
> An assembly of this kind cannot very well have any other purpose than that of generating a weak electrical current. If one remembers that it was found among undisturbed relics of the Parthian kingdom (which existed from 250 B.C.-A.D. 224) one naturally feels very reluctant to accept such an explanation. The fact that four similar vases were found near Tel' Omar or Seleukia increases the value of the discovery. Three of these contained copper cylinders similar to the one found at Khujut Rabu'a. The Seleukia finds were apparently less well preserved; there are also no iron rods in evidence. But close to those four vases pieces of thinner iron and copper rods were found, and these may be assumed to have been used as conductive wires. (R2)



Supposed structure of the famous Baghdad "battery." The electrical interpretation of this artifact may be wishful thinking. (X2)

Why would the Parthians of 2,000 years ago required batteries? The most reasonable answer is "electroplating."

In the case of the Baghdad battery, we have not only suggestive hardware but also a practical purpose. The electrical nature of the Baghdad battery seems to be soundly based technologically. It is not surprising then that, for almost a century, most scientists and archeologists have admitted that the Parthians invented the electrical battery about 1,600 years before Volta.

But in 1996, G. Eggert, a German chemist, after reviewing the Badhdad battery dossier, was not persuaded that this particular design and associated artifacts would have really worked as effective batteries. Furthermore, he wrote:

> Concerning the claim of an ancient power source, where are the ancient electrical apparatuses or processes? Despite claims, there is neither an

ancient object that supports the existence of ancient electrotherapy (most recent speculation: electroanalgesia), nor electroplating, nor is there any written evidence. Archaeometry so far could not prove any ancient Near Eastern object to be electroplated. (R15)

If the subject artifacts were not a batteries, despite the fact that just about everyone admits that they "look like" batteries and could be nothing else, what other purpose could these 2,000-year-old, metal-containing vases have?

Eggert asserts that the "batteries" could have been "magic containers" for blessings and incantations. This kind of application is foreign to our modern, Western ways of thinking, but this is not the case in the Middle East and Asia. Containers of this sort and their contents have high symbolic significance in some parts of the world. (R13)

Given this admittedly curious cultural information, his discovery of the electrical-engineering inadequacies of the "batteries," and the lack of any electroplated artifacts from the Parthian era, Eggert favors the "magic container" interpretation of the famed Baghdad "battery."

Thus what appears to be a genuine archeological anomaly may have a ritual explanation completely divorced from high tech.

The Baghdad battery, so long a powerful proof of advanced ancient technology, may like so many other claimed anomalies and imponderable observations, may have to be relegated to the "ritual" file.

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MMT10 Ancient Calculating Devices

Description. Mechanical devices of stone or metal with movable parts that aid human simulation of astronomical phenomena or the manipulation of numbers.

Data Evaluation. The only device in this category that is adequately anomalous for its sophistication and antiquity is the Antikythera device. (X1) This machine has been thoroughly studied and reported in the science literature. Rating: 1.

Anomaly Evaluation. In terms of its technical sophistication and engineering design and manufacture, the Antikythera device stands out vividly against the technical background of the first century B.C. Rating: 2.

Several nonanomalous calculating devices are also described here for purposes of background and general interest. They need not be evaluated.

Similar and Related Phenomena. Stonehenge as a computer (MSH17 in Ancient Infrastructure); remarkable accomplishments in science and mathematics in ancient times (Chapter MAS in another volume).

Entries

X0. Introduction. The calculating devices cataloged here are obviously nothing like our modern programmed computers or even our simple, hand-held calculators. Rather, they resemble more the abacus, itself of great antiquity, or the orreries ---those old mechanical models of solar-system motion now supplanted by planetariums.

As a beginning, Stonehenge must be cross-referenced, since it is often touted as a "neolithic computer" that supposedly enabled its builders to predict eclipses. Today, many doubt that Stonehenge possessed this eclipse-prediction capability although it certainly incorporates important astronomical alignments---as do many other Stone Age arrangements of standing stones. These Neolithic megalithic astronomical "devices" are discussed in Chapter MSH in Ancient Infrastructure,

Here, we deal with smaller, "portable" calculating aids and devices that either model the motions of astronomical objects or aid in numerical computation.

X1. The Greek "computer" or Antikythera device. Without question, the most technically advanced machine handed down to us from the Greco-Roman world is a complex assembly of many interconnected gears called the "Antikythera device." It is often called a computer but it does not add or subtract. It does, however, apparently have the capacity to predict the future positions of heavenly objects and, in addition, look backward into the past.

The analysis and elucidation of the Antikythera device has largely been the work of D. de Solla Price, a Yale historian of science. He described his early work on this machine in a 1962 issue of Natural History.

The story of the Antikythera device actually began in 1900, when Greek sponge divers discovered a sunken treasure ship near the tiny island of Antikythera. This shipwreck has been dated at 65 B.C., so the technical sophistication of one particular item in the wreck's cargo was a great surprise to the archeological community. Here is how de Solla Price described the discovery.

> Among the surviving art objects and the lumps of corroded bronze and pock-marked marble, there was one pitiably formless lump not noticed particularly when it was first hauled from the sea. Sometime later, while drying out, it split into pieces, and the archeologists on the job immediately recognized it as being of the greatest importance. Within the lump were the remains of bronze plates to which adhered the remnants of many complicated gear wheels and

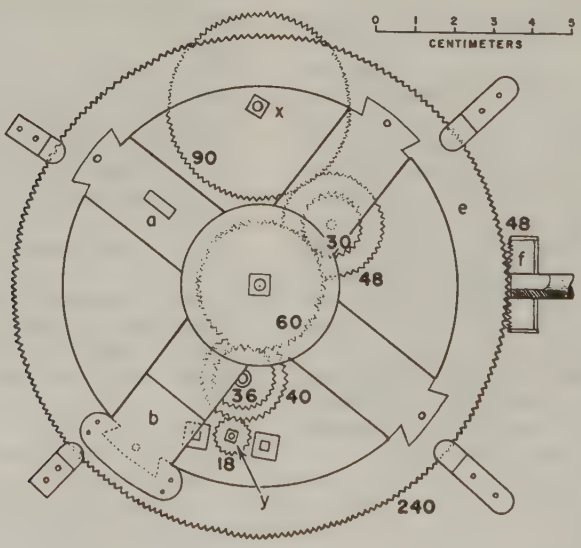
engraved scales. Some of the plates were marked with barely recognizable inscriptions, written in Greek characters of the first century B.C., and just enough could be made of their sense to tell that the subject matter was undoubtedly astronomcial.

.....

Little by little, the pieces fitted together until there resulted a fair idea of the nature and purpose of the machine and of the main character of the inscriptions with which it was covered. The original Antikythera mechanism must have borne a remarkable resemblance to a good modern mechanical clock. It consisted of a wooden frame that supported metal plates, front and back, each plate having quite complicated dials with pointers moving around them. The whole device was about as large as a thick folio encyclopedia volume. Inside the box formed by the frame and plates was a mechanism of gear wheels, some twenty of them at least, arranged in a non-obvious way and including differential gears and a crown wheel, the whole being mounted on an internal bronze plate. A shaft ran into the box from the side and, when this was turned, all the pointers moved over their dials at various speeds. The dial plates were protected by bronze doors hinged to them, and dials and doors carried the long inscriptions that described how to operate the machine. (R2)

During the 1960s, de Solla Price tried to decipher the inner workings and ultimate purpose of the Antikythera device. His work was slowed by his inability to discern the inner details of the gears and their exact relationships without damaging the priceless artifact. Happily, in 1971, de Solla Price convinced Greek authorities to allow X-ray and gamma-ray pictures of the device's internal workings. With clear views of the machine's interior, de Solla Price and collaborators were able determine gear ratios and relate them to calendric and astronomical data.

The Antikythera device turned out to incorporate a train of over 30 gears that was activated by hand. These gears turned a group of dials and pointers that enabled the machine's operator to determine the positions of the sun and moon, past, present, and future, and additionally the moon's phases and the risings of the



Reconstruction drawing of the main mechanism of the Antikythera device. The complete machine incorporates about 30 gears. The numbers refer to the numbers of teeth on the gears. (X1)

most important stars. (R5, R11)

Although eclipse prediction was not one of the Antikythera device's functions, the machine nevertheless required archeologists to completely reassess the status of ancient Greek technology. Indeed, the Antikythera device was so advanced for its time that, as now so often the case, some fringe publications speculated that extraterrestrials must have had a hand in its design and manufacture!

X2. A Byzantine mechanical calendar. With a single exception, there is neither archeological nor literary evidence that any other complex, multigear machine comparable to the Antikythera device was built during the next thousand years---the first millennium of the Christian Era.

The sole exception is a sundial incorporating a geared calendar that was probably made between 475-525 A.D. somewhere in Byzantium. This device is not nearly as complex as the earlier Greek "computer." Indeed, it could be considered a backward step in technology---something not uncommon during Europe's Dark Ages. The next example of calendric gearing worth mentioning is an astrolabe circa 1221 A.D.---and it was manufactured in Persia, then the center of world science. (R9)

X3. The Mallia Table. Some 2,000 years before the Antikythera device, some of its astronomical simulations may have been emulated by crude lithic devices. Stonehenge has already been mentioned (X0) as possible megalithic calendric structure. Almost as old as Stonehenge is the much smaller (90-centimeter) Mallia Table. This 4,000-year-old artifact has been interpreted to be a lunisolar clock by C.F. Herberger. (R7)

The Mallia Table was discovered in the Central Court of the Minoan Palace of Mallia on Crete. It is a large limestone disk 90 centimeters in diameter and 36 centimeters thick. Around its circumference are 33 cups of equal size. A 34th. cup is larger and is located in a sort of ear that extends beyond the normal circumference of the disk. The larger cup is oriented due south. The disk is set in the stone pavement of a small terrace that is slightly elevated above the level of the Central Court. This strange monolith, which dates circa 1,900-1,750 BC, has been a puzzle to scholars since its discovery in 1926 by French excavators.

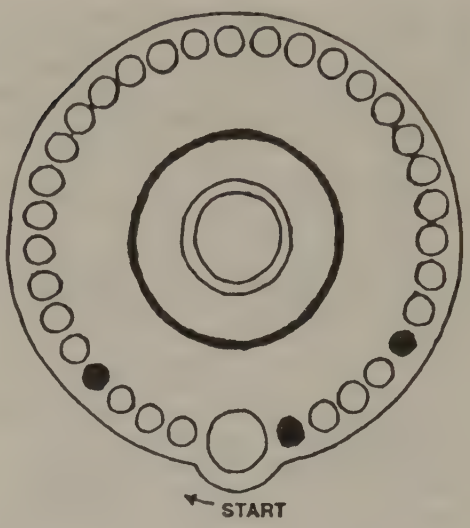


Diagram of the Mallia Table with its 33 small cups plus one large cup. In the lunisolar-clock interpretation, the intercalcation cups might have contained black markers. (X3)

C.F. Herberger's thesis is that the disk is a lunisolar clock. The 33 small cups provide a convenient and symmetrical division of the 99 lunations of the 8-year cycle. By moving markers placed in the cups, one could make a fairly accurate lunisolar clock. The 34th. cup, by virtue of its larger size, would announce the need for an intercalcated month. This sort of clock, even though arrived at empirically, represents a remarkable innovation for a period almost 4,000 years ago. Of course, this evaluation assumes that Herberger's hypothesis is correct! (R7)

The Mallia Table is manifestly a very simple artifact. One can also conceive that it might be merely an ancient gameboard of sorts or that it was employed in religious rituals of some sort. (R8)

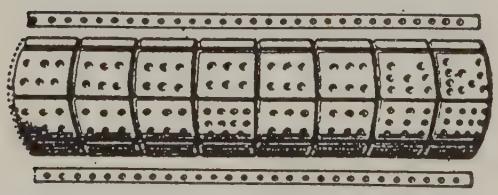
In the end, all is surmise where the Mallia Table is concerned.

X4. Some New World calculating aids. The mathematical aids employed by the Precolumbian inhabitants of the Americas cannot be compared to the sophisticated geared mechanisms existing in Europe and Near East in roughly the same time frame. (X1, X2)

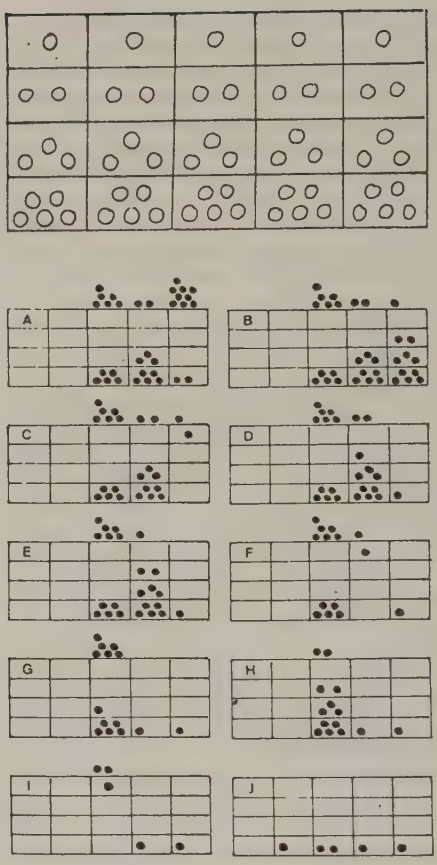
Nevertheless, two of them are sufficiently interesting to mention in passing.

A lunar calculating aid? The age and provenance of the artifact now described are unknown. Z. Sitchin is the writer now quoted.

> Several stone objects that are now kept in the National Museum of Peru in Lima are believed to have served the coastal peoples as calendrical computers. One, for example, catalogued under the number 15-278, is divided into sixteen squares that contain pegholes that range from six to twelve; the top and bottom panels are indented with twenty-nine and twenty-eight pegholes respectively---a strong suggestion of a count of lunar monthly phases. (R10)



A possible Incan lunar calculating aid. The top of bottom panels offer 28 and 29 peg holes, respectively. (X4)



(Top) La Yupana, an Incan calculating table. A base of 10 was used, with units in the far right positions, 10s next left, 100s left of the 10s, etc. (Bottom) How La Yupana can be used to add 629 to 582 in nine steps. (X4)

Since we do not know how this device worked, we cannot evaluate its mathematical sophistication or be certain of its appplication. Certainly, it is not an engineering or manufacturing accomplishment of any great magnitude.

An Incan calculating table. On a comparable level of engineering and mathematical accomplishment is a calculating aid used by the Inca. Called "La Yupana," this simple calculating table consisted of 20 squares arranged as shown in the illustration, with the squares containing cups in a 1-2-3-5 arrangement. The base-of-ten numbering system was employed, with units to the far right, tens to the left of them, etc. (R6)

The second set of illustrations illustrates how the numbers 629 and 582 are added in nine steps. This is rather cumbersome and hardly a major advance in calculating aids. The much older abacus would seem to be far superior.

References

R1. de Solla Price, Derek; "An Ancient Greek Computer," Scientific American, 200:60, June 1959. (X1)
R2. de Solla Price, Derek J.; "Unworldly Mechanics," Natural History, 71:8, March 1962. (X1)
R3. Verheyden, Ivan; "La Mécanique Inattendue d'Anticythere," Kadath, #1, p. 6, March-April 1973. (X1)
R4. Dehon, Robert; "Les Bricolages de Genie," Kadath, #17, p. 12, March-April 1976. (X1)
R5. Casson, Lionel, et al; Mysteries of the Past, New York, 1977, p. 156. (X1)
R6. Glynn, William Burns; "La Yupana ou Table de Calcul des Incas," Kadath, #47, p. 16, Autumn 1982. (X4)
R7. Herberger, Charles F.; "The Mallia Table: Kernos or Clock?" Archaeoastronomy, 6:114, 1983. (X3)
R8. Herberger, Charles F.; "La Table de Mallia: Offrandes, Jeux ou...Horloge?" Kadath, #59. p. 4, Summer 1985. (X3)
R9. Maddison, Francis; "Byzantine Calendrical Gearing," Nature, 314:316, 1985. (X2)
R10. Sitchin, Zecharia; When Time Began, New York, 1993, p. 264. (X4)
R11. James, Peter, and Thorpe, Nick; Ancient Inventions, New York, 1994, p. 121. (X1)
R12. Childress, David Hatcher; Lost Cities of Atlantis, Ancient Europe & the Mediterranean, Stelle, 1996, p. 119. (X1)

MMT11 Speculations about Ancient Flying Machines

Description. The design, manufacture, and application of aeronautical machines deemed to possess engineering sophistication and involve scientific knowledge beyond the recognized capabilities of the cultures involved. Kits, balloons, and heavier-than-air machines are involved here.

Data Evaluation. Unfortunately, much of our information is drawn from popular books which, in turn, rely on myth, legend, and interpretations of ancient texts. The data evaluations are the first figures in the ratings given below for the three potential anomalies reviewed here.

Anomaly Evaluation. Three claims for the existence of ancient aeronautical machines are cataloged here. The anomaly evaluations are the second figures in the ratings.

- The ancient Egyptian use of huge kites in raising obelisks and constructing the pyramids (X1). Ratings: 4/2.

- The use of hot-air balloons by the Nazcan culture to aid in the laying out of the Nazca lines and, perhaps, in their subsequent appreciation and/or use (X2). Ratings: 3/2.

- The construction and use of powered aircraft in India circa 500 B.C. (X3). Ratings: 4/1.

Similar and Related Phenomena. Methods of Egyptian pyramid construction (MSP6 in Ancient Structures); the Nazca lines (MGW in another volume).

Entries

X0. Introduction. Aviation's history is a long one, beginning with the first kites, progressing through gliders and hot-air balloons, and just recently to supersonic jets. In this lengthy story of the human conquest of the air, the earliest of the chapters relate tales and reproduce drawings found in ancient texts that suggest the possible precocious use of aeronautical machines in the construction of the pyramids and during the drawing of the Nazca lines---both subjects unavoidable in this Catalog of Anomalies. Therefore, a few pages are herewith assigned to this type of literary evidence, even though the artifacts essential to the proof of the existence of these wonderful aerial machines have not yet been found.

X1. Kites. Kites---even very large ones ---are more than 1,500 years old. Chinese records tell of attempts to launch man-carrying kites circa 559 A.D. (R5) Of course, kites per se are nonanomalous, but it is remotely possible that giant kites may have been used in lifting operations by the ancient Egyptians.

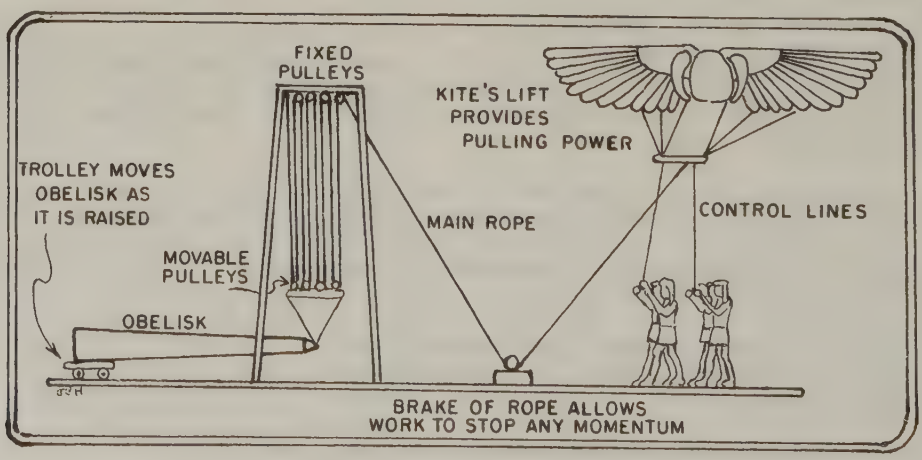
M. Clemmons, an aeronautics professor at the California Institute of Technology, has suggested that the ancient Egyptians employed huge kites to help them raise obelisks and also to slide multi-ton stone blocks into place during pyramid construction. (R7)

No one doubts that large kites in a strong wind can exert powerful forces, especially when the mechanical advantage of a pulley-system is added. Indeed, Clemmons has actually built a 40-square-meter kite with which he has erected small test obelisks.

Clemmons' engineering is faultless---at least on a small scale---but no artifacts, such as pulley systems, suggesting the use of huge kites in building the pyramids have been found so far. However, at least one hieroglyphic inscription does seem to show a kite aloft with control lines held by a force of workers below. This suggestive picture was enough for Clemmons to look at the potentialities of "kite power." (R7)

X2. Hot-air balloons. As with kites, the Chinese must be credited with the first use of hot air for levitation. But they apparently did not take this idea any farther than the "toy" stage. (R5)

Just as an Egyptian hieroglyphic stimulated thoughts of kites as ancient lifting machines, so the famous Nazca lines on Peru's Atacama Desert evoked mental images of balloons suspended in the thin air above them. You see, a puzzling



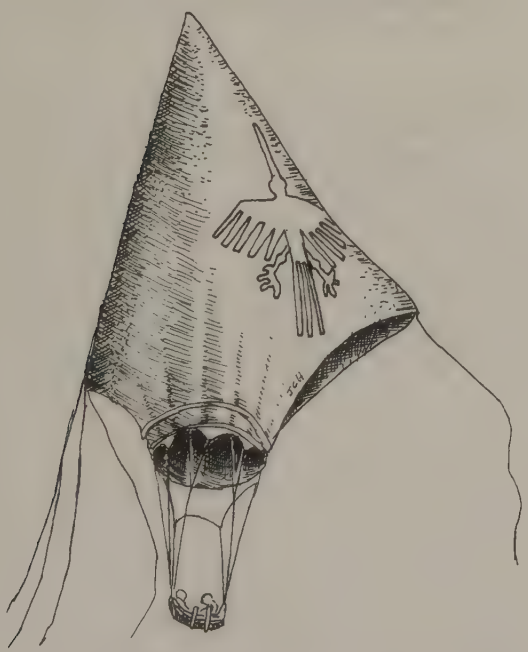
An ancient Egyptian mural inspired this speculative method of using large kites in the raising of heavy objects. (X1)

feature of the Nazca lines is that they are so extensive that they can be best appreciated only from high altitudes. Indeed, their modern "discovery" was delayed until they were spotted from an airplane. The patterns of lines run for miles, an engineering feat that brings forth the question of how the Nazca culture (500 B.C. to 900 A.D.) laid them out so precisely from the ground? No sufficiently high, natural vantage points are available on the Atacama. Could the Nazca have sent observers aloft in hot-air balloons to guide the line-drawing?

Hints to this effect occur on Nazca pottery and textiles, where one can see what seem to be balloons, kites, and humans somehow flying through the air. In addition, we have the fact that Nazca textiles are woven so finely and tightly that they could easily have served as balloon fabric.

Influenced by these facts, the International Expedition Society of Miami decided to make a small hot-air balloon of cotton fabric and test it out over the Atacama Desert. Called the Condor I, the balloon was first flown on November 23, 1975, carrying observers J. Woodman and J. Nott. The flight was a success, reaching an altitude of 380 feet. (R4, R5)

As with Clemmons' obelisk-raising kite (X1), proving that something can be done does not mean that it was. Until some appropriate artifacts, such as the remnants of a 2,000-year-old Nazca balloon, are found, archeologists will not be convinced of the proposed Nazca aeronautical prowess.



Drawing from a photograph of the modern Condor I hot-air balloon in flight over the Nazca Plain, Peru, illustrating that such a device was not beyond Nazcan capabilities. (X2)

X3. Ancient powered aircraft. Surely suggesting that the Wright Brothers were thousands of years late at Kitty Hawk verges on the ridiculous. Even so, it must be at least mentioned that Chinese annals note that Emperor Shun (2258-2208 B.C.) built a flying machine; so did Emperor Cheng Tang (1776 B.C.) (R2) Of course, no artifacts support these contentions. Neither is there hard evidence that texts from ancient India are truthful when they describe battles between aerial navies 2,500 years ago. (R2, R6)

The nature of the literary evidence for powered flight is not impressive.

> These references are encountered notably in the Ramayana and Mahabharatta. These works are by no means confined to one period of time, but, like most sacred books, they consist of materials of different dates, illustrating the progress of the social and religious evolution of the Brahmans. The great Hindu epics were written to celebrate the exploits of kings and the conflicts of an internecine war. References to flying during that period are very clearly indicated in the Ramayana. In this stirring poem, which was compiled about the year 500 B.C., we learn that Rawun, a King of Ceylon, used to fly over his opponents' armies and not infrequently caused them severe loss. (R1)

The Indian epic literature goes into detail concerning the aerial machines involved. Several types were reputed to have been in use. The ancient texts provide enough information for modern students of this highly speculative subject to make sketches of these machines, which are called "vimanas." None of these renderings of the vimanas impress today's

aeronautical engineers. None looks flyable. In fact, they remind one of the various depictions of Ezekiel's Wheel as drawn from the Biblical description. It, too, could fly and rather impressively at that!

References

R1. Shah, Ikbal Ali; "Aerial Warfare in Ancient India," Discovery, 1:185, 1920. (X3)

R2. Tomas, Andrew; We Are Not the First, London, 1971, p. 141. (X3)

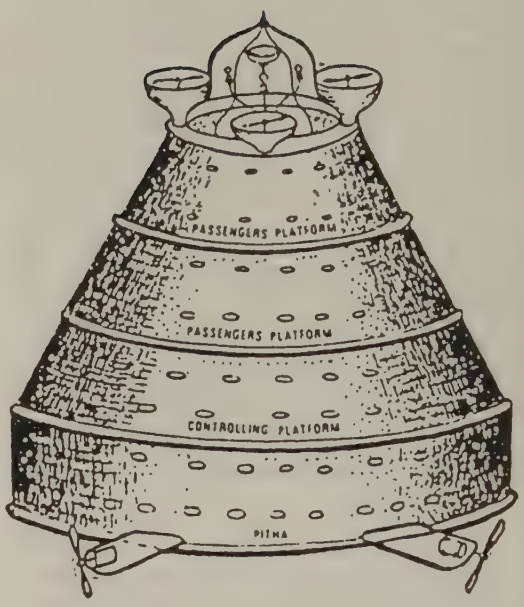
R3. Keyaerts, Jacques; "Les Vimanas, Mythe ou Realité?" Kadath, #19, p. 17, September-October 1976. (X3)

R4. Hitching, Francis; The Mysterious World, New York, 1978, p. 71. (X2)

R5. James, Peter, and Thorpe, Nick; Ancient Inventions, New York, 1994, pp. 105, 109. (X1, X2)

R6. Childress, David Hatcher; Technology of the Gods, Kempton, 2000, p. 165. (X3)

R7. Chown, Marcus; "Kite Fantastic," New Scientist, p. 40, October 27, 2001. (X1)



Conceptual sketch of one of the four types of vimanas mentioned in ancient Indian texts. (X3)

MMW WOODEN ARTIFACTS

Key to Phenomena

MMW0 Introduction

Wooden artifacts do not survive the rigors of time nearly as well as those made from stone. Unquestionably, millennia of decay have left a large gap in this portion of the archeological record. Nevertheless, we have collected a few things of interest.

The handful of wooden artifacts that have survived and which are also anomalous deal with the always controversial subjects of cultural diffusion and Precolumbian contacts with the New World. We have, for example, evidence of Norse exploration of the high Arctic around the year 1000 AD. Adding to the diffusion argument, some wooden tools called "tapa beaters" from ancient Southeast Asia and Mesoamerica are so similar that trans-Pacific diffusion seems indicated. We also find signs of rather sophisticated hominid woodworking at least 240,000 years ago.

MMW1 Wooden Artifacts in Unexpected Places

Description. Wooden artifacts representative of specific cultures discovered in geographical locations where modern archeologists have denied that these peoples ever lived.

Data Evaluation. Articles are from mainstream science journals and magazines. Rating: 1

Anomaly Evaluation. That the Norse ventured into the high Arctic of North America, perhaps even establishing outposts, about 200 years before Columbus' voyage is not yet part of mainstream archeology. Rating 3.

Possible Explanations. Transoceanic voyages to and explorations of the New World were more frequent and earlier than allowed in current historical models.

Similar and Related Phenomena. Consult the Subject Indexes of all Series-M catalogs for additional evidence of Precolumbian contacts with the New World.

Entries

X1. North America

Baffin Island. In 2000, P. Sutherland reported evidence of a Precolumbian Viking shore station on the northern part of this Arctic island located just north of Labrador. Artifacts included characteristic Norse woodworking and carvings bearing European faces. This site dates back to about 1,300 A.D., 200 years before Columbus. (R2)

Ellesmere Island. To the north of Baffin Island lies Ellesmere Island close to northernmost Greenland. There, P. Schledermann and K. McCullough found addditional signs of Norse activities in the late Thirteenth Century. The wooden artifacts included portions of barrels and a wooden carpenter's plane. (R3)

Alaska. At Point Barrow, in the late 1800s, J. Murdock reported that men digging a shaft came across a pair of wooden sun goggles at a depth of 27 feet. (R1)

Eskimos and other Arctic cultures often wore such goggles with slits cut in them to reduce the glare from the ice and snow. The puzzling fact in this case is the great depth of the find. The 27 feet suggest great age, but not enough information is available about the excavation to claim anything anomalous.

References

R1. Anonymous; "The Antiquity of Man in America," American Antiquarian, 9:49, 1887. (X1)

R2. Pringle, Heather; "Hints of Frequent Pre-Columbian Contacts," Science, 288:783, 2000. (X1)

R3. McGhee, Robert," A New View of the Norse in the New World," Discovering Archaeology, 2:54, September-October 2000. (X1)

MMW2 Advanced Wooden Weapons

Description. Wooden hunting spears, approximately 400,000 years old, found in Germany.

Data Evaluation. The discovery was reported in first-line science journals and magazines. Rating: 1.

Anomaly Evaluation. Before this reported discovery, anthropologists did not believe that European hominids (Homo erectus) of 400,000 years ago were capable of co-operating and killing large prey animals. Rating: 2.

Possible Explanations. None required.

Similar and Related Phenomena. None.

Entries

X1. It has been a strongly defended archeological paradigm that the proto-humans; i.e., pre-Cro Magnons; who occupied Europe earlier than 40,000 years ago were unable to kill large prey animals and relied for their suppers upon scavenged carcasses and those small animals they could trap.

But, in February 1997, German scientists reported they had discovered three excellently preserved wooden spears in a stratum 400,000 years old. Butchered horses nearby imply the systematic hunting of large animals. Such skills involved foresight, organization, and collective action. Thus, the long-accepted date of 40,000 years for the presence of sophisticated hunters in Europe is off by a full order of magnitude. (R1-R4)

R. Dennell, from the University of Sheffield, added these words to the discussion about the spears.

> The spears have other exciting implications...We see considerable depth of planning, sophistication of design, and patience in carving the wood, all of which have been attributed only to modern humans. (R1)

Mainstream thinking states that only Homo erectus roamed Europe 400,000 years ago. However, some anthropologists, such as M.B. Roberts, lean toward an archaic version of H. sapiens; that is, our species or "modern man."

References

R1. Dennell, Robin; "The World's Oldest Spears," Nature, 385:767, 1997. (X1)
R2. Thieme, Harmut; "Lower Palaeolithic Hunting Spears from Germany," Nature, 385:807, 1997. (X1)
R3. Anonymous; "Ancient Spears Revise Thinking on Early Humans," Baltimore Sun, February 27, 1997. (X1)
R4. Gutin, Joann C.; "Getting the Point," Earth, 7:30, 1998. (X1)

MMW3 Remarkable Ancient Wooden Tools

Description. A presumedly ancient, stone-studded wooden plank of debatable purpose from Honduras.

Data Evaluation. All we have is a few sentences in a review of papers given at an archeology conference. Rating: 3.

Anomaly Evaluation. We do not have enough information about the subject artifact to evaluate it.

Possible Explanation. The implement could be relatively recent, dating from the Spanish Conquest.

Similar and Related Phenomena. Microliths (MMS4).

Entries

X1. Mesoamerica. In an 1887 issue of the American Antiquarian, O.T. Mason mentioned a curious wooden implement found at some unspecified date and place in Honduras.

> It consists of a plank of hardwood, 18 inches long and 10 inches wide, into which have been driven nearly 2000 bits of quartz no larger than tiny arrowheads, only they are not chipped in the least and are less shapely. (R1)

Although Mason classified this implement as Paleolithic, he says nothing about the conditions under which it was found or how he estimated its age. So, we must be wary of this item.

The implement is nevertheless fascinating for it resembles a threshing sledge---a tool used in historical times in parts of Europe. Could it be only a Spanish rallador; i.e.; grater?

Reference

R1. Anonymous; "The Antiquity of Man In America," American Antiquarian, 9:49, 1887. (X1)

MMW4 Wooden Artifacts Suggesting Unexpected Cultural Diffusion

Description. Wooden objects so similar in morphology and application that their appearance in cultures widely separately geographically introduces the possibility of ancient long-distance diffusion of ideas and rituals.

Data Evaluation. The journal sources are reliable, but the information provided about the subject artifacts is disturbingly incomplete. Rating: 3.

Anomaly Evaluation. The artifacts involved here are so specialized and similar in appearance and use that diffusion rather than independent invention seems the more likely. In the three cases cataloged here, the land and water barriers involved are imposing. Rating: 2.

Possible Explanations. Drift voyages in the North Pacific currents account readily for the Hawaii-Japan connection.

Similar and Related Phenomena. Anomalous diffusion of artifacts is a common theme in all of the Series-M catalogs. Use of the Subject Indexes is suggested to locate the additional multitudinous artifacts suggesting diffusion.

Entries

X1. North America

Pacific Northwest. In a strange parallel to the stone collars or yokes of Mesoamerica (MMS6), the Kwakiutl Indians of the Pacific Northwest coast manufactured similar collars from cedar bark. These were mentioned, more or less in passing, by O.T. Mason in a 1900 issue of Science. His primary concern was whether the cedar collars were, like the stone collars of Puerto Rico, made in right and left versions; that is, as mirror images. His letter to Science continued as follows:

> The Porto Rico stone collars are rights and lefts. In the National Museum collection of thirty, every one of them is carefully carved to imitate the splice joint shown perfectly in Dr. Boas's examples of cedar bark. In the drama of the expulsion of the Cannibal, acted with so much spirit by these Indians in Chicago, two men led the Cannibal to the fire, each wearing a cedar bark collar. It requires little imagination to transfer this scene to Porto Rico, where stone collars in likeness of those of bark would surround the necks of the captors, one on the right hand, the other on the left, wearing each the decoration outside. (R1)

In MMS5, however, the Mesoamerican stone collars are described as being worn around the waist---probably in games of some sort.

Despite these contradictions, the similarity of the highly specialized wooden and stone objects does suggest (faintly) the cross-continental diffusion of culture.

X2. Mesoamerica. In MMS3-X6, P. Tolstoy described the strong similarities between the stone tapa (bark-cloth) beaters of Southeast Asia and Mesoamerica. His in-depth study of these tools also included wooden tapa beaters, so we provide a cross reference here.

Briefly, Tolstoy concluded that about 2,500 years ago there was a direct transfer of tapa-making technology from Southeast Asia to Mesoamerica, particularly Guatemala and Honduras. He rejected the possibility of step-by-step diffusion across the Pacific via the Polynesian

islands. (R3)

X3. Oceania

Hawaii. On these remote Pacific Islands, anthropologists have come across peculiar artifacts that imply early Japanese contacts with Hawaii---probably via drift voyages.

The artifact to which the author devotes most attention is the kahili of Hawaii, which compares with the keyari of Japan, which two present striking similarities in appearance and function. "One description will apply to both: a staff or standard with feathers arranged in cylindrical form on the upper part; insignium of rank, preceding the ruler or high noble on the road on ceremonial visits, and requiring obeissance due to its owner. (R2)

The similarities are too specific to pass off automatically as merely independent inventions.

References

R1. Mason, O.T.; "Cedar Collars of the North Pacific Coast Indians," Science, 11:831, 1900. (X1)
R2. Dixon, Roland B.; "Contacts with America across the Southern Pacific," Polynesian Society, Journal, 44:56, 1935. (X2)
R3. Tolstoy, Paul; "Paper Route," Natural History, 100:6, June 1991. (X3)
R4. Thompson, Gunnar; American Discovery, Seattle, 1992. (X2)

MMW5 Wooden Artifacts of Apparent Great Age

Description. Pieces of wood obviously shaped artificially discovered at great depths in the earth or in strata objectively dated as being hundreds of thousands of years of age.

Data Evaluation. One report (X1), almost 200 years old, is highly suspect but included nevertheless for its curiosity value. The second report is modern and seems reliable. We rate the latter only. Rating: 1.

Anomaly Evaluation. Wood is not as difficult to work as stone, but it is rather surprising to find hominids cutting, planing, and polishing it so long ago. Rating: 3.

Similar and Related Phenomena. Apparent examples of tool marks on petrified wood (MME4).

Entries

X1. Europe

France. In 1788, in a quarry near Aix in Provence, workmen had removed ten limestone strata, each separated by layers of sand and clay. They were surprised to find that the bottom of the eleventh stratum of limestone was

covered with shells on its under-surface.

> The stone of this bed having been removed, as they were taking away a stratum of argillaceous sand, which separated the eleventh bed from the twelfth, they found stumps of columns and fragments of stone half wrought, and the stone was exactly similar to that of the quarry; they found moreover coins, handles of hammers, and other tools or fragments of tools in wood. But that which principally commanded their attention, was a board about one inch thick and seven or eight feet long; it was broken into many pieces, of which none was missing, and it was possible to join them again one to another, and to restore the board or plate to its original form, which was that of the boards of the same kind used by the masons and quarry men; it was worn in the same manner, rounded and waving upon the edges. (R1)

The coins said to accompany the wooden plank, all at great depth, raises one's suspicions. The depth suggests great age; the coins, relative recency.

Britain. A piece of wood bearing apparent saw marks is cataloged in MME4-X2. Its estimated age: 0.8-1.75 million years.

X2. Middle East

Israel. In the northern Jordan Valley, Israeli archeologists unearthed a wooden plank at a Middle Pleistocene site.

> The plank is a soft and fragile piece of uncharred willow 25 centimetres long. Its surface is flat and polished and is cut at an angle to the branch's rays, so it was almost certainly fashioned by a human hand. (R2)

The stratum containing the plank was radiometrically dated by the potassium-argon method at 750,000 years. A mollusc also found in the stratum is believed to have gone extinct 240,000 years ago. What is indicated here is hominid woodworking at the surprisingly ancient date of at least 240,000 B.P., perhaps much longer.

References

R1. Anonymous; "Curious Geological Facts," American Journal of Science, 1:2:144, 1820. (X1)

R2. Anonymous; "Mollusc Confirms Dating of Oldest Known Plank," New Scientist, p. 14, July 20, 1991. (X2)

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