Letters

The Holly Oak Pendant

A whelk shell pendant bearing an incised depiction of a woolly mammoth, supposedly discovered at Holly Oak, Delaware, in 1864, was brought to light in 1890 (*1*). Although it was directly relevant to the intense debate then under way regarding human antiquity in North America (*2*), it was almost never cited by proponents of the contemporaneity of humans and extinct megafauna. Owing to circumstances surrounding the discovery, the pendant's authenticity was rarely accepted (*3*).

By the 1970's, the antiquity of the human occupation of the New World was well demonstrated by other evidence, while the Holly Oak pendant had been largely forgotten. The pendant then reentered the scientific and popular literature (*4*). If the artifact is genuine, it would be a unique type of Paleo-Indian artifact and would provide a convenient and striking illustration for the established fact that Paleo-Indians and mammoths were contemporaneous.

Particularly influential in calling attention to the artifact was the appearance of the Holly Oak mammoth on the cover of the 21 May 1976 issue of *Science*. The accompanying article explicitly recognized the possibility that the pendant was manufactured in the 19th century (*5*). However, the authors referred to a superficial examination that seemed to confirm the incising as ancient and then marshaled paleoenvironmental and paleogeographical evidence to suggest, among several possibilities, that the pendant dated to the late Pleistocene or earlier. The authors concluded that "an exciting new association of early man with the woolly mammoth in America" had been shown.

Other lines of evidence, however, indicate that the artifact is a modern fraud (*6*).

1) The mammoth closely resembles a famous engraving on a mammoth tusk found in 1864 at La Madeleine, the Magdalenian-type site. The similarities, recognized in the 1890's (*3*), could at that time be interpreted as demonstrating that the Holly Oak drawing indeed represented a woolly mammoth. There were then less than half a dozen known European Paleolithic depictions of the mammoth, among which that from La Madeleine was by far the clearest. Now there are more than 450 known Franco-Cantabrian paintings and engravings of the mammoth (*7*); yet still the Holly Oak drawing is closest to that from La Madeleine, and the two artists appear to have repeatedly chosen the same among the multiple alternatives that other European examples now show to be possible (*8*).

2) Aside from the engraving, the double-hole shell pendant is of a type largely restricted to the late prehistoric period of the Ohio Valley (*10*). No other Fort Ancient style gorgets are known from in or near Delaware, and a late Pleistocene date for such a gorget type is without parallel anywhere. Moreover, the engraving seems not to fit the orientation of the gorget: designs on Amerindian personal ornaments are placed to be viewed upright rather than sideways (*11*).

3) The Pleistocene range of the woolly mammoth did not extend as far south as Delaware (*12*). It has been suggested that the pendant may indicate the late survival of the woolly mammoth (*5*); however, there is no reliable evidence that any North American proboscidians survived into the Holocene (*13*).

4) The engraving and even the shell, with a *p*H in the basic range, could hardly have survived 10,000 years in the acidic environment of the "peat and fallen forest layer" where it was supposedly discovered (*3*).

5) The assemblage claimed to have been found in association with the pendant includes artifacts from markedly different time periods (*3, 5*), none of them credible as of Pleistocene age. This incongruity of the artifact assemblage was not apparent in 1890; now it is a clear indication that a bogus context was provided for the pendant.

We believe this is sufficient evidence to warrant deleting the artifact from the archeological record. Information on the supposed discoverer of the pendant and on the circumstances of his actions helps explain the failure of his contemporaries to accept his evidence and also strongly supports the deduction that the pendant was an intentional fraud.

Hilborne T. Cresson was born in the late 1840's and during the 1870's went from Delaware to France, where he studied art and archeology at the École des Beaux Arts and the École d'Anthropologie. There he met "scientific men" for whom he sketched "the primitive endeavors of early man" (*3*). In Paris it is likely that he saw what was then the most noted of these endeavors: the La Madeleine engraving. On his return to the United States in the 1880's, Cresson took an active part in the debate over the American "Paleolithic" and reported on several purportedly Paleolithic sites in northern Delaware, but these findings were not generally accepted (*3*).

Although claiming that the Holly Oak pendant had been discovered in 1864, Cresson brought it forth only in late 1889, never providing a convincing explanation for the delay. The significance of the artifact should have been apparent well before 1889, both to Cresson and to his alleged codiscoverer, his boyhood French teacher, especially since the latter, according to Cresson, had been a student of Édouard Lartet, who was the excavator of the La Madeleine engraving. When the La Madeleine engraving was discovered in 1864 (*14*), it immediately became a key piece of evidence in the European debate on the contemporaneity of humans and extinct mammals. Lartet had been a contributor to that debate, and Cresson studied archeology in Paris in the 1870's.

Cresson himself never mentioned the pendant in print—not even in his 1892 paper on "Paleolithic man in the southern portion of the Delaware valley" published in *Science* (*15*).

Between 1887 and 1892 Cresson was employed as a field archeologist by the Harvard Peabody Museum, excavating at several sites including Madisonville, a Fort Ancient village in Ohio. In late 1891, he was summarily dismissed from the excavation crew at the Hopewell site; he had been caught shipping home recovered archeological specimens for his private collection. Thereafter his enthusiasm for the American "Paleolithic" waned, and he admitted, without mention of the Holly Oak pendant, that the "peat and fallen forest layer" was not Pleistocene in age, as he had previously thought, but was quite recent (*3*).

In 1894 Cresson committed suicide in

New York City, leaving a note indicating he felt he was "suspected of counterfeiting, and that Secret Service detectives were continually on his trail" (*16*).

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References and Notes

1. F. W. Putnam, *Proc. Boston Soc. Natl. Hist.* **24**, 467 (1890).
2. K. R. Hart, thesis, Kansas State University (1976); D. J. Meltzer, *Advances in Archaeological Method and Theory*, M. B. Schiffer, Ed. (Academic Press, New York, 1983), vol. 6, pp. 1–51.
3. D. J. Meltzer and W. C. Sturtevant, *Mus. Anthropol. Univ. Mich.,, Anthropol. Pap.* **72**, 325 (1983).
4. Citations of the artifact, occasionally with some indication of doubt, include: R. A. Thomas, *A Brief Survey of Prehistoric Man on the Delmarva Peninsula* (1974); B. J. Meggers, *Prehistoric America* (Aldine, Chicago, ed. 1, 1976; ed. 2, 1979), pp. 13–15; J. C. Kraft, *Ann. N.Y. Acad. Sci.* **288**, 35 (1977); J. B. Carlson, *The Peopling of the New World* (Spec. Publ. 1, Northwestern University Archaeological Program, Evanston, Ill., 1978), p. [iv]; C. W. Dragoo, *Archaeol. East. N. Am.* **7**, 180 (1979); R. J. Mason, *Great Lakes Archaeology* (Academic Press, New York, 1981), p. 101; P. Brodeur, *New Yorker*, 11 October 1982, p. 81. An earlier revival of the Holly Oak pendant by C. A. Weslager can be found in *Archaeol. Soc. Del. Bull.* **3**, 10 (1941) and in *Delaware's Buried Past* (Univ. of Pennsylvania Press, Philadelphia, 1944), pp. 30–44.
5. J. C. Kraft and R. A. Thomas, *Science* **192**, 756 (1976). Later, D. R. Snow, evidently referring to unpublished opinions about the Holly Oak pendant, was more emphatic: "most [archeologists] consider it a fake. The engraving appears to have been copied directly from published illustrations of the European Upper Paleolithic" [*The Archaeology of New England* (Academic Press, New York, 1980), p. 118].
6. Physical tests of the artifact itself would almost surely be inconclusive and less convincing than the stylistic, archeological, and historical considerations here summarized. A radiocarbon age determination would be conclusive only if it proved the shell to postdate proboscidian extinction; a Pleistocene age for the shell would not rule out the possibility of modern incising added onto an ancient shell. But radiocarbon dating of shell is generally unreliable (*13*) and would be particularly so in this case, where the object has been subjected to various incompletely known, but partly chemical, attempts at preservation and restoration since 1890 (or 1864). These unknown vicissitudes, that may well have included efforts to strengthen or emphasize the incised lines, plus the present condition of the artifact—shattered, with a friable and spalled, crackled surface—would also vitiate the interpretation of any high-power, high-resolution microscopic examination of the incised lines.
7. M.-O. Berdin, *Trav. Inst. Art Préhist. (Toulouse)* **12**, 181 (1970).
8. A. Vayson de Pradenne, in *Les Fraudes en archéologie préhistorique* (Nourry, Paris, 1932), demonstrates that archeological frauds become more obvious as knowledge of the imitated style increases.
9. C. Rau, *Early Man in Europe* (Harper, New York, 1876), p. 59.
10. J. B. Griffin, personal communication (1982); J. B. Griffin, *The Fort Ancient Aspect* (Univ. of Michigan Press, Ann Arbor, 1943), p. 128; R. G. Morgan, in *Archeology of Eastern United States*, J. B. Griffin, Ed. (Univ. of Chicago Press, Chicago, 1952), p. 95; J. B. Griffin, in *Handbook of North American Indians*, vol. 15, *Northeast*, B. G. Trigger, Ed. (Smithsonian Institution, Washington, D.C., 1978), pp. 551–557.
11. T. J. Brasser, *Man Northeast* **19**, 95 (1980).
12. B. Kurtén and E. Anderson, *Pleistocene Mammals of North America* (Columbia Univ. Press, New York, 1980), pp. 353–354.
13. D. J. Meltzer and J. I. Mead, *Quat. Res.* **19**, 130 (1983). The Holly Oak engraving has generally been interpreted as a woolly mammoth. The mastodon, which did inhabit Pleistocene Delaware, had a more horizontal contour of head and back more like that shown on the Holly Oak pendant. But if the Holly Oak engraving represents a mastodon, then its strong resemblance to the La Madeleine woolly mammoth is even more peculiar. The best explanation seems to be that what was copied was Rau's rendition of the La Madeleine engraving, which differs from other, better copies in showing a mastodon (or elephant-like) profile of the back chosen from among several profiles engraved by the La Madeleine artist. The Holly Oak engraving and Rau's reproduction both differ from the original La Madeleine engraving in similar ways.
14. E. Lartet, *C.R. Séances l'Acad. Sci.* **61**, 309 (1865).
15. H. T. Cresson, *Science* **20**, 304 (1892).
16. *Philadelphia Record*, 8 September 1894, p. 1.
17. We thank S. L. Cresson, R. Gessain, L. Ginsburg, D. K. Grayson, J. B. Griffin, J. Haraseswych, G. Haynes, S. Hicks, C. M. Hinsley, Jr., Y. Laissus, S. F. Lehrer, J. Rosewater, and S. Williams for references, suggestions, identifications, and access to collections. For more details and more complete documentation see (*3*).

Sturtevant and Meltzer write that the Holly Oak whelk shell pendant depicting a proboscidian is a fraud perpetrated in the 19th century. We find nothing new or persuasive in their arguments. In the 1976 article (*1*), the sediments and geomorphology of the purported discovery area at Holly Oak, Delaware, were discussed, and four possibilities were concluded: (i) the pendant was buried in floodplain-type sediments more than 40,000 years old; (ii) the pendant came to rest (and was buried) on a land surface some time between 7000 and 18,000 years ago; (iii) the pendant was buried in a brackish coastal marsh approximately 2500 years ago; and (iv) the pendant and embellished stories pertaining to it were a fraud. These conclusions were derived using valid scientific methodologies and the multiple working hypothesis. In retrospect, clearly, it should have been noted that the depicted proboscidian was the American mastodon *Mammut americanum* (Kerr) and not the "woolly mammoth" [*Mammuthus primigenius* (Blumenbach)] that has permeated the literature of the past 100 years.

Paleo-Indian peoples occupied Delaware in some abundance 9000 to 15,000 years ago (*2*). They lived in Piedmont and coastal plain settings and left fluted-point artifacts (of the Clovis type) in scattered locations (more than 85), which were discovered mainly in surficial sites. From pollen evidence, we know they lived in a boreal setting with scattered grasslands along stream valleys. Mammoths and mastodons lived in adjacent Pennsylvania, New Jersey, and up to 300 kilometers to the south within the same time frame (*3*). We are pleased to note agreement of the authors that the American mastodon "did inhabit Pleistocene Delaware" (their reference 13). Yet their third point says that no reliable evidence exists that any North American proboscidians survived into the Holocene and that "the Pleistocene range of the woolly mammoth did not extend as far south as Delaware." (*4*).

Sturtevant and Meltzer state that "the mammoth" (Holly Oak) closely resembles a famous engraving on a mammoth tusk. Clearly, the Holly Oak artifact bears an etching of a mastodon. Equally clear is the fact that the carving on the La Madeleine tusk is that of a mammoth. There is a difference between the high crowned head and deep indentation at the neck so characteristic of a mammoth (on *all* European drawings) and the "more horizontal contour of head and back (of a mastodon) more like that shown on the Holly Oak pendant" (their words in their reference 13). If the drawing is a fraud, then it is an extremely poor one, particularly if it is a copy of any extant drawing of a mammoth. More information might be derived from applying statistical techniques of pattern recognition or forms of morphometric analysis.

Sturtevant and Meltzer imply that occupants of the Ohio Valley had a monopoly on "double-hole shell pendants." Although no other Fort Ancient-style gorgets have been found in Delaware, whelk shell gorgets similar to that found at Holly Oak have been found at other Delaware sites (*5*). The source of the whelk shell was marine, probably from the mid-Atlantic shelf coastal zone (New Jersey, Delaware, Maryland, Virginia) where this species is abundant. Further, it is interesting to learn that any living archeologist can read a prehistoric gorget to the degree that such knowledge may be used as evidence (their second point). Sturtevant and Meltzer state that the shell and engraving "with a *p*H in the basic range could hardly have survived 10,000 years in the acidic environment . . . where it was supposedly discovered." We wonder how it is that millions of mollusc shells are commonly found in the peats and organic sediments from the coastal zone of Holocene and Pleistocene times but the Holly Oak shell could not have survived (*6*).

Sturtevant and Meltzer note that the artifact assemblage (claimed to have been found in association with the pendant) includes artifacts from different time periods, "none of them credible as of Pleistocene age" (their fifth point). This is presented as "a clear indication

that a bogus context was provided." In no way does this prove anything. Of course the artifacts are less than 5000 years old. Cresson is said to have collected them from the Piedmont surface as well as from the narrow estuarine plain. He never said that he found the Holly Oak pendant in immediate stratigraphic context with the other artifacts. Many were collected from spoils along Naaman's Creek several kilometers away. The only true assemblage that we know of is that created in museum drawers (*7*). Furthermore, the artifact assemblage from Naaman's Creek is consistent with other local assemblages of certain provenience, contrary to the statements by Sturtevant and Meltzer (*8*).

All of the above begs the question. If an answer of fraud or truth is ever to be found, it must be based on the artifact itself. Contrary to suggestions in the letter, many "experts" have examined the specimens over the past two to three decades and expressed the opinion that the artifact was of genuine antiquity (*1*).

At least three scientists have requested permission to have carbon-14 or amino acid dates made from a portion of the specimen. These requests have been denied on the basis that previous chemical treatment might render the dates invalid. Surely the issue is one of validating the pendant. Scientific methodologies applied to the specimen would provide a definitive answer. But in their reference 6, Sturtevant and Meltzer reject these methodologies as a possible answer to the dilemma of the Holly Oak pendant, thus precluding debate based on deduction from fact. We suggest that *trying* geochemical and other scientific and statistical methodologies is better than repeatedly arguing the same points without clear definition.

In our opinion, the letter restates an old story. The authors substitute opinions or circumstances for "evidence" and reach a conclusion based on few, if any, "facts." Let us hope that this potential national treasure will be well preserved until such time as scientists will be allowed to apply scientific methodologies such as geochemistry and scanning electron microscopy, as well as statistical pattern analysis. Then, indeed, we may prove or disprove the antiquity of the Holly Oak pendant.

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References and Notes

1. J. C. Kraft and R. A. Thomas, *Science* **192**, 756 (1976).
2. J. F. Custer [in *Delaware Prehistoric Archaeology* (Univ. of Delaware Press, Newark, 1983)] succinctly discusses the many aspects of Paleo-Indian peoples' occupancy of Delaware and their environments and presents references to proboscidian megafauna and late Pleistocene–early Holocene dates within 100 to 200 kilometers of Holly Oak.
3. F. C. Whitmore, K. O. Emery, H. B. S. Cooke, D. U. P. Swift, *Science* **156**, 1477 (1967). Custer (*2*, p. 46) refers to mastodon and mammoth occurrences in New Jersey, Pennsylvania, and New York 10,000 to 12,000 years ago.
4. Did a barrier exist along what is now the Delaware border? Could not mammoths have walked 100 to 200 kilometers to see our lovely state? Did not Paleo-Indian peoples walk? Surely, of all American Indians, the megafaunal hunters must have traveled rapidly and great distances. H. A. Semken [in *Late-Quaternary Environments of the United States*, vol. 2, *The Holocene*, H. E. Wright, Jr., Ed. (University of Minnesota Press, Minneapolis, 1984), p. 185] presents documentation for up to 11 proboscidian finds from the early Holocene 5,000 to 10,000 years ago and explains the statistical sense of extinction when taken from the fossil record. One could even argue that the "last mastodon to die" has not yet been found and may have died in the late Holocene, but that of course would only be speculation.
5. J. F. Custer, *Practicing Environmental Archaeology: Methods and Interpretations*, R. Moeller, Ed. (American Indian Archaeological Institute, Washington, Conn., 1982); R. A. Thomas and N. Warren, *Bull. Archaeol. Soc. Del.* **8** (1970); see also (*2*).
6. True peats are rare in Delaware; however, organic marsh muds, often referred to as "peat," are not rare.
7. The conclusion of fraudulent intent does not stand even if Cresson thought that the large number of artifacts he collected in northern Delaware and southeastern Pennsylvania's Piedmont and estuarine plain *were* penecontemporaneous. It only shows his limitations as an archeologist given the state of the art in the mid- to late 19th century.
8. J. Swientochowski and C. A. Weslager, *Bull. Archaeol. Soc. Del.* **3**, 2 (1942); J. F. Custer, *ibid.* **13**, (1982); C. Kier and K. Calverly, *Pa. Archaeol.* **27**, 2 (1957); R. A. Mounier, *Bull. Archaeol. Soc. N.J.* **32**, 1 (1975); D. Cross, *Archaeology of New Jersey* (Archaeological Society of New Jersey, Trenton, 1941), vol. 1; *ibid.* (1956), vol. 2; R. M. Stewart, *Shady Brook Site* (New Jersey Department of Transportation, Trenton, 1981). These sites date from various time periods, but they show that Sturtevant and Meltzer are not correct when they say that the artifact assemblage composition itself proves a "bogus context."

Animal Research Guidelines

As scientists we have a duty to society to continue to make progress in advancing knowledge, in saving lives, and in alleviating suffering. This duty necessitates the continued use of animals in those areas of research where alternatives are not yet available.

The ethical principle of reverence for life demands, however, that any gain in knowledge be achieved at the cost of the least possible suffering to the fewest possible animals. The New York Academy of Science's Animal Research Committee is working with representatives of several scientific societies and industry toward this goal. We have initiated a program to develop a set of interdisciplinary standards and guidelines for the use of animals in research and education. The primary focus of these standards and guidelines is the use and treatment of animals in experiments, and the emphasis will be on those procedures which minimize pain or distress. Once established, these standards and guidelines will form the basis of an educational program directed toward student-scientists and others involved in animal research.

A system of voluntary regulation of biomedical and behavioral research by scientists will ensure the moral stewardship of experimental animals without prejudicing the scientific method. Our program takes a first step toward the implementation of such a system.

We would appreciate hearing from scientists about procedures for animal experiments which have been developed to minimize pain and distress. We urge them to contact any member of the committee at the address listed below.

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*Jeri Sechzer, chair; other members are Doreen Berman, Barbara Carter, Bruce Ewald, Nancy Geller, Anne Griffin, Phyllis Grodsky, Leon Lewis, Brian Morgan, Robert Scala, Philip Siekevitz, Philip Sechzer, and Dennis Stark.

"Implausible" Inventions

I would like to comment on the issues raised by R. Jeffrey Smith in his article "An endless siege of implausible inventions" (News and Comment, 16 Nov., p. 817). Many of the really profound inventions in use today, such as the airplane, electric motor and generator, telescope, microscope, and so forth, grossly violated the best theories of their day. They were also developed by persons outside the pale of orthodoxy. The second law of thermodynamics notwithstanding, some of today's physical theory will probably also be overthrown by new inventions that require new theory to explain them. To proclaim modern theory immune to major change is historically unjustifiable. Joseph Newman's motor may or may not work as he claims, but the patent examiners do the public a disservice in assuming a priori that it cannot.

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Erratum: In the next-to-last paragraph of the letter from Adrian R. Morrison and Peter J. Hand (31 Aug. 1984, p. 878), the first sentence was incorrectly punctuated. It should have read, "On the basis of knowledge we have gained as expert witnesses for the defense in two court trials, an appeal before a Public Health Service board, and the HHS meeting, we can make one thing immediately clear."