CHAPTER 4

BONE AND ANTLER TOOLS

by

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Archaeological evidence indicates that the tools manufactured and used in the Sunwatch community were fashioned of natural resources obtainable in the surrounding environment (i.e., wood, stone, bone, shell, antler, etc.). Although metal tools have been found in later Fort Ancient sites in the Ohio Valley, none have been recovered thus far from the Sunwatch Village.

Bone tools are the most prevalent of all the tools preserved within the archaeological assemblage of the site. They were predominantly made from deer and elk, but bird bone, such as turkey and goose, was also used. Bird bone, because of its hollow nature, is frequently used to produce beads (Figure 4.1 c). The jaw bone of the wolf, raccoon, and bobcat as well as drilled teeth from elk, raccoon, wolf, and other mammals were used for ornamentation (Figure 4.2).

Many artifacts have been found in garbage pits at this Dayton site showing bone tools in various stages of development. In studying these remains - broken preforms, cut marks, and variations in style of like objects, we can come to some reasonable conclusions about the procedures used in tool manufacture. Therefore, we decided to test out our theories by reconstructing some of the bone and antler tools ourselves.
Figure 4.1. Bone Fishhooks and Biproducts (a), Drill Deer and Elk Toes (b), and Bird Bone Beads (c).
Figure 4.2. Worked Teeth and Mandibles: Beaver Incisor Tooth Chisels (a), Drilled Raccoon Teeth (b), Drilled Deer Teeth (c), Drilled Wolf Teeth (d), Drilled Elk Teeth (e), Ground Raccoon Mandible (f), Ground Wolf Mandible (g), and Drilled Elk Molars (h-j).
We found that bone tool manufacturing was one of the few tasks well suited to the semi-darkness of the houses during rainy days. Bone tool manufacturing takes little light, little space, very few tools, and little concentration. The process can be stopped at almost any point, the tools stored indefinitely and picked up later to be finished. It is a great social activity much like a quilting bee.

The first step in reconstructing bone tools is to secure a quantity of deer, elk, and bird bone. Hunters have been generous on that account. After selecting the proper bone it must be "made ready" for working. All skin, hair, sinew, etc. must be removed. Soaking the raw bone for an hour or two in water softens the sinew, making it easier to remove. The tendons, which are like iron when dry, become soft like rubber bands when wet. Longer soaking for three or four days does not seem to make the bone any softer. It does tend to promote decay. A good stout pocket knife or flint tool is used to clean the bone. After the bone is split open, the marrow is cleaned out with a knife, or the bone can be laid on an ant hill. Ants do a marvelous job of cleaning the inside as well as the outside of the bone.

Boiling is another fast and easy way to clean the bone. This process takes at least two hours to remove the marrow and softens the bone slightly making it easier to carve. However, boiling also removes natural oils from the bone that add gloss to the finished article. Once the bone cools it becomes hard and brittle due to the loss of natural oils in boiling.
Evidence of pre-boiling may be indicated in Fort Ancient tools in that some artifacts still contain a high degree of gloss while others are very dry and fragile. This phenomenon might not, however, be a result of pre-boiling, but instead the result of the ravages of time and the acidity of particular loads of garbage in association with the artifact.

After the bone is thoroughly cleaned and the sinew saved for sewing thread, one is ready to begin making tools.

In general, most of our reconstructed tools were made from selected bone splinters collected after smashing the bone with a rock or hammerstone. Hairpins (Figure 4.3 a), pins (Figure 4.3 c-e), and awls (Figure 4.4 e-f) were made this way. Another way of procuring a bone of predetermined length is to use the "groove and snap" method. A deep groove is cut all the way around the bone at the desired point(s) and the excess is simply snapped off. Flint gravers can be used to cut the bone lengthwise. These specialized flint tools are preferable to the flint chips we used. Modern tools such as metal knives and saws hold no advantage to the flint and sandstone found in the nearby quarries. Flint drills or pointed flint chips are used to bore holes. Sandstone is used to sand the bone into its final shape. This process also produces a rich waxy gloss on the finished bone. Sandstone chunks with deep grooves were found in the garbage pits on this site. The grooves were produced during bone tool manufacturing. We found that the grooves are quickly ground into the stone during the manufacturing process.
Figure 4.3. Bone Hairpin (a,f), Matting Needle (b), Pins (c-e), Worked Raccoon Penis Bone (g).
Figure 4.4. Deer Ulna Awl (a), Turkey Metatarsal Awl (b), Deer Metatarsal Awl (c), Scapula Awl (d), Splinter Bone Awls (e-f), and Bird Bone Awl (h).
Adding water to the stone does not facilitate the job of grinding. The bone dust becomes wet and makes a sticky paste that clogs the grooves and pores in the sandstone. When the bone is worked dry, the buildup can be blown off.

The time needed to make a bone tool varies greatly. A simple tool like a splinter bone awl takes only ten minutes. More intricate tools such as fishhooks or beamers can take hours, even days to produce. Also, during our work a lot of time was used up on experimentation and improper tools. With knowledge and experience comes speed.

The easiest and fastest tool to make is a splinter bone awl (Figure 4.4 e-g). After breaking a long bone into fragments, a piece is selected with the socket still on one end. The bone should taper toward a point at the other end. The pointed end can quickly be sanded to a very sharp point in only a few minutes with a block of sandstone. The socket end of the awl is used as a handle to push the point through hides to puncture holes—the awl's primary function.

Awls were sometimes made of turkey metatarsals (Figure 4.4 b), deer ulnas (Figure 4.4 a), and scapulae (Figure 4.4 d). Broken tools such as squash knives (Figure 4.5) or beamers (Figure 4.4 c) were also modified to make awls.

Another simple tool to make is the bone pin (Figure 4.3 c-e). Pins were made in varying sizes—ranging from two inches to twelve inches long. They are generally made of long bone and pointed on both ends. The shape varied from round
Figure 4.5. Elk Scapula Squash Knife (a) and Squash Knife Preform (b).
tooth pick shapes to rather wide flat shapes. A few were even notched or carved with a decorative motif. The quality of the finished product varied greatly too. The smaller pins for utilitarian uses were frequently crude. The larger "hairpins" were often polished to a high gloss and decorated in some way.

Preforms were selected from splintered bone or grooved and snapped long bones. The preform was then sanded into the desired shape with a piece of sandstone. The more the bone was sanded and turned, the rounder the pin became and the higher the gloss on the finish. Decorations, such as scallops, notches, etc. were added by using the edge of a jagged sandstone as if it were a saw.

The time used to produce a pin varies from a few minutes to several hours depending on the size and quality of the finished pin.

The points on the awls and pins can be as sharp as a modern steel needle. The advantage is that if the point breaks off it can quickly be resharpened. The points are very durable, however, and seldom need resharpening.

Our crew turned out several matting needles for use in cattail mat weaving. The only tools needed were sandstone and flint. Deer or elk ribs supply the long natural curve needed when sewing mats.

The matting needles found in the excavation were usually about 7" long, 1/4" wide at the fat end and slowly tapering to a dull point (Figure 4.3 b). They are all made of longitudinally split ribs so are reasonably thin. When new the needles
resemble a highly polished ivory corset stay.

The process is begun by splitting the longer ribs with a flint graver or flint chips. This process takes a long time, so much patience is needed!! A line is etched into the side (thin edge) of the rib carefully. Pressure can then be applied in increasingly longer strokes. Eventually the cut breaks through to the marrow. A larger piece of flint is then used to cut through to the other side. Great care is needed here, for as hard as the bone appears, it also is very fragile and will splinter easily. The inhabitants of this Fort Ancient site must have suffered the same frustrations as we did from the evidence left behind in the pits of broken preforms in all stages of development.

After the bone is split, the marrow is cleaned out with a piece of flint or pen knife. The bone is now ready for sanding. A bone fragment about 7" to 8" long is selected. The needle is shaped and flattened by sanding it on the sandstone. This process will take about 8 to 12 hours. A flint drill or pointed flint chip is used to drill holes in the flat end of the needle (Figure 4.3 b). Our crew made round holes in just seconds with flint chips, but the artifacts we examined from the site had oval holes. The oval holes are cut in rather than drilled.

Another artifact easy to replicate is a bone bead (Figure 4.1 c). Bird bones being hollow are ideal for making beads. The bones most often used for beads are turkey wings and metatarsals (legs). A groove is etched around the bone near each end. The ends are then snapped off and the marrow is cleaned out.
The bone can then be stained with berry juices (pokeberry makes a nice purple), painted and strung for a necklace or sewn on clothing as decoration.

While several loose beads have been found at the site, none have been colored or strung as in a necklace. Bone bead necklaces have been found at other Fort Ancient sites in Ohio, however.

Pin and cup games have also been found. These can be made using the same procedure as used in making beads. Deer or elk toes are used (Figure 4.1 b). These bones are just above the hoof. It is best to select the largest bone. One end of the bone is grooved and snapped, the marrow is cleaned out, and a hole is drilled in the round end. A notched pin is tied on one end with a string or rawhide strip. The other end of the string is laced through the hole in the bone cup and a knot tied in the end to fasten it.

Squash knives were made of elk scapula (Figure 4.5 a-b). The basic shape is cut out with flint chips. Flint chips work better than a flint knife because of the curves. After removing the excess pieces, the squash knife is sanded with a whetstone to the desired shape and sharpness.

Fishhooks are probably the most difficult tool to make (Figure 4.1 a). Fishhooks can be made of long bone but the favorite bone on this site was the ulna of a young deer. On bones which still have the cap (epiphysis) attached only by cartilage, the bone is more pliant which indicates that it came from a young animal.
An oval preform is first cut out with flint chips. The inside is drilled out creating a hoop. One must cut through the opposite corners of the hoop to create two hooks. The fishhooks are finished by sanding and sharpening on the sandstone whetstones. Although two hooks can be made from one preform, most of the hooks from this site suggest a singular production.

The beamers used for scraping hides are frequently found in the garbage pits at the Dayton site. Beamers were made exclusively of the metatarsals (lower back legs) of deer (Figure 4.6). A sharp oval is cut out of the center of the flat side of the bone. The marrow is cleaned out and the cut edges are sharpened. These tool first appear in the Ohio Valley on Fort Ancient sites. There is a particularly good discussion of these tools in the Blain Village site report (Prufer and Shane 1970:134-135).

The most abundant antler tool found at the archaeological site was antler tip points (Figure 4.7 m-o). The tips of the deer and elk antlers were saved when the animals were killed and/or collected as shed racks when found in the woods. The fractured base is removed from the antler by grooving around the antler about 1 1/2" to 2" down from the tip of the tine (Figure 4.7 h-i). The grooved and snapped end is smoothed off with sandstone and the base is drilled out with a flint drill to form a hollow cone shaped point. This is not a difficult task if the antler has been soaked in water. Boiling is not necessary. The hole must be made deep enough to secure the wooden shaft
Figure 4.6. Stages of Beamer Manufacture: Replica Showing Cuts (a) and Piece Removed (b) and Actual Deer Metatarsal Beamer from 33MY57 (c).
Figure 4.7. Antler Tools: Drifts (a-c), Snapped and Scored Antler Preform (d), Bipointed Tool (e-f), Elk Antler Gouge (g), Stages of Antler Point Manufacture (h-i), Stages of Hair Comb Manufacture (j-l), and Antler Points (m-o).
of the arrow. It is best if the hole is slightly narrower than
the shaft as the attachment of the two will be more secure. The
last step is to sharpen the point on a sandstone abrader. It is
easier to do this after the shaft has been added.

The antler points have some advantage over the triangular
flint points. While they take a longer period of time to produce,
they are virtually indestructible and can be used over and over
again.

Other antler tools were probably used in flint knapping.
These include cylindrical "drifts" (Figure 4.7 a-c) and thick,
bipointed tools (Figure 4.7 e-f). The later objects are usually
between 2 and 4" in length, with a great range in quality - but
most are not particularly refined in their production. On some,
a time of the desired thickness and length is snapped to the
exact size by the groove and snap method (Figure 4.7 d). The
majority of these torpedo shaped pieces appear to have been
grooved from large sections of antler.

The groove and snap method is used parallel to the axis of
the antler, as well as for cutting the antler piece to the desired
length. Frequently, one end of the torpedo is much shorter
than the other.

Occasionally a broken hair comb or hair comb preform is
recovered from the pits (Figure 4.7 j-l). These are extremely
time consuming to replicate and were no doubt treasured by
their prehistoric owners. After grooving and snapping a section
of antler to the desired shape, the preform can be carved into
the desired comb shape with flint (Figure 4.7 j-k). It is excep-
 tionally difficult to carve out the teeth of the combs. The only one on which we could count the actual number of teeth had four (Figure 4.7 l).

The points and edges of the bone and antler tools hold up well to the tasks for which they were designed. If the points become dull or the edges need reworked this can be readily accomplished with a small sandstone abrader.

REFERENCES CITED

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