A Report on the Examination of Animal Skin Artefacts from the Bronze Age Salt Mines of Hallstatt, Austria

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Introduction

My PhD research focuses on the social context of cloth from the Neolithic to Bronze Age with case studies from the Alpine area. One aspect of this is the interrelationship of the technologies used to create flexible, thin sheets of material that can be wrapped, folded, shaped and tied. This includes fibre-based cloth such as textiles, netting and twining as well as animal skins (leather and fur). This short report summarises preliminary research findings stemming from the examination of animal skins from the Bronze Age Hallstatt salt mines. These mines offer an ideal preservation environment for cloth as the salt inhibits the action of microorganisms that would otherwise lead to the decay of organic materials, such as plant and animal fibres, and animal skins. Of these the least commonly preserved in contexts outside the salt mines are animal skins, making finds of this type significant for my research.

Research Aims and Method

The aim of this report is to describe the ten animal skin fragments and artefacts, and to discuss these in relation to the qualities and role of skins as a cloth technology in the Bronze Age. This includes the colour and texture, dimensions and thickness, sewing, seams and edges, use and reuse of these artefacts. These fragments and artefacts have not been studied before and add to the previously published findings of animal skin artefacts from the Bronze Age salt mines, most recently published in a number of articles by Barth (1993; 1992; 1989) and will be discussed in comparison to recent analysis of the textile finds (Grömer 2005) from the same site and in relation to the context of animal skins in the Bronze Age.

The artefacts I examined come from the Christian-Tuschwerk Bronze Age mine gallery and were studied and documented at the Vienna Naturhistorisches Museum. They are only a small sample of the skin remains in the archives. The collection awaits a full analysis and report by the excavators.

Background

The Hallstatt miners exploited a salt deposit of the north-eastern Alps (Fig. 1). The first active archaeological research in the mines was conducted by Johann Georg Ramsauer in 1849; excavation of the mines has continued periodically since then, with yearly excavation programs since 1960 (Barth 1982: 31-32, Reschreiter 2005: 11-13).

Although there is some evidence to suggest that the salt deposits were exploited in the Neolithic around 5000 BC, the earliest mine galleries date from the Middle Bronze Age, about 1400 BC, with further important galleries belonging to the early Iron Age (Reschreiter 2005: 13). The Christian Tuschwerk is the most recent area to be excavated (Reschreiter 2005: 12). Based on dendrochronology dates the gallery dates from 1460 to 1245 BC (Grabner et al. 2006: 45), equating to the Middle Bronze Age. Other

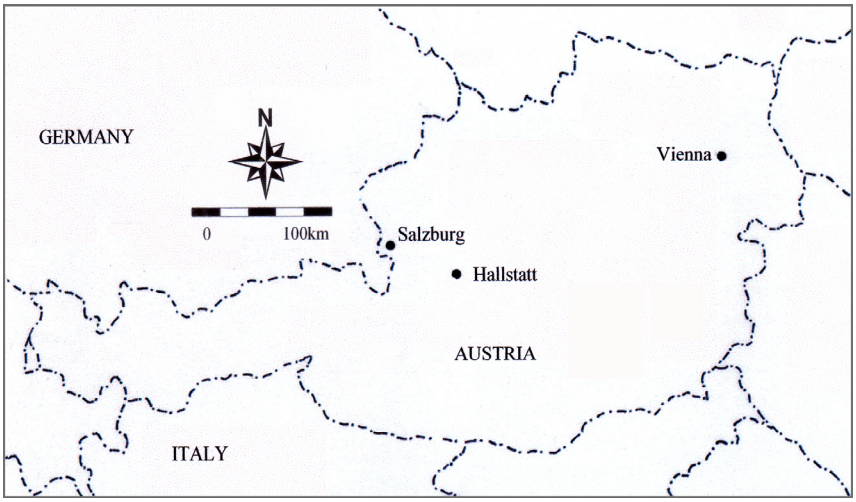

Figure 1. Location map of the Hallstatt salt mines, Austria.

Bronze Age mines at Hallstatt include the Grünerwerk and the Appoldwerk, which are dated several centuries earlier (Reschreiter 2005: 13; Stadler 1999: 79). The mines consist of a number of shafts and galleries full of waste that was left behind by the miners, including broken tools, burnt spills and rope along with cloth fragments and artefacts.

There are a number of well-known animal skin artefacts from the Bronze Age mines, including carry sacks made of cow-skin with wooden supports (Barth 1992), a conical hat (Barth and Lobisser 2002: 15) and a number of hand-leathers, which would have been tied over the palm of the hands to protect them during rough work, such as handling ropes (Barth 1993: 29, taf.5). Ryder (1993) analysed the species and curing method of some of the skins bearing hair or wool. Although he refers to all these as Iron Age, some have subsequently been dated to the Bronze Age. From his total sample, nearly 90% of the animal species used for skins are domestic, including cattle, goats and sheep; others may include chamois / gemse (*Rupicapra rupicapra*) or steinbock (*Capra ibex*), dog or other small fur-bearing animals (Ryder 1993: 107). The skins do not appear to be vegetable tanned but possibly oil-tanned or rawhide (Ryder 1993: 106). For this reason, I refer to the artefacts collectively as animal skins, rather than leather.

Examination of the Animal Skin Artefacts from the Christian Tuschwerk Alter Grubenoffen Bronze Age Gallery

The ten artefacts examined as part of this case study are summarised in Figure 2. Throughout this report the museum archive catalogue number is used to reference the artefacts.

Archive number	***Artefact***	***Description***
93.811	Composite dark-brown flat sheet of fur	Three pieces of fur sewn into a flat sheet. The hem is turned up with a separate narrow strip. Direction of the fur lying towards the hem. Tree root looped through a rough hole.
94.837	Torn strap	Thick animal skin strap with slit at one end, both ends torn.
92.029	Fragment with torn seam	Fragment of fur with torn off seam and pierced hole with evidence of strain.
91.974	Fragment of a hand-leather	Two pieces of fur sewn together with a narrow strip of skin.
93.498	Hand-leather	Roughly oval-shaped, two-layered hand-leather with off-centre thumb-hole and long straps. The two oval pieces are of different thickness.
90.946	Hand-leather	Roughly circular piece of fur with off-centre hole and strap cut from the same piece.
92.031	Bristly fur sheet	Irregular flat sheet, many tears, and bristly fur.
93.433	Wooden trough bucket sewn with skin strips and repaired with a fur patch	Broken trough bucket joined with narrow strips of skin using a sewing technique. Crack in the wood repaired with a roughly circular, dark brown fur patch sewn on with skin strips.
94.895	Pair of hand-leathers	Two roughly circular shaped piece of fur (one with fur facing inwards, the other outwards) with fringed off-centre thumbhole and strap ties.
89.943	Fragment with three holes	Fur band with three holes 9-13mm diameter along one edge, other edge torn.

Figure 2. Summary of the artefacts examined. From the Christian-Tuschwerk Bronze Age gallery.

Colour and texture

Most of the animal skin artefacts from the Bronze Age salt mines still have their hair or wool (fur) attached; this varies in colour and texture from dark brown (93.433,

93.811, 93.433) to variations of yellow brown (89.943, 94.895, 91.974), or orange-brown (94.837) and cream. In terms of texture, the fur ranges from bristly (particularly 92.031) to fine. The careful composition of the sheet of dark brown fur (93.811) shows

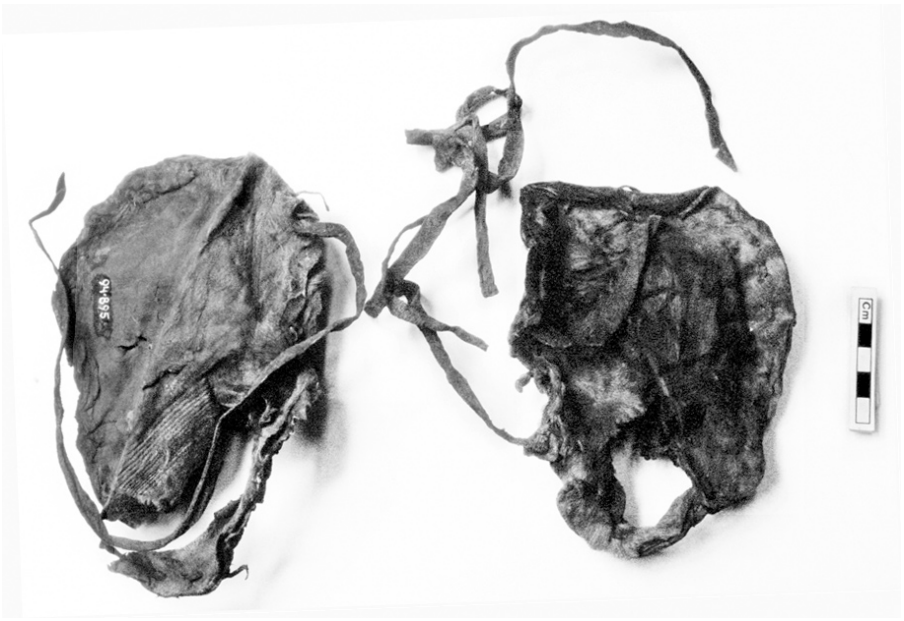

Figure 3. A pair of hand-leathers, archive number 94.895.

how this piece was matched in colour and fur direction to create a homogenous grain direction.

Dimensions and thickness

The complete pieces range in size from the hand-leathers (Fig. 3.) at less than 20cm in diameter to pieces over 75cm in length, such as the dark brown composite fur artefact with hem (93.811) and an irregular flat piece of dark-brown bristly fur (92.031). The thickness of the skins varies: some of the skins are just 1.2mm in thickness (93.811), others are over double this thickness at 3.25mm, such as the torn strap (94.837) (Fig. 4.). Some of the hand-leathers are made of two thin skins sewn together, creating a thickness of up to 3mm (94.895).

Sewing, seams and edges

The numerous sewing techniques vary in scale and regularity. The double layers of the hand-leathers are sewn together with running stitches, 8-18mm long and are roughly executed (91.974, 94.895, 93.498) (Fig. 3.). By contrast, some of the leather and fur artefacts have evidence of fine and regular seams (96.029). Where visible these are 3-4mm long with thread 1mm in diameter (93.811). This piece is hemmed using a strip

of leather, which is stitched to the bottom edge, turned over and sewn onto the reverse to create an invisible hem that would not stretch out of shape. Another edge technique is small fringes cut 2-4mm deep and 3-5mm apart around the thumbhole of some of the hand-leathers (94.895).

Figure 4. Torn skin strap, archive number 94.837.

Use and reuse

As already mentioned, a number of the skin artefacts are hand-leathers. These are oval-shaped with an off-centre hole for the thumb and would have been tied to the palm with two narrow skin straps (91.974, 93.498, 90.946, 94.895). There are conspicuous signs of wear on the surfaces, sometimes on both sides (94.895). Narrow strips cut from skins were used to join pieces of wood using a sewing technique through holes bored in the wood. This technique was used on a wooden trough-bucket (93.433) where the base is attached to the side. A split in the wood was mended with a fur patch. Skin strips of various dimensions, like the ties for the hand-leathers or those used for sewing, are common in the mines for tying and binding tasks.

The bucket and hand-leathers appear to have been made specifically for mining, however, other pieces may have originally been used for other purposes then reused in the mine. The composite brown fur (93.811) appears to have been re-used. I consider this to be the case because of a marked contrast between the careful precision of the sewing and hemming compared to a roughly-created hole added at a later date. This re-use appears similar to that performed on the conical hat, mentioned above. The attention to detail contrasts with the big stitches used for the carry-sacks or hand-leathers that were made specifically for work in the mine.

Discussion

This sample of finds, in addition to the findings from other reports on animal skins from the Hallstatt salt mines, raises a number of possibilities for interpreting the way skins were worked and used in the Bronze Age and the relationship of skins to other cloth types. In terms of colour and texture, skins were used with the fur still attached so they would have been recognisable by their varied colours, which were determined by species of animal. In this sample, colours range from dark brown to orange brown and yellow brown to cream. The woven woollen and linen cloth finds from the Bronze Age mines are mainly natural coloured with one example of an olive-dyed woollen fabric in twill weave (Grömer 2005: 20). There does not seem to be any evidence of dyed skins. The texture of furs varies from fine to bristly whereas the texture of woven cloth produces a smooth surface. The furs therefore offer a variety of colour and texture possibilities that could be directly associated with the species of animal and contrast with the smooth appearance of woven cloth types. Usually considered rather unglamorous, the variety of colours and the care taken to match the direction of the fur in composite pieces suggests that the appearance of fur had the potential to be appreciated for its visual appearance.

The range in thickness in skins from 1.2-3.25mm thick shows the diverse qualities of animal skins, from fine and flexible to thick and sturdy. In addition, fine skins were made thick by sewing two layers of skins together. Woven textiles also vary in thickness. The woollen textiles from the Bronze Age salt mines are generally rather coarse, with threads between 1-1.5mm although finer cloth types are known with threads just 0.3mm. Some of the coarser wool cloths are felted (Grömer 2005: 20). From this it is possible to recognise that skins, like woven cloth, ranged from fine to coarse. This suggests that, like woven textiles, skins could be adapted to a range of uses.

From this sample, it is evident that skins were sewn in a variety of ways, sometimes favouring small, neat seams with fine thread, at other times long, irregular stitches sewn with strips of skins from 2-4mm wide. Further diversity in sewing techniques is known from other skin artefacts, such as the carry sacks, that are sewn with skin strips about 1cm wide (Barth 1992: 125). There is some evidence of sewing on the edges of the woollen carrying bags, although poor evidence of seams (Grömer 2005: 20-21). It is apparent that sewing was used on skins and woven cloth, although the techniques and role of stitching may have varied between and within cloth types.

In terms of use, the clearest examples from this sample are the whole artefacts, including the hand-leathers and wooden bucket sewn together with strips of skins, and the previously published carry sacks and conical hat. With the exception of the hat, these are also the artefacts that are most readily associated with working in the mines. This would support the idea that skins were used predominantly for heavy work, to collect the rock salt, handle the ropes and sew wooden containers.

However, the presence of neat seams and hems, coupled with the attention paid to matching the fur grain of composite sewn artefacts, and the possibility of colour and texture as significant aspects of the sensory appeal of furs, suggests that skins were not

confined to heavy uses in the Bronze Age. The role of skins for daily clothing, containers and furnishings is supported by the frequent references to such items in Homeric myths. In addition there is evidence for the use of cow skins as shrouds in Danish oak coffin burials dating to the late 14th century BC (Broholm and Hald 1948: 29,43).

One of the questions of the role of skins in relation to other cloths in the Bronze Age is the relative quantity of cloth types. The large quantity of skin artefacts excavated from the salt mines suggests that in some contexts skins were at least as, if not more, common than woven cloth. This contrasts with the proportion of skins to woven textiles in the north European oak-coffin burials where woven textiles are more numerous than skins; the likelihood is that the relative proportion of cloth types probably varied according to cultural preferences and situation.

The examination of the animal skin artefacts from the Hallstatt salt mines offers a rare opportunity to understand the role of skins and techniques of skin-working in the Bronze Age. Showing variety in colour, texture, thickness and dimensions, skins would have been a diverse and adaptable material resource. Skins are often considered a cloth type that protected the body from the cold or during heavy work. However, the role of skins was probably more varied than this: the presence of finely-worked and coarsely-worked skins indicates that these items probably served a number of roles above ground. This is brought out by the quantity of skins found in the salt mine and the number of ways that people worked with skins, seen through the range of sewing techniques, seams and edging.

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