Written in Bones

Studies on technological and social contexts of past faunal skeletal remains

edited by
Justyna Baron
Bernadeta Kufel-Diakowska

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Editors
Justyna Baron and Bernadeta Kufel-Diakowska

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Layout
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Cover
Justyna Baron

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53-505 Wrocław, ul. Lelewela 4

Elisabeth A. Stone

The Role of Ethnographic Museum Collections in Understanding Bone Tool Use

Osseous tools are an important component of the material culture of many ancient and contemporary groups and are used in a wide range of activities. One of the major uses of bone tools is the preparation and manufacture of basketry, woven fabrics, mats, nets, hides, and leathers. Because fiber technologies have low survival potential in the archaeological record, I propose that some classes of osseous tools are a good proxy for fiber processing and may provide direct evidence for this practice through use-related attrition. Functional analysis of archaeological specimens may include comparison to both experimental and ethnographic tools, as the context and process of wear accumulation are known in such cases and help provide standards for the assessment of attrition patterns on archaeological artifacts. Here I examine some of the variability in morphology and use of bone tools from ethnographic and ethnohistoric museum collections and explore the utility of these collections to create comparative standards for the assessment of archaeological artifacts and for the construction of experimental programs. I discuss some of the diverse kinds of records that provide information on contemporary and historic bone tool use and argue that studies of the ethnographic material record can be productively organized at the artifact level.

Keywords: bone tools, functional analysis, ethnographic analogy, cross-cultural research

Perishable fiber technologies - objects made from plant and animal soft tissues - may comprise up to 95% of the material culture made and used by contemporary foragers but are rarely found archaeologically (Barber 1991; Croes 1997; Hurcombe 2008b; Tuross, Fogel 1994). Fiber technologies, then, are frequently archaeologically invisible in two ways: 1) physically, they are perishable and are thus recovered less frequently from the archaeological record; 2) intellectually, even when they are present, these technologies are often associated with the labor of women, children, and the elderly, who are frequently omitted from our reconstructions of the past. These two factors are interrelated and each feeds the other in the development of a gap in our knowledge about ancient perishable technologies: lack of interest in less powerful members of society – in the past and the present – limits the investigation of these individuals in the past, the difficulty of recovering this evidence minimizes the attention paid to these material classes. In the deep past, the archaeological study of fiber technologies is more problematic because of the extreme rarity of actual exemplars of such objects. However, there are many means that archaeologists can employ to study ancient economic activities such as the processing and manufacture of goods with animal and plant derived fibers.

Osseous tools constitute an important component of the material culture of many ancient and contemporary groups, and are used in a wide range of activities. One of the major uses for bone tools is the processing and manufacture of organic artifacts such as cordage, thongs, basketry, woven fabrics, mats, nets, prepared hides, and leathers (Amato 2010; Christidou, Legrand 2005; Legrand 2008; Maigrot 2003; Owen 1994, 2005). As I will discuss below, numerous tool forms are associated ethnohistorically with the processing and production of animal and plant fibers technologies and archaeological forms may be studied to understand the past use of these more perishable materials. My work on ethnographic osseous tools was developed in the context of research on the role of different fiber sources and fiber technologies in the Upper Paleolithic of northern Spain. Given the deep time depth of Upper Paleolithic sites and the poor preservation of soft organic materials from ancient sites, other means must be used to identify the processing and working of hides, sinew, reeds, and plant fibers during the end of the Pleistocene, or in other places where direct evidence is scant. I propose that some classes of osseous tools can provide a good proxy for fiber processing and may provide direct evidence for this practice through patterns of use-related attrition.

The Social Role of Perishable Materials

In the documented ethnographic and ethnohistoric record there is strong evidence for the varied and substantial role of fiber industries in economic and social life. Perishable technologies include objects manufactured from soft fibers of both animal and vegetal origin, including hides, furs, wools, leathers, sinew, thongs, bast fibers such as nettle or flax, reeds, rushes, leaves and leaf fibers, bark, roots, and small woody stems. Among the fiber industries are cordage, felt, prepared hides and leathers, baskets, woven textiles, nets and sewn or knotted flexible structures. Perishable materials constitute a major component of material culture and fulfill important social roles among all known contemporary and historic peoples (Barber 1991; Drooker, Webster 2000; Petersen 1996; Schneider 1987). Economically, baskets and bags are crucial to many subsistence activities, while lines, cords, nets and snares play an important role in the exploitation of aquatic and small terrestrial resources. Textiles and basketry were also frequently used as trade or tribute items in the more recent past (Brumfiel 1996; Drooker, Webster 2000).

In general, material culture is used in the active construction and passive reflection of group membership, cultural affiliation, and personal agency (Sackett 1977; Wiessner 1983). Perishable technologies are particularly apt to the explicit expression of social identities. Fabrics, mats, and baskets create an important locus for the expression of individual, group, and local identity on many scales beyond their crucial economic and subsistence roles. The importance of clothing, for example, includes not only protection from the elements and other "utilitarian" aspects, but also results from its critical place in the construction and communication of social identity (Barber 1991; Burnham 1992; Drooker Webster 2000; Schneider 1987). Clothing, as the most malleable aspect of the human appearance is a rich medium through which alliances and rebellions, status, age, and position are marked. Woven fabrics and baskets are key indicators of learned technical styles that express both hidden or non-explicit aspects of conformity through the learned techniques of production, along with the more evident symbolic aspects of pattern, color and design choice (Lechtman 1977, 1984). So, fiber technologies are used in many ways and take many forms, and we cannot fully understand either economic and subsistence systems or social identities without considering perishable artifacts.

Who Produces Perishable Technologies?

Of additional interest for archaeologists is the question of *who* makes perishable technologies, from the perspective of the ethnographic and ethnohistoric records and how this can inform our studies of the past. The assumption frequently made is that weaving, sewing, basketry, and hide-working are tasks done by women. There is a strong tendency for the association of women with these tasks in the record of non-industrialized societies (Murdock, Provost 1973). However, this is an empirical observation of the known patterns over the last few hundred years. Given the broad similarities in the division of labor across many peoples, numerous scholars have grappled with understanding the forces that contribute to the gendered division of labor, and more specifically to the manifestation of patterns that seem to repeat (Adovasio *et al.* 2007; Hayden 1990; Owen 1994; Soffer *et al.* 2000). In order to make an argument about the possibility of an association of women with the production of perishable technologies in the past, we must pull apart this connection to determine whether the contemporary configuration of labor divisions are a result of chance and historical contingencies or whether there are underlying factors that might drive this patterning.

Archaeological interpretations of the context and social systems ordering the manufacture of fiber industries have been influenced by two interrelated generalizations derived from 18th and 19th century ethnographic research conducted within a discipline dominated by men with greater access to and interest in men's activities, as well as a greater emphasis on action and change over the maintenance of cultural practices over a longer span (González-Marcén *et al*. 2008; Wobst 1978) and guided by then-prevalent notions of the ubiquity of many aspects of Western European lifeways. The first assumption is that these activities represent, for the most part, household production. Fiber goods are ubiquitous and utilitarian and their production is conservative over time and does not vary much from household to household. Secondly, this type of production is seen as having low status, both within the living context and in contemporary archaeological research structures. It does not facilitate, in a direct and obvious manner, tasks often deemed high-status, such as large game hunting, or drive the household or seasonal organization of labor. Finally, these manufacture sequences and their end-products also do not vary greatly over time and thus are assumed to have less importance for understanding patterns of cultural change and have less to tell archaeologists interested in tracking trends in social and economic behavior. Although contemporary ethnologists have problematized the concept of tradition, the remarkable stability of certain forms, such as the eyed needle, call attention to the long-term maintenance of particularly effective technologies. These conservative technologies demonstrate the utility of certain forms for accomplishing common tasks, but study of the ethnohistoric record indicates that the maintenance of a particular form does not always indicate that the context or manner of use remain unchanged.

Given theoretical models for the allocation of labor by gender and age, and patterns in the ethnographic record, can we suggest that women, elders, and children were responsible for the production of fiber technologies in much of prehistory? The allocation of time and labor among members of a household or small foraging group is driven by the kinds of tasks required to maintain social and economic life, along with the demands of scheduling, both over the year and among group members, and is typically divided along interrelated lines of age, gender, and social status. Judith Brown (1970) argued that the primary factor in determining the subsistence contributions of men and women is the compatibility of a given subsistence activity with childcare. After noting that the contributions of women to overall subsistence vary fairly systematically with the primary subsistence resources, Brown suggests that women's work can be predicted based on the ability of subsistence labor to be combined with attention to babies and children. From this, she derives the prediction that women's work must be close to home, interruptible, monotonous, and cannot require undivided attention, silence, or isolation. Although empirically generalizable, this explanation does not account for the different ways that men and women contribute to subsistence and economics, but instead assumes that women will be preferentially engaged in subsistence, unless they are prevented from filling these roles by some other task, in this case, childcare. Thus, it describes a situation that may have historical roots and so may not be relevant in the deeper past.

Nicole Waguespack (2006) argues that when male contributions to subsistence are high, women's labor will be oriented toward the manufacture of goods and other kinds of material processing, along with the allocation of time to childcare. She suggests that by limiting our analysis of the organization of labor to subsistence and childcare, we overlook other important tasks to which time and energy must be allocated, and that might be done by different members of a society, depending on competing demands for their resources and time. Thus, it may be that women, elders and children were responsible for many of the tasks associated with fiber processing and manipulation, particularly in forager groups.

Bone Tools and the Manufacture of Fiber Technologies

The ethnographic and ethnohistoric records show that osseous tools are frequently employed in sewing, weaving, basket weaving, and hide-working (Amato 2010; Densmore 1929; Hayden 1990; Kehoe 1990, 1999; Murdoch 1892; Osgood 1940; Owen 1993, 2005). The availability of bone as a raw material, along with its anisotropic structure and the ability to produce a smooth, hard surface, make bone an ideal material for fiber-working tools. Bone is both flexible and strong and comes in sizes and shapes that lend themselves to certain forms – particularly long and slender shapes that characterize many tools for fiber-working. Before the development of metal-working technology, needles and awls of diverse forms were typically made from bone in a wide range of archaeological and ethnohistoric contexts. In fact, of the common tools used in hide-working, sewing, spinning, weaving, netting, mat-making and basketry, many were historically made with osseous materials (Table 1).

Because of the importance of bone and antler tools in the processing of plant and animal soft materials, the presence of such tools may be indicative of the production of perishable artifacts that are themselves no longer present in the archaeological record. However, because many of the functional tool types vary significantly in both morphology and precise function, *there is no one-to-one correlation* between archaeological artifacts and specific fiber technologies. In order to better clarify the connection between osseous and fiber technologies, I employ a multi-scalar approach that combines the data from ethnographic, ethnohistoric, experimental, and other sources to create a framework for the analysis of the morphology, condition and attrition from use and handling of archaeological objects.

Comparative Frameworks for Functional Analysis

General frameworks for the functional study of archaeological artifacts, including osseous industry, include the construction of comparative standards from experimentation and the study of ethnographic materials and the assessment of overall variation within and between assemblages of morphology, condition, and surface attrition patterns. Three primary methods are used to assign function to artifacts.

The first, and least reliable but most common, are simple "common sense" formal analogies that draw on our own experiences to contextualize objects and are based on the inherently functional nature of many terms. Occasionally, as in the case of the eyed needle, these analogies may be fairly reasonable, but they must be tested against more rigorous standards. In general, though, such groupings are a necessary first step in creating order in an archaeological assemblage and are complementary to methods of grouping derived from archaeological practice, such as stratigraphic, raw material or size class groups.

The second method is based on the theoretically derived models that link form, materials, context, gesture, and use. This includes the ways that we conceive of the constraints and possibilities created by the physical properties of materials, availability of different products, tools, and knowledge, and socio-economic context. Many functional analysts have made effective use of mechanical models to order their understanding of the patterning in archaeological assemblages and as a way to structure experimental protocols (Buc 2005; Campana 1989; Kamp 2001; LeMoine 1997; Ono 2005).

The third approach to the assignment of function to archaeological artifacts is the use of comparative collections with known histories. These comparative collections are of two kinds: experimental and ethnographic. Experimental programs have long formed the backbone of functional research, beginning with the seminal work by Semenov (1973). Experiments allow archaeologists to clearly and systematically link surface attrition patterns with materials, gestures, or tasks. Different variables, such as pressure, length of work or condition of raw materials can be manipulated in order to understand the contribution of distinct factors to the overall accumulation of wear. Experimental programs have been shown to be widely effective for understanding bone wear and other aspects of osseous technology (Averbouh, Christensen 2003; Buc 2005; Campana 1989; Christidou, Legrand 2005; Legrand 2008; LeMoine 1997; Letourneux, Petillon 2008; Olsen 1984; Owen 1994; Sidéra, Legrand 2006). They are most effective in situations where the local research structure allows for the long-term collaboration of numerous people with interrelated interests.

However, there are certain kinds of information that cannot be obtained through even the most careful experimental protocol. Experimental programs do not eliminate the problem of equifinality, particularly in cases of complex, layered wear (Binford 1983). Archaeologists today were rarely raised making and using flint and bone tools or hunting, gathering, processing and manufacturing all of their own possessions. This means that most of us lack the motor habits developed by skilled artisans accustomed to the use of these raw materials and activities (Hurcombe 1994, 2008a, 2008b). Additionally, many experimental archaeologists are self-taught or learn skills within the "community of practice" of which they are members: archaeologists. Thus, we learn in a context where the goals of manufacture and use are distinct from those of prehistoric practitioners. Although it is difficult to determine what kind of error we may be introducing through this novel context of use, there are reasons to believe that actions and outcome are subtly affected by intention. Archaeological experimentation is also driven by our expectations for use, and so certain kinds of wear will not be replicated in the experimental context because of both logistic and intellectual constraints on the materials, gestures and tasks tested (Owen 1999).

Finally, both the primary benefit and drawback to experimentation is the ability to simplify the history, context and pattern of use of any specific tool. This simplification is what lends experimentation its utility and elegance: the life history of the object is known, documented, and manipulated to meet the requirements of the experimenter. However, this simplicity can present obstacles when attempting to apply the models produced through the study of experimental tools to the archaeological record of objects with long and complex use histories, further complicated by post-depositional taphonomic agents and post-excavation agents.

Ethnographic materials provide an alternative and complementary comparative collection for the establishment of standards for the assessment of archaeological patterns. The two methods complement each other by providing different kinds of object life histories, each strengthening the interpretation of the other. Ethnographic objects were created and used by individuals with learned, lifelong developed motor habits and were used in a living context in which they are tools with particular uses, but may also be used expediently in diverse ways. They are also subject to handling, storage, and transport over their life history. The complex surface attrition patterns on ethnographic tools may provide a good model for archaeological surface patterns. Wear on these objects was accumulated through use, handling, transport, repair, storage, and alternative uses of tools in a lived context. Experimental tools, on the other hand, are curated in special ways in order to best maintain the surface that reflects contact with a specified material and in a particular manner. Thus, the two kinds of comparative standards are complementary.

Ethnographic Collections and the Archaeological Record

Traditionally, ethnographic analogies in archaeology have been used in two primary ways: 1) to generate testable hypotheses about the role of artifacts in the past; 2) to suggest potential meaning or non-material associations of the objects. It has generally been held that analogies are strongest when there is a direct historical connection between the living people and the producers of the archaeological assemblage and that, in the absence of a direct relation to any living people, analogies should be made between groups of people in roughly similar ecological contexts (Binford 1962, 1978; Wylie 1985). I argue that these stipulations on the cultural or ecological relations between peoples are more appropriate when the analogy is one of human actions and behavior or symbolic meaning. However, in many cases, the analogy being made, when more closely examined, is not on the behavioral scale, but rather at the scale of the artifact, or even, artifact component. Assessments of archaeological function usually operate at the artifact scale because the goal is to identify the use of the object *before* it can be situated in a social and historical context. Thus analogies are frequently invoked during speculation over possible uses or as justification of experimental or other analyses aimed at clarifying use, rather than providing behavioral explanations for material patterns.

In this study, as I am considering artifacts from an archaeological population with no direct or evident cultural links to any living peoples, I draw analogies of artifact surface similarity, organized through the lens of tribological principles. Rather than beginning from the assumption that there should be direct analogs for Upper Paleolithic tools in museum collections of objects of contemporary and historic origin, I employed a sampling strategy based on contact surfaces, focusing on osseous tools used to manipulate plant and animal fibers during basket-making, weaving, netting and hide-working in order to understand the wear patterns that result from contact between bone and soft fibers of diverse kinds. The benefit of this approach is that it resulted in an increase the range of artifacts studied, along with a larger overall sample, because I considered artifacts from any historical or contemporary group where bone tools were used to modify plant or animal fibers (Table 2).

Setting the scale of analysis to the artifact, rather than behavioral, level allows us to more effectively compare archaeological and ethnographic attrition patterns and can also be useful in cases where a behavioral analogy is not evident. When there are no strong indications to suggest a pattern of tool or material use, then a wide ethnographic sample is warranted and the scale of analysis can be organized at the level of artifact wear surface rather than activity. Focusing the level of analysis on the artifact surface permits a more precise empirical understanding of the physical outcome of contact between two known materials under known circumstances. When working in deep time this approach is particularly useful, as we have a limited understanding of the social and economic life of people in the very ancient past. The patterning in ethnographic materials can be used to explore both the range of variation in the ways that people have used bone as a raw material and the physical effects of the interaction between bone and other surfaces. The range of variation in the uses and roles of tools that are morphologically similar to tools for fiber manipulation, but have distinct functions, such as nut picks that are morphologically similar to hide-piercing awls, can also be described.

Ethnographic and Ethnohistoric Documentation

Although vast collections of ethnographic material exist in museums, the archaeological study of these artifacts has been relatively scant, as there are significant difficulties in obtaining the detailed information requisite. The kind and amount of detail can vary significantly within and between ethnographic collections, ranging from simple identifying names, such as "Awl nut pick" (NMAI 021719.000) to detailed information on the owner, context of use, and meaning, such as "Bear bone awl used in making bark utensils" (NMAI 164196.000). Accompanying documentation varies more widely. The range in the reliability and kind of documentation requires significant amounts of archival research to determine the validity of artifacts for an archaeological study. Many ethnographic artifacts will not have sufficient documentation of life history. Nonetheless, artifacts with suitably detailed and specific documentation of use are not uncommon and a large sample of usable artifacts can be obtained, albeit with significant investment of labor into sorting prior to the study of the artifacts themselves. Greater detail on my sampling strategy and different means of identifying ethnographic artifacts appropriate for archaeological comparisons can be found in Stone (2011). Here, I will describe the general aspects of artifact selection, demonstrating that most difficulties can be overcome and the information that can be gained from ethnographic material justifies their study.

Research in museums with ethnographic collections can center on two sources of information: archival and object-based. Ethnographic collections are not direct representations of the tools made and used by a particular group of people any more than archaeological records are a direct reflection of the range of materials found in the past. Nonetheless, a vast amount of information can be gleaned from the combination of physical collections and written documentation that accompanies them. Judicious use of ethnographic materials requires that the units of comparison be clearly delineated in order to determine means for accepting and eliminating objects and kinds of data.

Many museum collections were compiled in an arbitrary manner, during the course of ethnographic fieldwork. There are few systematic collections of material goods and of those that exist, none that I know of focus on tools of textile, basketry, or leather production. Thus, systematic comparison of elements in these collections requires the reorganization of objects into larger groups that necessarily gloss over myriad contextual and social variables. When the goal of study is understanding the physical signatures of artifact manufacture, use or handling, this regrouping presents no analytical problems. Additionally, the degree of detail and accuracy of the names and descriptions given to accessioned artifacts varies substantially. Most objects are given names and keywords so that they can be easily tracked in collections databases. When possible, it is important to determine if the names derive from some kind of documentary information or are determined by the museum registrar based solely on form. This can usually be determined with archival research.

Archival documents are the true key to ethnographic and ethnohistoric collections: they provide the information that links object and action. Ethnographic literature contains information about the broader social and cultural context of labor, the individuals who are responsible for different tasks, and the meaning and role of objects within a social context. Ethnohistoric studies are concerned with both historical documents and other kinds of data that contribute to an anthropological understanding of historic communities, and are uncommon outside of the Americas. Archival documents in museums may be associated with ethnographic or historic collections. These documents range in quality and format and can include formal reports, publications, letters, inventories, interviews, and other kinds of records. Reports include formal statements such as those made to the Smithsonian Institution, the Bureau of American Ethnology or earlier reports sent to colonizing governments by explorers or members of the military or religious orders. These formal statements often contain descriptions that are anecdotal in nature and were designed to give the readers back in museum or government headquarters an impression of the lives of indigenous peoples, including their daily activities and general information about their technology. The reports that arose from the first anthropological expeditions were also designed to contextualize the physical collections acquired for the Smithsonian and other museums and institutions as part of the mission of early ethnographers and historians. This arose in the context of the early post-colonial phase in which the dominant paradigm in ethnology was one of documenting "dying" cultures before they disappeared. Hence, the emphasis of early ethnographers lay in identifying extremes: the most exotic behaviors and those behaviors that seemed most familiar to them, with little in between and with minimal attention to the historic processes that contributed to the configuration of social structures (Wobst 1978).

It is also useful to remember that the American four-field approach to anthropology – which integrates the study of living peoples, human biological forms, language, and history or prehistory – was developed at this time and in the context of early interest in Native American peoples by Western intellectuals and many early collections are a result of these investigations. Additionally, early ethnographers were predominantly male, interested in male activities and because of their lack of focus and access to women's work, frequently came to the conclusion that women played little role in the social and economic spheres of indigenous communities, so documentation of women's activities is less complete than that of men's tasks and more generally, ritual.

Along with formal reports, there are numerous other kinds of documentation that may accompany ethnohistoric collections. Letters discussing the experiences of early anthropologists often contain rich details on individual instances of production and use of different tools. Additionally, letters frequently contain references to the division of labor by gender, age or social role that can illustrate some of the organization of production in these indigenous societies. Written summaries or transcripts of interviews with the owners of tools that were given to the museum are also available in some cases.

The kinds of information that can be obtained from the diverse sources of documentary evidence fall into a several groups. Of lesser interest for the study of the archaeological record, but of key importance when understanding the colonial history of anthropology in the Americas, is the embedded context of colonial and early post-colonial interaction between native groups and anthropologists and other colonial intellectuals. Letters, interviews and formal reports all reflect the context and attitudes that framed the development of anthropology as a discipline. Because we operate in a context and a discipline with this strong colonial history, it is important to consider how this impacts the analyses and narratives that we construct concerning the recent and ancient past of indigenous peoples worldwide. Early biases still perpetuate themselves through the cumulative nature of anthropological and archaeological study and hidden knowledge gaps can affect our use of ethnographic and ethnohistoric data if attention is not paid to the context in which this material was produced. Left unexamined, these biases can impact archaeological interpretation.

Ethnographic and ethnohistoric records can reveal some of the ways that objects and different raw materials have meaning within a social world filled with diverse actors. The social and ritual meaning of things can have direct impact on the choices that people make in terms of the ways that seemingly similar materials and tools are used. Bone, for example, is linked to living animals and this may or may not have significance for the way that bone is employed as a raw material. Although these patterns cannot be extrapolated directly to the archaeological record or to cross-cultural ethnographic patterns, they can help explain idiosyncrasies in the use of materials and tools. The relationship between tool makers and users and the social status of each can also help explain some kinds of variation among and between tool collections.

Of greater direct relevance to the construction of comparative standards for the study of archaeological collections, are other kinds of information relating to the manufacture, use, maintenance and discard of osseous artifacts. The most obvious and concomitantly most essential data relate to the names and functions of tools, including the amount of tolerated variation in alternate uses of tools. Some kinds of tools have very specific functions while others are generalized tools in practice, even if they have names that might imply to outsiders that they have a particular and bounded use. Additionally, the methods and social, spatial, or temporal context of manufacture, use and maintenance are often identified in ethnohistoric documentation.

Assessing Form and Function of Ethnographic Tools

After reviewing the accompanying documentation, a thorough study of ethnographic collections can effectively inform on many dimensions of bone technology. Here, I demonstrate this utility by examining one small aspect of bone tool variation. I focus on whether there is a correlation between form and function, and if so, what is the nature and prevalence of this correlation? I later assessed the range and kinds of variation in microwear on bone needles, awls, and other tools to identify patterns of attrition and wear associated with different worked materials on bone. A consideration of usewear on ethnographic tools is too extensive for the aims of this paper but can be found elsewhere (Stone 2011).

The first consideration is one of terminology and begins with the recognition that the "functional" terms that we use to describe archaeological and ethnographic objects are often fluid and contextual. For

Fig. 1. Innu (Montagnais) snowshoe needles (Courtesy, National Museum of the American Indian, Smithsonian Institution, Catalogue number 028877; Photo: E.A. Stone)

Fig. 2. Alaskan sinew-sewing needles (a: Catalogue number E24463; b: Catalogue number E89395; c: Catalogue number E89392; d: Catalogue number E89394; a-d: Department of Anthropology, Smithsonian Institution; Photos: E.A. Stone

example, a "needle" could be a *sewing needle,* used to draw a thread through a fabric, or a *tattoo needle* for drawing an inked thread through skin. It might also denote a large, broad *matting needle* for rushes and thatching or a small, dense *snowshoe needle* for netting leather thongs through a wooden snowshoe frame.

In rare cases, form and function align, as in the case of bone snowshoe needles. Found throughout the northern portion of North America, snowshoe needles are usually made of bone, although examples in wood and metal are also known. Although they vary somewhat in size, and the form of the central perforation varies, overall, snowshoe needles – flat, wide, bi-pointed, and centrally perforated – are remarkably similar (Fig. 1). Conversely, the simple "sewing needle" for use with sinew thread varies more dramatically, even within the same region and broad cultural group. Alaskan sinew-sewing needles vary in dimension, curvature, form, and can be made in ivory, bone, or later, metal (Fig. 2). Thus, in the case of the sewing needle, despite serving only one

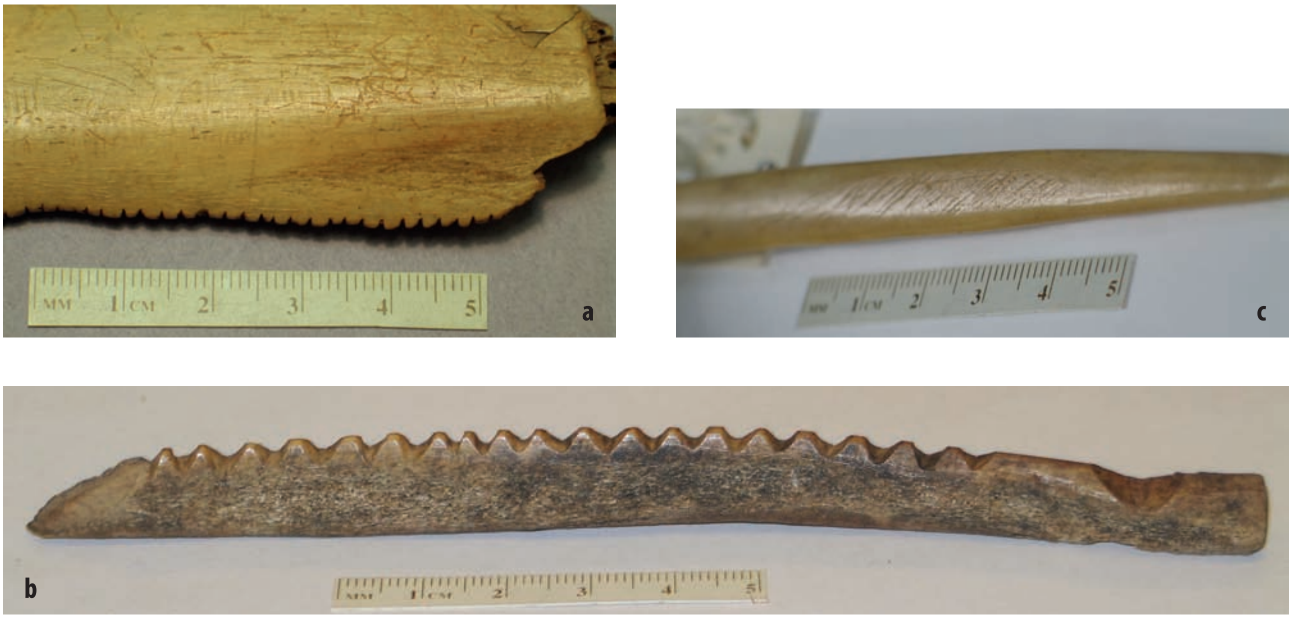

Fig. 3: Weaving battens or needles: a) Hawiku, New Mexico (Courtesy, National Museum of the American Indian, Smithsonian Institution, Catalogue number 066490, Photo: E.A. Stone); b) Inuit, Alaska (Courtesy of the Burke Museum of Natural History and Culture, Catalogue number 1996-49/12, Photo: E.A. Stone); c) Zuni, New Mexico (AMNH 50.1/8789; Courtesy of the Division of Anthropology, American Museum of Natural History, Photo: E.A. Stone)

Fig. 4: Morphologically similar tools of diverse function: a) Weaving awl; Collas Aymara (Courtesy, National Museum of the American Indian, Smithsonian Institution, Catalogue number 15/8531, Photo: E.A. Stone); b) Nut pick, Comanche, Oklahoma (Courtesy, National Museum of the American Indian, Smithsonian Institution, Catalogue number 021719; Photo: E.A. Stone); c) Basketry awl; Hopi, New Mexico (AMNH 50.1/9998; Courtesy of the Division of Anthropology, American Museum of Natural History); d) Pipe cleaner; Innu (Montagnais), Quebec, Canada (Courtesy, National Museum of the American Indian, Smithsonian Institution, Catalogue number 101433, Photo: E.A. Stone)

general function, form can vary, while the snowshoe needle is more morphologically constrained.

Tools for the same purpose may vary substantially in form, to the extent that archaeologists would rarely group them together. Weaving battens are a good example. Here, weaving battens from New Mexico and Alaska, demonstrate three approaches to accomplishing the same task, each with a distinct morphology (Fig. 3). Macroscopic and microscopic wear patterns indicate the similar gesture and materials of use for these tools, despite different morphologies.

More commonly, a shared form takes on multiple meanings, particularly in less-elaborated shapes. The ubiquitous small and pointy forms that we see in both the ethnographic and archaeological records can fall into numerous ethnographic categories, among them leather pricking awls, thread-manipulating weaving awls, knitting needles, bag pins or toggles, and more surprisingly, lice scratchers, pipe cleaners and nutpicks (Fig. 4). Context of recovery and attrition patterns would be necessary to discern difference of use in archaeological forms. Form, then, may at times reflect function but need not always do so. This is an archaeological truism, yet morphology is still frequently used as a proxy for function in day-to-day archaeological contexts.

Conclusions

Many kinds of data can be obtained from the study of objects in ethnographic and ethnohistoric museums. These data can inform on the analysis of archaeological material by providing standards for the relationship between morphology, manufacture, use, condition and meaning that complement experimentation, analogy and inter- and intra-assemblage analysis. Information on the variation of morphology of different tool types, manufacture and raw material choices can be obtained. An understanding of the morphological variability of osseous tools in the ethnographic and ethnohistoric record strengthens and enriches our approach to other analyses of archaeological tools, but variability is not the only information that can be obtained from the study of ethnographic artifacts. The patterning in tools in the ethnographic record includes form, use, wear, repair, discard, and museological aspects of tool condition and attrition. From a meta-analysis of methodology of museum collections, the study of these collections lends itself to understanding museum practices of curation and conservation and identifying changes in museum practice that might affect both ethnographic and archaeological collections. If the function and history of the tool is fairly well known, handling and wear patterns can be linked with material and gesture. Condition at time of discard can be recorded, although given the diverse ways that objects enter the museological record, this cannot indicate anything beyond the level of the individual tool. In some cases, the information generated through experimentation and archaeological study might help clarify the history of some ethnographic objects, as the assigned names and functions can be assessed based on artifact surface attrition.

The ethnographic and ethnohistoric record provides a rich source of information on material culture and its role in human lifeways. By emphasizing the study of physical objects with the methodologies developed within archaeology and structuring an analysis at the artifact level, useful comparative standards can be constructed from ethnographic collections. Many of the common methods of archaeological analysis can be applied to museum collections, but only after extensive archival documentation. The unprecedented magnitude and variability of ethnographic collections can provide an extraordinary resource for archaeologists that is currently underutilized because of fears about the reliability of ethnographic documentation. Archaeologists need not assume that ethnographic collections lack the appropriate documentation for archaeological study, as this is only sometimes the case. Consideration of the history of these collections as an integral part of ethnographic artifact sample selection allows more complex and sophisticated analyses of archaeological collections and can enhance both artifact study and the development of more inclusive and holistic interpretations of the past.

Table 1: Tools Used Ethnographically in the Production of Fiber Technologies

Tools	**Raw Material**	**Activities**
Spindles	Wood	Spinning
Spindle whorls	Clay, ceramic, shell, stone	Spinning
Combs	Bone, antler, wood	Fiber separation, ordering and cleaning; weaving.
Scrapers	Stone, bone, metal	Hide preparation; bark peeling
Smoothers	Stone, bone, metal	Hide preparation
Needles	Bone, antler, ivory, wood, metal	Sewing; weaving; tattooing
Awls	Bone, antler, ivory, metal	Piercing; fiber manipulation in weaving; thread guiding
Battens or weaving swords	Bone, wood	Weaving
Frames, looms	Wood	Weaving; hide-working
Loom weights	Stone, clay, ceramic	Weaving; dying
Tubs, baths	Stone, ceramic, earthen, wood	Dying; retting; tanning
Dyes, mordants, tannins	Vegetal and mineral sources	Dying; tanning
Blades and knives	Stone, metal	Fiber procurement, processing, and preparation; object finishing; varied tasks
Hooks, gauges	Bone, wood, baleen	Netting, crocheting
Knitting needles	Bone, wood, metal	Knitting
Hands		Basketry, weaving, netting, knotting, spinning

Table 2: Ethnographic Collections Studied

Origin Area	**Eyed Sewing Needles**	**Eyed Snowshoe Needles**	**Eyed Mat Needles**	**Eyed Fish Needles; Large Needles Use Unk.**	**Completely Worked Awls**	**Articular Awls**	**Basketry Awls**	**Weaving Awls & Batens**	**Net Needles & Guages**	**Bone Points**	**Pins, Bodkins**	**Wound Plugs, Pegs**	**Hide Scrapers**	**Worked Rib Tools**	**Total**
Arctic	32	13		15	14	11	3	3		18	12	5		5	**131**
Calif. Coast				1	1	12	4			2	1	13		1	**35**
NE N. Am.	18	68	22	4	9	16				2		5	2	1	**147**
Pacific NW	1		32	1	9	28	7		12	5		12			**107**
N. Am. Plains	3	4	37	1	4	4		1		1		4	1		**60**
Oceania			10	1		11	4	1							**27**
SE Asia							1								**1**
Siberia				2											**2**
SW N. Am.	1				5	26	9	11							**52**
Andean	3				1	5	6	2	1						**18**
SW S. Am.						2									**2**
TOTAL	**58**	**85**	**101**	**25**	**43**	**115**	**34**	**18**	**13**	**28**	**13**	**39**	**3**	**7**	**582**

* types drawn from museum catalogs; Museums are the American Museum of Natural History, Burke Museum of Natural History and Culture, Smithsonian Institute National Museum of Natural History and the Smithsonian Institute Museum of the American Indian; Am. = America; Calif. = California

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