Raw material used. Cattle metatarsus on the left, red deer on the right

Grinding facets on tool 1 Shaping tool 2 with modern aids

Neolithic Bone "Beamers" from Hungary:

An article in cooperation with Alice Choyke, archaeozoologist from the Central European University at Budapest, Hungary.

Typological and Archeological Facts:
This type of tool appears in considerable numbers in late Neolithic and Chalcolithic sites all over Hungary and also in Austria. It was thus in use for at least 1000 years.
The artifacts are almost exclusively made from metatarsal of cattle or red deer, the species depends mostly on availability. Tools are characterized by continuously renewed and sharp edged facets along the whole length of the diaphysis, sometimes on one, two, three or all four sides. For the sharpening flint tools were used. Eventually the compacta gets too thin in the center and the tool breaks.
Facets are created on the dorsal/plantar surfaces first and then, more rarely on the medial, lateral sides. Choyke suspects the curved facet is first established from one end of the diaphysis to the other (never extending onto the epiphysis) and then renewed as the two parallel edges get dulled. The tool seems to have been pulled with one hand on either epiphysis. It is very rare to find these tools complete, thus different stages of production/use can not be studied. They are used up very intensively.
From analogy with similar objects from ethnographic and historical contexts these tools might have been used to clean hides pinned to tree trunks and are thus termed "beamers".

Experimental Manufacture and Use of Beaming Tools:
1. Manufacture and Use of first Tool:
Raw material: Metatarsus of red deer. 27cm long, diameter at center of diaphysis 2,0 by 2,1 cm.
Intention: Recreating a tool with prehistoric methods from the initial shaping to its first stage of usability. Observing use wear through prolonged use and continued resharpening.
Manufacture: Creating facet on dorsal and plantar sides, with a flint/silex with steep angled working edge, 45-90 degree; (resharpening flint by retouching working edge is not very proficient. Better take a new flake after edge is dulled). Alternatively, the rough work to create the initial facets can be achieved by grinding against a course rock or sandstone. (Some deep cuts are visible on certain beamers, maybe from initial grinding on rough surface?) and then doing the fine tuning with a flint. This way proved to be the faster approach. A facet can be created in about 15 minutes.
These first working edges have very steep angles slightly larger than 90 degree, due to natural shape of bone. They are straight on one side and slightly curved on the other. Thus they only show promising keenness towards proximal end of tool, where the profile of the diaphysis is more square.
Use: Tool was tried on deer skins. The hides had been salted and were rehydrated before scraping by soaking in a creek for 24 hours. For scraping a rather narrow upright wooden beam of 6 cm

Creating initial facet on tool 1 with flint blade

Breaking through the compacta on the medial and lateral sides of tool 2

diameter was used. The tool proved to be able to remove hair, grain layer and also fat, flesh and membrane on both sides of the hide, but was rather ineffective due to the shape of the working edges, especially towards the distal end where the epiphysis is more rounded. Therefore two more facets were created, on the other sides of the bone, thus the tool received four working edges. The profile of the diaphysis now being rectangular.
The resulting edges could be used more successfully.
This shows, that in order to create an effective tool for wet scraping of hides at least two neighboring facets need to be created, sharing one clean cut working edge.
During use the tool is held in such a way that only the working edge is in contact with the skin. It is not the whole facet that is placed flat onto the hide. It proved most convenient to use one working edge until it had dulled and then move on to the next, until all four had been used rotationally and become dulled from scraping. Sharpening of one edge can be achieved by scraping of one or both facets and requires approximately 10-20 seconds.
Due to the natural shape of the epiphysis, certain positions during work are more uncomfortable for the hands than others, as the tool needs to be gripped tight and force be excerted in order to remove unwanted tissue from the skin. After prolonged work of about an hour, the palms of the hands start to get sore and red. This is typical for the use of most bone scrapers, where the handles are formed by unmodified parts of the bone. My experience with such tools is that they gain enormously from creating comfortable handles by wrapping with leather or other cushioning material. It would thus be interesting to examine the original artifacts in that regard to see if evidence of such treatment of the epiphysis is detectable.
Long term use of this tool will show how the working edges will develop through repeated resharpening. An account of the hides scraped could give an indication of how long such a tool was in use before it broke.

2. Manufacture and Use of second Tool:

Raw material: Metatarsus of contemporary domestic cattle. 23,5 cm long, diameter at center of diaphysis3,6 by 3,4 cm. Realizing that modern middle European cattle are not comparable to Neolithic animals.

Intention: Recreating a tool toward the end of its life, where the facets and working edges are curved and the compacta is worn through in the center. The beamer was shaped using modern steel tools because removal of large amounts of bone were necessary. This sill proved to be a lot of work. Final touches and resharpening were done with flint.

Use: This tool also worked well on a narrow 6 cm diameter beam (Bone tools in general require narrower beams than metal scrapers. This becomes even more relevant when the working edges become more curved due to prolonged use of the tool).

Tool 1 on left with added cushioning made from leather scraps, tool 2 on right

Traces of sharpening with flint blade on tool 1

Conclusions from Experiments: Some so called "beamers" make effective, long lasting wet scraping tools for cleaning skins up to size of red deer.
Nevertheless, judging from the provided photos, some of the original artifacts do not seem to meet the necessary requirements to make a tool effective for scraping larger sized animal hides, as their active working area is rather small or short. Maybe they were used especially for small fur bearers on very narrow beams or they were intended for something different, like peeling bark of small diameter wood.
Likewise some tools feature working edges not keen enough for scraping hides (see specimen at bottom right) and must thus have also been used for something else. It appears, that the tools simply lumped together as "beamers" need to be looked upon more intently, as they might include a whole range of different artifacts.
Experiments do not clarify why metatarsus were used almost exclusively and not metacarpus.
Both narrow and long bones (red deer) as well as shorter and stouter tools (cattle) make usable scrapers. Choice of bone material thus most likely follows the general terms of availability.
Furthermore, judging from my experience with comparable edge tools, these beamers are less effective than bone scrapers which feature working edges of much less than 90 degrees, such as rib scrapers. This is due to the overall resharpening time being longer, as well as the fact that the edge needs to be kept sharper to be effective, than on tools with smaller angle working edge.
Comparisons of microtraces of usewear between originals and reproductions are still pending.

Scraping a deer (*capreolus capreolus*) hide with tool 1 Close up of the removal of hair and grain with tool 1

To the right are images of some of the original artifacts from different eastern Hungarian locations.
(Photos by Alice Choyke)