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ANIMAL-HEADED BONE ARTEFACT FROM KUUVUORI IN TURKU INTERPRETED – AND REINTERPRETED

ABSTRAKT

EN TOLKNING – OCH OMTOLKNING – AV ETT BENFÖREMÅL MED DJURHUVUD FRÅN MÅNBERGET I ÅBO

Hösten 1959 hittades ett märkligt spetsigt benföremål av lokala invånare på Månberget i Åbo. Utgående från paralleller till tre benföremål hittade i Lund, kom föremålet att bli katalogiserat som ett skrivverktyg, och mer precist; en medeltida griffel (stylus). En AMS-datering hösten 2013 av nämnda föremål visade dock att det är betydligt yngre; 150 +-30 före nutid. Det här innebär att föremålet kan dateras till en period från sent 1600-tal till tidigt 1900-tal. Det här resultatet påverkar tolkningen av föremålet och dess antagna funktion betydligt. Den här artikeln tar upp forskningsprocessen kring Månbergsfyndet och analyserar det utgående från nya jämförbara fynd, scanner- och printerteknik samt resultat från C14-dateringar. Med grund i den här analysen presenteras en kritik mot att dessa benföremål tolkats som grifflar. Istället måste nya tolkningar sökas. Det är plausibelt att Månbergsfyndet och dess paralleller var de facto nålliknande verktyg som använts i något numera bortglömt hantverk, möjligen med maskulin och/eller maritim prägel, som fallit utanför vår nuvarande arkeologiska och etnologiska expertis i studiet av materiell kultur.

INTRODUCTION

The focus of this article is on a pointed bone artefact with an animal-shaped head (Fig. 1). The item in question was found by local inhabitants of Kuuvuori hill in Turku, SW Finland, in 1959. The location of this rocky hill is some two kilometres from Turku Cathedral and the old town centre of Turku. The find site has since the late Iron Age and for the most part of its later his-

tory belonged to the village of Nummi of Kaarina Parish. The hill has been inhabited from the early 20th century onwards. Since 1939 the area has been part of the town of Turku. The artefact found at the site was deposited to the Provincial Museum of Turku in 1971.

In the find catalogue, the following information is recorded (translation by the authors):

'A writing stick for wax, a so called stylus. Medieval. Decorated with a stylised buck's head with carved hair. Frontal used to smoothen the wax and the pointed end for writing. Length of the artefact 10 centimetres. A hole through the artefact in its upper end. Found in the end of Kuuvuorenkatu-street on the highest point of Kuuvuori hill, from a cleft of the rock some 60 centimetres deep.'

Additionally, the find catalogue refers to similar animal-headed medieval styli from Lund published by Anders W. Mårtensson.[1] There are also other equivalents from Finland unknown to the cataloguer at the time. These are discussed in detail below.

In this article we present the research process of the Kuuvuori find and analyse it by using new comparable finds, scanning and printing techniques and radiocarbon dating results. On these grounds we propose a critical view against the assumptions of these bone artefacts being medieval styli. Instead, other interpretations must be searched for.

Fig. 1. An animal-headed bone object from Kuuvuori, Turku (Turku Museum Centre 17172:1). Length 100 mm and maximum width 16 mm. The cross-section is oval /flat with c. 5 mm thickness and the pointed end has been bevelled. The diameter of the drilled hole through the item is 3–5 mm (Photo by Janne Harjula).

THE FIRST INTERPRETATION OF THE KUUVUORI ARTEFACT

Of the current authors, Janne Harjula was in the late 2000s starting an archaeological research project focusing on the material aspects of medieval and early modern reading and writing practices,[2] and in this context was informed of the Kuuvuori find. In fact, the artefact was found interesting enough to be scientifically approached by a research team of archaeologists, each representing different views.[3] This group is the same as the authors of this article. Our purpose was to take a closer look on the artefact and its context in the broadest sense using both traditional and modern methods of artefact studies. The starting point was the hypothesis that the item in question really represented a medieval stylus as its parallels apparently pointed at this function and dating.

As mentioned, the article *Styli och vaxtavlor* by Anders Mårtensson, published in the journal *Kulturen* in 1962 was used as a reference for the Kuuvuori find in the museum catalogue. The paper discusses finds of medieval styli and wax tablets from Lund, Sweden. In the article, among other finds, three artefacts interpreted as horse-headed styli (Fig. 2) were described and discussed.[4] The person cataloguing the Kuuvuori find in Turku had noticed the obvious similarities between the shaping of the Kuuvuori find and the Lund finds. Mårtensson dated the Lund finds medieval and categorized them as styli.

Styli and wax tablets have a long history. Writing on wax tablets was carried out already in the Antique and the tradition continued throughout the Middle Ages until cheaper paper started to replace tablets as note-making implements during the beginning of the Ear-

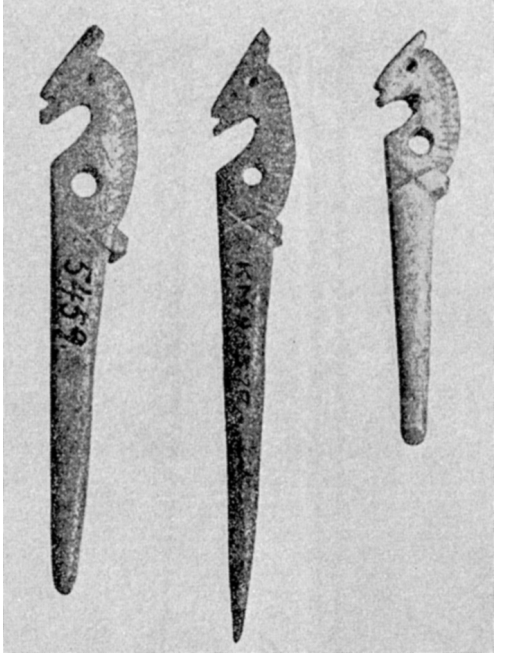

Fig. 2. Horse-headed bone objects from Lund. From left to right: Kulturen, KM 5459, 25579:a and 8798). Lengths 80 mm, 86 mm and 58 mm. From Mårtensson 1962.

ly Modern Period in the 16th century. Writing on tablets was performed with a pointed instrument. A special tool for this purpose is called a stylus (Lat. *stilus* or *stylus* pl. *styli*). These were made of bone, wood or metal. However, any other needle-like object with a pointed end was suitable for making notes on a wax tablet, and therefore no strict criteria for defining styli exist.[5]

The form and size of the Kuuvuori find is well suited for writing on a wax tablet. The pin fits the hand very well when held like a pen, and it tapers to the other end. However, the tip is not sharp which is a requirement for neat script. Still, coarse and simple markings could have been performed with the bevelled edge of the tip and smoothing of the wax by using either the animal-shaped end of the pin or with a thumb-nail. Special erasing-ends were not necessary in styli since even harder wax surfaces could be easily smoothened by slightly warming the wax surface. The most obvious explanation for the hole through the object was that it was made for hanging the item from a belt by a ring or cord.

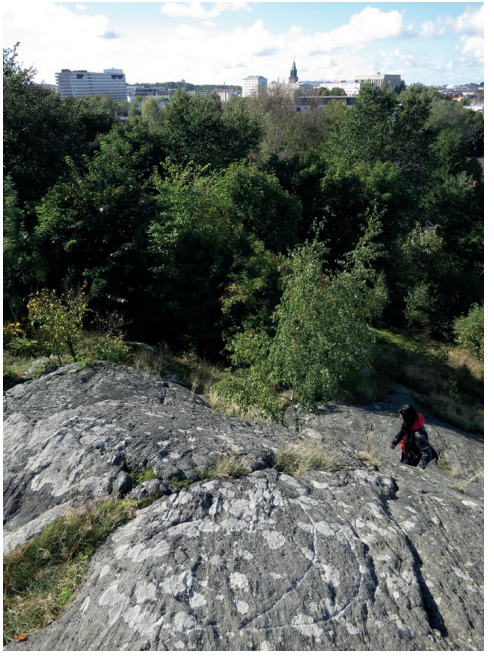

Fig. 3. In the front the crescent moon carved 0n the rock face of Kuuvuori. The height of the crescent is 100 cm. Turku Cathedral visble in the background. Sonja Hukantaival walking below. (Photo by Janne Harjula)

Moreover, the find seemed even more interesting due to its special find-context as the majority of the stylus finds derive from urban contexts in Finland.[6] The unusual find-context of the artefact gives reason to consider if it has been deliberately concealed deep in the rock cleft at Kuuvuori hill. Deliberate concealments dating to historical times have especially been discussed in connection to buildings,[7] but there is evidence that similar ritual concealments have also been made outside buildings; in yards, fields, and even natural environments. When discussing ritual concealments it is crucial to consider both the object and its context.[8] As is shown in this paper, the animal-headed bone artefact is an eye-catching object that could be embedded with symbolism connected to the depicted animal.[9]

The find's context, the rocky Kuuvuori hill, is intriguing as well. Kuuvuori means 'Moon Mountain', and the age or origin of this unusual name is unknown. A carving of undetermined age depicting a crescent moon is visible on the rock face (Fig. 3) close to the highest peak. The carving faces southwest, the direction of the Cathedral visible to this spot, and resembles a border-mark. The rocky hill is distinguishable in its environment, so it would be a natural choice as a border location. However, to the knowledge of the authors of this paper, there is no recorded historical border at this place.[10]

As is typical of natural places that stand out in their environment,[11] stories about otherworldly activities at Kuuvuori have been recorded. A rock-formation on the hill is still known as *Pirunkirkko* which means 'the Devil's Church'.[12] The priest Petrus Gyllenius wrote in his diary about his visit to Kuuvuori in August of 1653. He mentions that locals believe that the Devil teaches witchcraft to magicians at the site, and there is in fact a seat in the rock from where the Devil conducts his school.[13] These stories show that Kuuvuori was seen as a special, even dangerous, place. The special nature of the context of the find that seem to have been deliberately concealed strengthens the interpretation of some folk ritual activity.[14] However, the meaning of such an act remains a mystery.

Perhaps the most intriguing detail of the Kuuvuori object is its animal-head-shaped end. In contrast to the horse-headed objects from Lund, the Kuuvuori find represent a different species. The carved animal head was identified as a male goat in the museum catalogue. However, the shape and size of the horns resemble more of those of a ram (male sheep). The straight lines depicting the animal's hair could be attributes of a coarse sheep fleece. The modern Finnsheep is polled and its wool is soft, short and curly, but previously Finnish sheep had prominent horns and a coarser fleece type.[15] There are lines across the animal's forehead and muzzle seemingly forming a halter. Because of their wild nature and tendency to cover ewes (female sheep), rams' urges and behaviour were controlled with collars and halters (Fig. 4). Breeders were kept separated from the flock.[16]

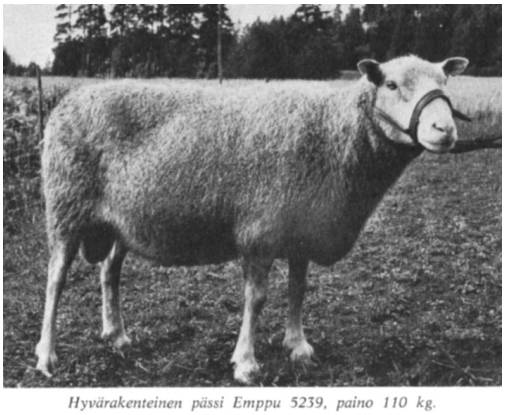

Fig. 4. A 'good structured' (weight 100 kg) Finnish male sheep called Emppu with a halter. From Inkovaara 1976, Fig. in p. 111.

3D-SCANNING AND 3D-PRINTING

Next, we carried out 3D-scanning and printing of the Kuuvuori find. The 3D-documentation was accomplished with a Breuckmann SmartScan -scanner that uses the combination of structured light and colour photography to create a 3D-mesh with the maximum point density approaching 40 microns. The resulting 3D-mesh, around 50 MB in size and containing ca. 0.85 million vertices forming ca. 1.7 million triangles, was put together from 16 individual scans that took 2 hours and 15 minutes to acquire. By reducing the density of the point cloud and by virtually smoothing the artefact surface, the file size can be compressed into ca. 5 MB (Fig. 5).

The benefits of the 3D-scan are the opportunity to zoom into details and the accessibility of the data during the interpretation process without repeated visits to museum collections. The data is also easy to share with other researchers interested in the interpretation. From the 3D-scans it is evident (Fig. 5) that the halter-line crossing the forehead is worn which indicates slight friction, but there is no evident polish that would follow from continuous use. Some slight polish on the neck area of the ram could have resulted from its use as a hook. The shaft also shows some polish that is likely to have been caused by holding the object in the hand.

Moreover, the resulting data was used to create a 3D-print of the artefact at the FabLab of the Aalto University on 27th of November 2012–to our knowledge, this was the first time an archaeological artefact was ever 3D-printed in Finland. This first printing was executed on draft mode in transparent ABS-plastic, and the somewhat disfigured result was not some-

Fig. 5. Examples of 3D-scans of the Kuuvuori artefact. These were used for closer inspection of details and, for example, finding out the possible use and wear marks on the surface of the artefact.

thing that could have been used to substitute the actual artefact either for research or display purposes. Later on, a second attempt was made with a different device (Fig. 6). The material used was PLA. The plastic pins are coarse copies of the original as the tiny surface details are not copied accurately due to the printing technique. The extruder nozzle is 0.35 mm. Thus marks of wear and polished surfaces visible in the 3D-file do not show in the printed objects. However, these pins proved popular and useful as they could be freely handled during the interpretation process.

Fig. 6. Three plastic 3D-prints of the Kuuvuori-pin (Photo by Auli Bläuer).

TOWARDS THE NEW INTERPRETATION

The authors had an almost complete article draft on the medieval Kuuvuori stylus and its parallels based on interdisciplinary research finished when the research process suddenly became to a halt. A recent find from Hamina, SE Finland, changed the whole perspective concerning the Kuuvuori artefact. The excavation carried out in 2011 on a traditional military area called *Rykmentinkenttä*, unearthed a horse-headed bone item resembling in many ways the finds in both Kuuvuori and Lund (Fig. 7).[17] The find context of the Hamina artefact was the late 19th century burnt layer under the artillery hall built in the early 20th century. This context does not suggest a medieval dating for the artefact. Also the other objects from the site are from the 18th century or younger and are composed of redware and Slavo-Karelian ceramics, metal objects, glass, coins, and clay pipes, all typical finds for the late modern period.[18] A stylus does not fit into this context as it is known that these items went out of use soon after the Middle Ages, and were later replaced by slate tablets and slate pens.[19] In fact, the finds from Hamina also include fragments of both slate tablets and pens. A writing stick of bone, however, would not be suitable for writing on stone.

Moreover, other similar finds with different functional interpretations started to come to our attention. From Loimaa, SW Finland, derives an an-

Fig. 7. A horse-headed bone object from the excavation in Hamina, Rykmentinkenttä (NM Hist. 38898:136). Length 55 mm. Cross-section is oval/flat. Thickness 5 mm (Photo by Janne Harjula).

imal headed bone object interpreted as a tobacco pipe cleaner in the museum find catalogue (Fig. 8).

In addition, a similar object, although of brass and interpreted as a sack needle in the catalogue, has been found in a field in Pirkkala in 1906 (NM 5347:6, length 81.5 mm). This object has no apparent animal head but the hooked shape of the pin head resembles the general profile of the other examples, only without the distinguishing details. As stray finds, the latter two examples cannot be dated by their find contexts.

After these 'new' findings, we were no longer convinced of the medieval stylus interpretation of the Kuuvuori find and its parallels. Therefore 'another round' of research was considered necessary and it was started by examining the dating and contexts of the three Lund styli more closely. In his publication Mårtensson dated the objects medieval. However, he did not state his grounds for the dating. It turned out that none of these objects can actually be dated by their find contexts and also their functional interpretations at least in the present museum database vary.[20] Therefore a conclusion was that the only way to define the age of the Kuuvuori find was a natural scientific dating of the artefact itself. Depending on the result, the information could be used in evaluating the dating of the other similar finds and perhaps by this means helping to define or redefine their possible functions, as well.

A sample of the Kuuvuori artefact was AMS radiocarbon dated in the Tandem Laboratory of the Uppsala University. The result was 150 ± 30 BP.[21] When calibrated, the result with a 68.2% (2σ) probability ranges from 1670 AD to 1950 AD. The result is with a 95.4% probability (1σ) AD 1660–1890 (78.2%) and AD 1900–1960 (17.2%).[22] Thus the dating from the late 17th century to late 19th century seems most probable. Most importantly the artefact is certainly not medieval or from the beginning of the Early Modern Period and therefore the stylus interpretation is no longer valid. Due to this new dating we need to rethink the possible functions of the Kuuvuori bone

object. We also should seriously reconsider the functions and datings of the other animal headed bone objects discussed here, foremost the three objects found in Lund on which the function and dating of similar finds has largely been based. For the discussion, a closer comparison with the other find parallels is necessary.

THE FINDS AND THEIR CONTEXTS IN COMPARISON

The present lengths of the artefacts discussed range from 55 mm (Hamina) to 100 mm (Kuuvuori). The lengths of the other finds are situated between these measures. It must be taken into account that the present lengths can vary also due to wear and possible reworking of the tips. For example, the Hamina object seems to be broken or worn. The sharpness of the tips varies, but none of the finds actually seem to have tips pointed enough for needle or awl-like purposes, suitable for piercing materials such as leather let alone harder materials. The cross section is flat/oval in all cases. Moreover, all examples have holes through the artefact in their widest parts.

Fig. 8. An animal (horse?) headed bone object from Loimaa, Puujalkala, Heikkilä (Turku Museum Centre 13675:1), deposited to the museum in 1943. Length 92 mm (Photo by Janne Harjula).

Of course, the most striking feature in all artefacts discussed is the animal head and its details. The parallel finds of the Kuuvuori object (Hamina, Loimaa, Lund) were clearly shaped as horse's heads and share several common features (ears, eyes, mouth) with each other and with the Kuuvuori find.

Additionally, the Lund finds have a couple of details which are missing from the other finds, i.e. a carved saltire below the hole, and a bulge in the intersection of the neck and pin parts.[23] In closer inspection, the latter detail could tell us more about the species and actually seems to represent the dorsal fin of the sea horse (genus *Hippocampus*),[24] distinctively and almost uniformly occurring in figurative representations, such as trinkets or pendants, of this animal species.

All of the bone finds except the Loimaa example, which lacks the details excluding the eyes, have a mane carved with lines. The Hamina find seems to have a halter represented with carved lines across its muzzle. Also the Kuuvuori find has a halter across the muzzle, but in addition, across the forehead, too. In fact, without the horns the Kuuvuori pin would look very much like a horse. It is possible that the maker of the Kuuvuori pin was following the same pattern used in the horse headed pins but, for some reason, selected a different species (ram) for this specimen. The pin found from Pirkkala is made of brass and it does not have a distinctive animal head. This makes it exceptional compared to the others and also the material points to industrial manufacture of the object type.

The contexts of the finds vary. The Lund finds are from an urban environment. Kuuvuori is suburban, situated near the town of Turku. The Hamina pin is from a military context and the others from rural settings. Only the Hamina find was found during archaeological excavations and hence has a properly documented context. The Kuuvuori find could be deliberately concealed, as discussed above, but nothing points to a similar act in the other cases. The other objects could be accidentally lost.

Despite the differences in details, the general shape and attributes of the items in question seem very uniform in such extent that a similar function can be suggested for all of these finds.

THE FUNCTION OR FUNCTIONS OF THE ARTEFACTS?

We have not come to any certain conclusions about the new identity of these artefacts and therefore several possibilities remain. In our opinion the objects belong to the same type having the same function. They all have pointed ends and most of them have a curved 'throat' section which might have been used as a reed hook, for example in some similar action as sleying when constructing the loom. The hole present in all of the artefacts can have been used to hang the object or to tie it to the wrist when working with it.

One aspect that can be used to narrow the possible function is the find chronology. None of the objects date clearly to the medieval period. Ample evidence of well-dated medieval bone objects exists, but this particular object type has not appeared among them.[25] The only examples with similar appearance are ear scoops with a unicorn motif.[26] However, there is no indication of a scoop-like tip on any of the studied objects. The object type has also not occurred in early modern layers at archaeological excavations. It is also evident that when the Lund and Pirkkala finds were catalogued in the late 19th

and early 20th century, the function of the objects was not obvious and they were recognized as something belonging in a museum. Thus the objects seem to date to a relatively brief time-span of the late modern period. Perhaps they represent some short-lived 'lost craft'. Moreover, the animal symbolism of the artefacts seems to refer to masculine artefacts/tools since both ram and horse are considered as male symbols. Sea horse could perhaps be related to maritime activity and symbolism.

Because of their detailed decoration, personal tools for certain delicate tasks could come in question. But what might these tasks have been? Tobacco pipe cleaners, sometimes made of bone, were already mentioned in the Loimaa case. This function must be considered plausible even if we have been unable to find exact parallels.[27] No staining of tobacco is visible on the tips of the objects. However, as mentioned, the tips may be broken. Tools for horse hoof cleaning (hoof picks) could be another option. This could explain the horse-heads on the artefact ends, but not the Kuuvuori ram. Besides, hoof picks have an angled picker part, while all the objects discussed in this paper are straight. Moreover, hoof pickers are typically made of metal. The context of the Hamina find could refer to military culture, but, for example tools for keeping the flintlock firearms clean (e.g. touch-hole prickers also called vent picks) have typically been sharp pointed, and more importantly, for durability's sake, made of metal.[28] Tuning pegs for stringed musical instruments were also considered, but their cross-section is typically round and the shaft of even thickness or only slightly tapering in contrast to the animal headed pins discussed. A tuning peg should also have a hole in its lower end to hold the string, lacking in finds of this article.

Decorative hair or dress needles might be plausible, too, but the observed masculine nature of the symbolism makes this less likely. Proper awls (for leather or wood) must be out of the question because the tips of the objects are not sharp enough for this purpose as mentioned earlier. The objects are better suited for making holes in coarse textile by separating rather than severing the threads, thus keeping the eyelets stronger. Such a tool is called a sewing stiletto. One possibility could also be so called marlinspike seamanship, namely ropework art of sailors.[29] In this handicraft a pointed tool called a fid or marlinspike (Fin. *malspiikki*, *pujontapuikko*) was used for splicing and knotting ropes. These items could be made of metal, wood, or bone and sometimes had decorative motifs at the end. Also in this use it is important that the tool is not too sharp; otherwise it could damage the rope. However, we have not encountered exact parallels to the discussed objects in this connection either. The seamanship crafts are also not 'lost', so the question why this exact object type has not been recognized remains.

CONCLUSIONS

This article is an example of walking on thin ice when trying to interpret archaeological artefacts with only a few examples from uncertain contexts. New finds appearing can suddenly change the whole situation, as in our case. In this kind of cases there are two paths one can follow. The first is to try to find similar artefacts from better dated contexts. Another option is to try dating the artefacts themselves by utilizing natural scientific dating methods. Even these do not tell us the exact function of the artefact, but at least crops some options out. In the Kuuvuori case, the medieval stylus function is now out of the question. Instead, artefacts of much later historical period must be considered.

In many respects Mårtensson's article from the early 1960s, discussing the styli finds in Lund, is still a solid work. Hence, it has been largely cited and its interpretations widely approved even in PhD level studies or other large and fundamental volumes on the subject, not to mention several minor publications citing these volumes.[30] However, the interpretation of the Lund horse-headed artefacts should be re-evaluated in the light of the new evidence. Since these objects are made of organic material, a C14-dating could be carried out on them as well, if only it is considered financially possible and ethically justifiable.[31]

The article also raises issues of broader relevance, related to data acquisition, 3D-scanning and 3D-printing of archaeological artefacts. What are 3D-scans in the first place: pictures, illustrations, measurements or point clouds? This is a question that has been hardly touched upon, at least in Finland. For example, the National Board of Antiquities of Finland does not yet have a set policy for this type of data. Should it be publicly available for no monetary compensation for both commercial and private exploits in a similar way that the National Land Survey of Finland is now distributing its airborne laser-scanning (LiDAR) data on the Internet? Alternatively, with more restricted access to data, 3D-scans could perhaps be turned into an educational vehicle for the enjoyment of museum visitors or portable reference libraries for scholars interested in ancient artefacts.

Nevertheless, at the present 3D-artefact scanning is hardly more than an alternative but also a convenient way to document archaeological artefacts. The scanning as such does not add anything new to artefact studies, as the data still needs to be interpreted. Still it enables the precise measurement of distances, angles, volumes, and surface areas. Regarding the near future of 3D-aided artefact and material studies, it is not too far-fetched to predict that with tailored algorithms this data can be used for automatic pattern recognition that can be of great help, for example, in species identification in zooar-

chaeology and typological determinations in pottery studies. In this way, 3D-artefact data can free specialized resources for more purposeful research than mere identifications. Moreover, 3D-scanning is opening up a way for green and more democratic artefact studies as scholars do not have to travel to reach collections, as the data is downloadable for anyone on the Internet.

Printing the 3D-data is a fast and cost-efficient way to produce relatively detailed replicas. The printed replicas could in the future be used in experimental studies. However, the plastic material limits their usefulness. For example, bone and plastic are fairly similar materials, but printed stone or metal objects have limited possibilities in use-experiments.

The course of this study also revealed a shortcoming caused by the lack of proper studies on late modern small artefacts, especially from urban contexts. While archaeologists have concentrated on earlier periods and ethnologists mainly on rural farming tools, a considerable gap in our understanding of object types in other contexts has remained.

Acknowledgements

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NOTES

1 Mårtensson 1962.

2 Harjula 2008a; 2008b; project 'With Quills and Styluses: Archaeological Perspectives on the Sociocultural Contexts of Writing in Medieval and Early Modern Finland (ca. 1300-1700). Academy of Finland, grant no. 131716.

3 Janne Harjula: functional artefact study; Sonja Hukantaival: the intriguing find context of Kuuvuori; Auli Bläuer and Heini Kirjavainen: interpretation of the animal species carved at the end of the object; Janne Ikäheimo, Tanja Ratilainen and Auli Bläuer: 3D-modelling and printing of the object.

4 Mårtensson 1962, 122, Figs. 14–16.

5 On the types of wax tablets and styli throughout their history, e.g. Büll 1977; Lalou 1992; Wattenbach 1896. On the 'temporary' objects used as styli in Turku, see Harjula 2013, 168–169. On the problem in distinction of needles or other pointed objects from styli, see Krüger 2002, 20–22; Øeby Nielsen 1996, 52.

6 Harjula 2013, 163–169.

7 See e.g. Hukantaival 2007; 2009; 2011; Falk 2008.

8 See also e.g. Osborne 2004, 7.

9 On possible reasons for choosing objects to be concealed in the study area, see Hukantaival (forthcoming).

10 The 'Moon Mountain' has its equivalent, *Aurinkomäki* which means 'Sun Hill', c. 300 meters to the south-west of it. The largest part of this rocky hill has been blasted out of the way of an intersection, so it is unknown if a similar rock carving of a sun was present there. The remaining part of 'Sun Hill' is covered in carvings of hearts and initials, and it is possible that these carvings have been inspired by an older carving.

11 See e.g. Bradley 2000; Anttonen 2003; Ruohonen 2010.

12 Söderholm 1978.

13 Gyllenius 1962, 159–160.

14 About the archaeology of folk religion, see e.g. Hukantaival 2013.

15 Bläuer 2015, 116–118, Kirjavainen 2005, 131–146.

16 e.g. Inkovaara 1976, 119.

17 The function of the object was not defined in the excavation report (Vuoristo 2011).

18 Vuoristo 2011, 42–52.

19 Harjula 2015, 28, endnote 52; on slate tablets and pens in historical sources, see Grotenfelt 1887, 160; Oxenstierna 2:11, 698.

20 KM 5459: described as a 'stylus' in the museum database Carlotta; from the great sewer excavation in Lund 1890, closer find context unknown; KM 8798: described as a 'bone awl' in the museum database Carlotta; from a museum garden in *Kulturen* quarter, Lund 1894, closer find context unknown; KM 25579a: described as a 'stylus? with a horse head' in a museum database Carlotta; from plot 23 in Thomander quarter, Lund 1917, closer find context unknown. See the find descriptions in the find database of Kulturen museum (carl.kulturen.com/web). Searched 26.3.2015; also Øeby Nilsen 1996, 148; Carelli 2001, 447.

21 Ua-48077.

22 Calibration according to Reimer et al. 2009 using OxCal v. 3.10 (Bronk Ramsey 2005).

23 According to Krüger (2002, 49), the distance between the saltire/bulge and the tip of Lund 'styli' was perhaps used as a yardstick. However, Krüger does not give examples of measured items. According to Krüger, there is a very close parallel to Lund finds in the collections of the National Museum of Denmark (Inv. Nr. D7067) from an unknown context. Even this example has the cross and bulge.

24 On the anatomy of the sea horse, Driscoll 2004.

25 E.g. MacGregor 1985.

26 MacGregor 1985, 100.

27 On the ethnographic pipe cleaners of wood, bone, brass or iron sometimes furnished with decorative animal heads, see Sirelius 1989, 354, Fig. 291.

28 Examples in Burgess 2010.

29 See e.g. Smith 1993; Marino 2001, 5–6.

30 See e.g. Büll 1977; von Roesgen 1992, 193; Øeby Nilsen 1996; Lundberg 1999; Carelli 2001; Krüger 2002.

31 When taking the sample for dating a hole must be drilled in the object. In the case of the Kuuvuori pin this was agreed upon after serious discussion between the authors and the museum authorities. Eventually the procedure was seen as providing a chronological context to a stray find.

SOURCES

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