Are many Vendel and Viking Period gaming pieces made of whale bone?

Gaming pieces are often found in Late Iron Age burials. Most are interpreted as being made of antler or bone from large terrestrial animals, without any further analysis of the material. When studying gaming pieces and their raw material in detail, we have sometimes noticed that none of the above-mentioned materials actually correspond to the bone structure seen in the artefacts. After reading recent studies of gaming pieces from the Salme ship burials on Saaremaa (Konsa et al. 2009, p. 58; Peets et al. 2012, p. 5), we decided to study the raw material of some 40 gaming pieces found in 2013 in a barrow at Gnista in Danmark parish near Uppsala. Our study sheds light on a little-known large-scale production of whale bone products during the Vendel Period. It casts a new light on Viking Period whale bone handicraft and, importantly, long-distance trade networks in Scandinavia during this period.

Background

Gaming pieces first appear in Scandinavia during the Roman Iron Age. From the start these objects are strongly linked to high-status weapon burials. Gaming pieces can be made of a wide variety of exclusive and eye-catching materials, such as glass, amber, ivory and horse teeth. But most commonly, gaming pieces are seen to be made of unspecified bone or antler. Most Roman Period and Migration Period pieces are made of a compact material, without spongious matter, which probably means that either elk antler or thick bones such as metatarsals of horse or cattle were used. Significantly, the early gaming pieces are either small with a domed profile, or rather flat and low when their diameter is larger. The width and height proportions change at the transition to the Vendel Period in the decades around AD 550. The gaming pieces are now made larger and taller than before. This is especially prominent in finds from the Lake Mälaren area, while the design change is less clear for example on Gotland. The general shape of these gaming pieces seems to remain the same during most of the Vendel Period. When we get into the Viking Period after AD 790, gaming pieces grow increasingly spherical, although still with a flat base.

The shape and size of the gaming pieces relate to the choice of raw material, and there are clear limitations to how large and thick an object can be cut from the bones and antlers of terrestrial mammals in Northern Europe. Thus many large Vendel and Viking Period gaming pieces have been puzzling, since the structure of the raw material fits neither with antler nor bone.

The Gnista barrow

In 2013 a barrow was excavated at Gnista (Raå Danmark 62:1) just outside Uppsala. It was a collaborative project between Upplandsmuseet and Societas Archaeologica Upsaliensis, funded by ICA fastigheter (Hennius et al., forthcoming).

The barrow, about 18 m in diameter and 3 m high, had been built in several stages and erected over the cremated remains of a man who died in the Early Vendel Period (late 6th century). He was accompanied on the pyre by many animals, including two horses, five dogs, five pigs and several birds of prey: goshawk, peregrine falcon and eagle owl.

The find assembly is also rich, including items of gold, gilded bronze, silver foil and garnets. Although they are severely burnt, we have identified parts of a sword and a shield, horse harness and probably a helmet as well – items familiar from rich coeval inhumations e.g. at nearby Valsgärde.

The excavation also brought to light at least 42 gaming pieces. They are all relatively large, with two holes in the bottom, comparable to finds from well-known graves like the Östhög barrow at Old Uppsala and the Ottarshög barrow in Vendel (Lindqvist 1936, pp. 166, 175). Most gaming pieces are lathe-turned, and the hole or holes regularly found under their bases bear witness to this process. These holes vary over time: two holes are never seen after the Early Vendel Period.
During cleaning, the conservator recognised traces of red pigment which he interpreted as possible remains of paint (Jahrehorn 2014). All of the gaming pieces are made of the same raw material, but initial osteological analysis could not determine which.

Osteology
A breakthrough in the interpretation of the gaming pieces came from the excavation and analysis of two Late Vendel Period (early 8th century) ship burials and mass graves at Salme on the island of Saaremaa in Estonia (Konsa et al. 2009; Peets et al. 2010; 2012). On the basis of many parallels, the buried warriors can be interpreted as Scandinavians, probably from the Svealand region in Sweden. The Salme team realised something that no-one has seen in Sweden, despite the thousands of gaming pieces kept in our museums. They found that the vast majority of the Salme gaming pieces are made of whale bone (Konsa et al. 2009, p. 58; Peets et al. 2012, p. 5). This includes at least 250 whale bone pieces from Salme ship II, compared to only seven made of antler. Salme I yielded 72 pieces, made of either whale or bovine bone (unspecified distribution).

An aspect that strengthens the whale bone interpretation comes from $^{14}$C analyses of the gaming pieces. They revealed a low $\delta^{13}$C content, which suggests a marine origin for the bone, and also gave older dates than other samples from the grave, reflecting a marine reservoir effect (Peets et al. 2010, p. 29). This inspired us to take a closer look at Swedish gaming pieces, beginning with those from Gnista (fig. 1).

The gaming pieces are made from spongious material even though they measure around 40 x 30 mm in diameter and height. No entirely compact bone material is visible. The spongious structure is coarse with elongated cavities and does not correspond to any type of local animal bone.

In antler, the spongy structure can vary decidedly between different deer species and also within a single antler. Not so with the gaming pieces from Gnista. They lack the oval, bubbly, spongy structure of antler, as well as any trace of an entirely compact area. Furthermore the Gnista pieces have a coarser homogeneous spongiosa where almost all cavities are orientated in the same direction. In antler and common types of bone the cavities are much thinner and go in various directions.

Having excluding bone and antler from terrestrial mammals, we compared some gaming pieces to whale bones in the collections of the Swedish Museum of Natural History in Stockholm, as well as the Paleontological Museum of Uppsala University. These reference bones are beach finds with eroded surfaces, but cracks and damaged spots reveal the inner structure of some
finds which originate from minke whale, grey whale (Sw. *vikval*, gråval) and an undetermined whale species.

The whale bones and the gaming pieces share the aforementioned coarse, elongated and “fibrous” spongious structure of the bones, with oblong, elongated cavities (fig. 2). In living whales these hollow spaces are filled with fats and oils. The structure and density of the spongy bone varies comparably little between, as well as within, different bones, and the bones have no entirely compact outer layer. In short, the correspondence with the structure of the gaming pieces is almost perfect.

After a preliminary survey of other graves with gaming pieces, it quickly became evident that the Gnista find is far from unique. We have so far identified more than a hundred whale bone gaming pieces from five examined Vendel and Viking Period graves around Uppsala; at Valsgärde (7, 13) and Old Uppsala (Prästgården 1, Storbybacke 512, 596). In fact, we have found whale bone gaming pieces in all of the coeval graves that we have examined so far. There is also at least one find from Sveratsmara in Åland (Fornlämning Fi 18.1, grave 41).

In addition we have made a brief survey of pictures of gaming pieces in the Swedish History Museum’s online catalogue (mis.historiska.se). A substantial share of the depicted Vendel and Viking Period gaming pieces appear to be made of whale bone too. For gaming pieces of earlier and later periods, the situation is different. Here terrestrial bone or antler probably dominates.

**Conclusion**

This study is preliminary, but the results indicate strongly that whale bone was common, in some periods perhaps even preferred, as a material for gaming pieces in Svealand during the Vendel and Viking Periods.

This topic demands deeper study. But we can already suggest a number of hypotheses that we aim to address in the future:

- Whale bone gaming pieces are common, numbering in the thousands of specimens in museum collections.
- These gaming pieces indicate a previously unexplored form of large-scale raw material production, probably somewhere along the Atlantic coast of Scandinavia.
- They also support written descriptions of whaling during and even before the Viking Period (Storli 2007 w. refs).
- Whale bone or finished gaming pieces may have been quite a common commodity moved by the Scandinavian trade networks of the Late Iron Age. This went hand in hand with increased production and trade in other wilderness products during the Vendel and Viking Periods, such as tar, iron, blubber, furs and preserved game meat (e.g. Hennius 2007; Lindholm & Ljungkvist in press).

**References**


Storli, I., 2007. Ohthere and his world - a contemporary
Korta meddelanden