Cultural Heritage and Archaeological Issues in Materials Science

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Self Sacrifice Awls in Cantonona, Puebla, Mexico

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ABSTRACT

In the ancient city of Cantonona (600 B.C. to 1050 A.D.) in the region of Puebla, Mexico, a great number of awls made of animal bones were found inside several offerings and burials. The present paper presents the identification of species used to elaborate these awls, along with the formal characteristics of the objects and their manufacturing techniques. The last was studied through experimental archaeology and the analysis of modified traces by Scanning Electron Microscopy (SEM).

INTRODUCTION

Cantonona is an archaeological site located at the far east of the Central High Plateau in the north-central section of the Puebla eastern basin. It was an important settlement from 600 B.C. to 1050 A.D. [1] (figure 1), due to its privileged geographical localization; this site connected the communities of the central high plateau with the Mexican Gulf coast. The Cantonona Archaeological Project was started in 1992 with the direction of professor Angel Garcia Cook, through this project several materials have been recovered, among them some animal bone remains from three excavation seasons. Until now, 5000 animal bones (approximately) have been identified. The analyzed bones belong to three vertebrate groups: reptiles, birds and mammals. The more numerous of them were those of mammals, which the most abundant are the Cervidae family with the 99.5% with three genres and four species, being the white tailed deer (Odocoileus virginianus) the most present within the site.

From the modified animal and human bone materials, worked objects were recovered, such as straighteners, polishers, decorators, burnishers, knives and awls, among others [2]. For this paper, we selected a group of awls with active cutting edges whose raw materials consisted of bones from two large Mexican carnivores of great ritual relevance.

The main objectives of this research are the identification of the animal species used in Cantonona, as well as establishing the function of the cutting awls and identify the manufacturing techniques of them.

MATERIALS AND METHODS

As we said before, the osseous material came from the Cantonona archaeological site and was sent by the professor Angel Garcia Cook to the Archaeozoology Laboratory “M en C. Ticleu Alvarez Solórzano” of the Subdepartment of Laboratories and Academic Support, INAH, for its analysis.

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The identification was mainly made by direct comparison with specimens from the osteological reference collection of the same laboratory, and for the taxonomic classification and geographic distribution we use the one given by Wilson and Reeder [3]. In a first step optical microscopy was carried out at 10X, 30X and 65X.

Scanning Electron Microscopy (SEM), was performed at 100X, 300X, 600X and 1000X (Figure 8b). The last one was used with the same parameters proposed by Velázquez Castro [7].

High Vacuum Mode (HV), 20 kv of energy, SEI signal, spot size of 42 and 10mm of work distance.

Figure 1. Location of Cantona archaeological site in Puebla, Mexico

BONE IDENTIFICATION

Nine osseous remains from mammals of carnivore order and Canidae and Felidae families were analyzed, its characteristics are stated below:

Family Canidae

*Canis lupus baileyi.* - This specie is commonly known as gray wolf, is one of the large Mexican carnivorous. *Canis lupus* abundant over much of the North Hemisphere has several subspecies reported throughout America. but the one identified for Mexico is *Canis lupus baileyi* which could be found from the North of the country, passing through the Central High Plateau to Oaxaca. The gray wolf was much venerated in prehispanic Mexico and has been found in several offerings and burials of different archaeological sites, such as Cantona.

The identified remains of this species were three: one metatarsus III, one phalanx and two that form the third toe of the right back leg, these were found at CJP5-1 (ball game complex) top, N 5.98 to 6.14, E 6.50 to 6.61 (object 61).

Family Felidae

*Puma concolor.* - It is commonly known as puma or mountain lion, is other one of the large Mexican carnivorous and its widely distributed throughout the American continent. Of great esteem since prehispanic times, its osseous remains have been found in archaeological context at different sites. At Cantona, these remains were recovered in offerings, ball games and burials. In the Great Temple of Tenochtitlan, complete skeletons of this feline, its fur [4] and bone mud awls can be found.

The identified pieces of this specie were six awls inside two units. In the first unit one right metatarsus II, one right metatarsus III, one right metatarsus IV and one left metatarsus III wit its first phalanx were identified from the 201 Unit, East Square (extension), layer II (75-7 elements). In the second unit, a left radius and one right metatarsus III were identified from the Unit, Central Square, well 1, burial 16 (element 82).

TYPOLOGICAL ANALYSIS

The worked objects were classified according to the morphological and functional proposal from which self sacrifice awls are characterized, which according to Reyes, Pérez [5] and Heyden [6] have to present the following attributes (figure 2):

- Active borders with cutting morphology which angles oscillate between five and ten degrees.
- Raw materials that belong to large carnivores or birds of prey.
- The objects are found in public spaces, like squares, ball game structures, and burials.
- The length between the active border and the opposite border oscillates between 60.7 to 140 mm.
- The worked traces that this objects present is a polish on the active zone.

Thanks to the XVI century historical sources [7-8] it is known that for the Mexicas the self sacrifice artifacts were reserved only for the ruling classes and were fabricated from jaguar or eagle bones. These awls were used for piercing body parts, specially ears, lips, tongue, calve the arms and the genital organ. Afterwards, the subject extracted blood from the pierced part in way of penitence. It should be noted that we are taking these data to infer how the awls were used by the people who lived in Cantona.

TECHNOLOGICAL ANALYSIS

The manufacturing techniques of the awls were analyzed under the methodology develop under the "Manufacturing techniques of the shell objects from pre-Hispanic Mexico" project and proposed by Velázquez [9]. In this project the objects are replicated experimentally, use the techniques and tools that are assumed to have been used on prehispanic times. The purpose is to employ the materials and tools which, through different sources (archaeological finding historical sources and studies by other researches), are assumed were used in the past.
In order to avoid the speculative level and to propose more accurately the tools and techniques employed, the manufacturing traces obtained in the experiments are characterized: sight), optic microscopy (plant microscopy (SEM) (100X, 300X, 600X and 1000X). The latter is the technique that has achieved the best results, for it is suitable in the studies of the surface characteristics of the materials.

Figure 2. The image of a character using a awl of self sacrifice (Florentine Codex by Franciscan friar Bernardino de Sahagún).

For the technological analysis of the awls collection from Cantona, 15 replicas with different modifications, such as surfaces and cuts, were obtained. These polymers were coated with gold ions and observed in high vacuum mode (HV), with a number of 20 kV, an amplifications (100X, 300X, 600X and 1000X) of each were obtained. Later, the micrographs by the analyzed traces in the micrographs currently counted in the database of the following results for:

- Puma (Puma concolor): right radius, right II metatarsus, right III metatarsus and right IV metatarsus IV.
- Wolf (Canis lupus bailey): right III metatarsus.

Cuts: Three polymers were analyzed for:
- Puma (Puma concolor): right radius and right IV metatarsus.
- Wolf (Canis lupus bailey): right III metatarsus.

Surfaces
The results of observation under SEM indicate that in the case of the surface abrading, it was possible to appreciate 21 to 33 μm bands, which get stacked and most of them were parallel to each other; these traces matches with the experimental abrading with rhyolite (figure 3 and 4).

Figure 3. The image of a awl elaborate of a right III metatarsus of a wolf (A). An amplife image of awl 40x (B). It was abraded with rhyolite: archaeological (C) and experimental (D).

Cuts
For the SEM studies, these modifications a succession of very fine lines of 0.7 μm of width could be seen, these traces match the ones produced by cutting or making incisions with sharp obsidian tools (figure 5).
RESULTS AND DISCUSSION

The obtained results show the way that the awls were elaborated. In the first stage, they were cut with obsidian tools, and later they were abraded and regularized with rhyolite. In the case of the polymers obtained near the cutting points of the awls, the traces of obsidian and rhyolite were flattened, possibly due to the worked surface.

With the information from the context, raw material, manufacturing and wear traces, we could maintain that the studied objects are sacrifice punches.

In Cantona, the place where more puma punches (made over the back leg on four different posthumous) come from is at the East Square (Unit 201) layer II. Perhaps these objects were left after the rite. Other place is in the Central Square (Unit 9) burial 16, where two awls of the same carnivore (the right radius and the III metatarsus) were found; due to this evidence we can assume that the artifacts were deposited there as part of the individual offering. As for the case of the Burial 23 from the Structure 1 at the Ball Game Complex 5, one wolf awl was located; it is a right toe from the back leg that is topped with a cutting end in the opposite part of the claw.

With all these exposed data, we can corroborate that the puma (Puma concolor) and the only wolf (Canis lupus baileyi), two large carnivores, were of great appreciation and esteem for the high rank groups at Cantona, where its bones were transformed into ritual objects.

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