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Needles and bodies: A microwear analysis of experimental bone tattooing instruments

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ABSTRACT

Tattoos can be conceptualized as embodied experiences, ideas, and meanings expressed by groups and individuals. In Northeastern North America, many Iroquoian nations from the Contact period were known for practicing body transformations of this sort. Moreover, the archaeological literature abounds with cases of Iroquoian bone objects interpreted as tattooing implements. However, such functional interpretations are often proposed without any clear and thorough demonstration, and thus may be misleading. This paper presents the conclusive results of an experimental microwear analysis of replicated bone tattooing needles. They allow to access and investigate the social dimensions of tattooing practices in the past, as is illustrated with an example from St. Lawrence Iroquoians.

1. Introduction

The art of tattooing has been practiced by a large number of cultures and social groups around the globe. While there are indications that tattooing may have its origins during the Middle Stone Age (Deter-Wolf, 2013a), the oldest indisputable evidence for tattooing have been observed on the mummified body of the Iceman from Ötztal (aka Tyrolean Iceman), dated to 3370–3100 cal BC (Deter-Wolf et al., 2016). However, the discovery of human mummies is extremely rare globally, and even fewer wear tattoos. Thus, archaeologists tend to look for other kinds of material evidence to identify cases of ancient tattooing practices.

The archaeological literature of North America contains numerous mentions of artifacts that have been identified as probable tattooing implements (Deter-Wolf, 2013b). Most of these identifications were based on the shape of the objects, usually simple bone sticks with a pointed tip, or stone gravers with a sharp spike. This type of functional identification can be misleading because such artifacts may actually have had many different functions (see Gates St-Pierre, 2007), and nothing in their shape alone indicates that tattooing was more likely than any other possible function. Other identifications were based on the contextual association of pointed bone tools with so-called "stone mixing pallets", along with small quantities of red ocre or hematite, presumably used as tattoo pigments (see Deter-Wolf, 2013b and Knight, 2004, for example). Although intriguing, these associations do not suffice to conclude with certainty that the bone tools had served as tattooing needles. Microwear analysis remains the best method available to precisely and reliably identify the function of bone artifacts, including tattooing instruments.

This paper presents the results of a microwear analysis that was conducted in order to define the specific criteria to be used to identify bone tattooing needles in archaeological assemblages of bone tools. It then uses a case study from St. Lawrence Iroquoian bone tool assemblages and explores the social dimension of tattooing. Many ethnohistorical documents confirm the widespread use of tattooing among Iroquoian populations during the period of Contact with the first Europeans in Northeastern North America. For example, the Recollect missionary Gabriel Sagard Theodat mentions that among the Hurons *"Some have the body and face tattooed [gravée] with figures of serpents, lizards, squirresl, and other animals, and especially the Petun tribe [culturally related neighbors of the Hurons], who nearly all have the bodies so covered with devices […]"* (Sagard Theodat, 1865 [1632]: 133; translation borrowed from Sinclair, 1909). François-Joseph Bressani, a Jesuit missionay, stated in 1652 that *"And this [tattooing] in some nations is so common that in the one which we called the Tobacco, and in that which […] was called Neutral, I know not whether a single individual was found, who was not painted in this manner, on some part of the body"* (Bressani, 1899: 251). This quotation suggests that nearly everybody wore tattoos in the two nations that Bressani mentions. However, other sources indicate that only male warriors were allowed to decorate their bodies with tattoos, and only under certain conditions, usually after a feat of arms (see Balvay, 2008; Krutak, 2013, 2014). Many paintings and colored engravings from the time also show the popularity of tattooing among various Iroquoian nations, always men (Fig. 1). This study will indicate how usewear analysis can identify bone tattooing needles that could have been used to produce the tattoos similar to those described or

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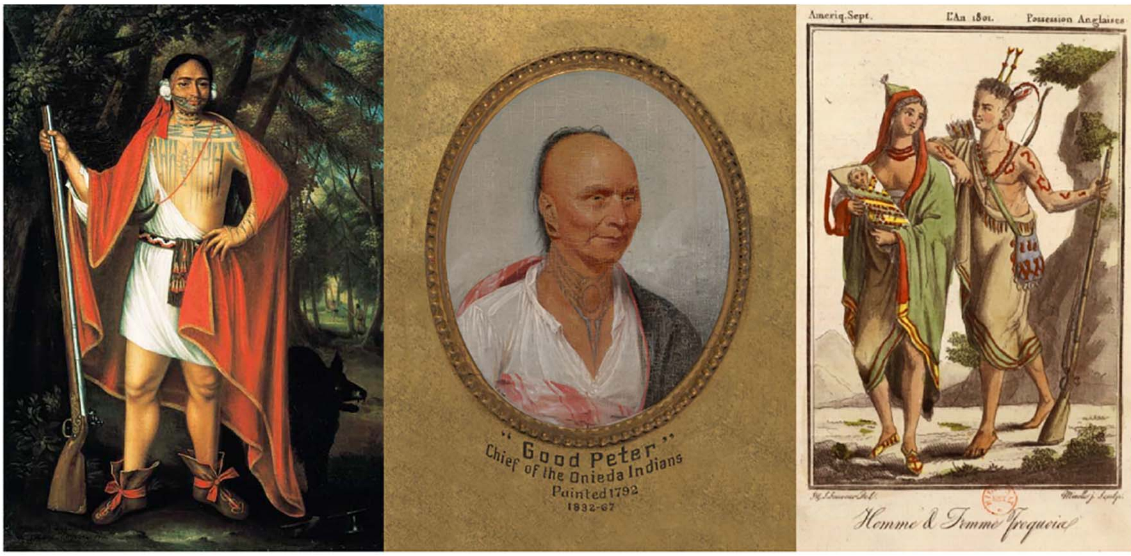

Fig. 1. Mohawk chief Sa Ga Yeath Qua Pieth Tow, by Jan Verelst, 1710 (left); "Good Peter", Chief of the Oneida Indians, by John Turnbull, 1792 (center); Homme & Femme Iroquois ("Iroquois Man & Woman") by Jacques Grasset de Saint-Sauveur, 1795–96 (right).

illustrated in ethnohistorical documents.

2. Previous studies

Other researchers have previously published the results of microwear analyses that are highly valuable for identifying ancient tattooing implements. For example, Deter-Wolf and Peres (2013) have tested the efficiency of various kinds of pointed objects that are mentioned in ethnohistorical reports as tattooing implements. These include bone awls, fish teeth and dorsal spine, a bobcat claw, sharpened river cane stalks, honey locust thorns, and various lithic tools such as gravers. The results of the experiments conducted on pig skin indicated that bone tools were the most efficient of them all. Quite surprisingly, however, the experimental testing did not produce any discernible wear pattern. Perhaps this wass due to the limited number of punctures carried out in the experiments (Deter-Wolf and Peres, 2013: 43).

In a similar study, Kononenko et al. (2016) used obsidian flakes bearing various pigments to tattoo pig skin. At the end of the experiment, diagnostic usewear and blood residue were identified (see also Kononenko, 2012). Although conclusive, these results cannot be transposed to bone tools, since different materials such as bone and stone will not develop the same kind of usewear, as their distinctive micro-structure and composition will react somewhat differently to the principles of tribology.

More recently, Arcos (2017) experimented the use of bone, antler, stone, and copper tools in tattooing pig skin. The study demonstrated once again the greater efficiency of bone implements over tools made from other raw materials. However, the usewear pattern could not be thoroughly described and characterized due to the use of low magnification.

The results of the experiments presented here are complementary to this exciting seminal research. They provide additional data allowing the definition of a more precise, complete, and reliable set of criteria that can be used to demonstrate the use of archaeological bone implements as tattooing needles.

3. Materials and methods

Usewear analysis is in large part a comparative process based on analogical reasoning. It thus requires the existence and availability of reference collections of experimental replicas showing microtraces that are diagnostic of specific gestures and materials. For the present study, the experiments first needed the production of bone needle replicas. These were made by an archaeologist who specializes in the production of artifacts using traditional materials, tools, and techniques, in order to obtain replicas that are as close as possible to the original artifacts under analysis. Metapodial bones from white-tailed deer (*Odocoileus virginianus*) were modified using flint blades, stone hammers and abraders, to produce straight and narrow splinters which served as blanks that were later sharpened at the distal tip and ground on most of their surface (Fig. 2).

Next was the preparation of a home-made black ink using soot mixed with water and a small amount of paraffin wax. Finally, two square slabs of fresh pig skin from the belly part (which included subcutaneous tissue, but no bone) were obtained from a local butchery. No scraping of the hair nor any other modification of the skin was necessary. The pig skin was used as a proxy for human skin, as is common in scientific experiments, since they are very similar in terms of general structure, thickness, hair follicle content, or collagen and lipid composition (Debeer et al., 2013; Summerfield et al., 2015). Also, pig skin is easy to obtain and handle, but most importantly it avoids the need to produce a certificate of ethical research, as would be the case if human beings were used instead.

Once all the materials and equipment were assembled and ready, a series of three successive experiments using three different bone needles were carried out in controlled conditions. Each experiment was carried out by a different person, in order to have feedback from different individuals with different backgrounds and knowledge (Fig. 3). However, each experiment was conducted by a single individual from beginning to end to ensure consistency during the entire process. The three needles used in the experiments were examined and photographed under an Olympus BX-51 metallographic microscope with reflected light at 50 ×, 100 ×, and 200 × magnifications before use, and then after 5, 15, 30 and 60 min of use, for a total of nearly two hours of use – except for needle No 1 which was only used for 20 min as a preliminary, yet conclusive test. About 30 punctures per minute were produced and the ink on the needle was refreshed after a dozen punctures, on average. Needle No 1 also served as a referent for an early stage of usewear. Each time a series of six distinct loci were systematically observed and photographed using a digital camera integrated into the microscope. This allowed us to document the usewear progression at each locus and for each needle. The usewear was recorded and described in terms of shape, dimension, location, orientation, and intensity of various types of surface modifications, such as striation,