

Products of animal skin from Antiquity to the Medieval Period

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(with 7 figures)

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Abstract

The present study investigates the utility of animal skin from Antiquity to the Medieval Period, compiling archaeological finds, pictorial and written sources, most of which derive from Europe and the eastern Mediterranean. We suggest that skin, leather, fur, and parchment have been extensively used to fulfil multiple necessities. Animal skin was exploited to produce clothing (*e. g.*, cloaks, shoes, gloves), working and military equipment (*e. g.*, aprons, hats, armour), objects related to animals (bridles, saddles), household items (flasks, chests), and living spaces (*e. g.*, bed covers). Other objects were connected to education and entertainment (books, instruments, toys). In a period when raw materials were limited, animal skin constituted a decisive part of daily utensils. This also involves aspects of economy, practicability, availability, prestige, and social status. The starting point for this extensive collection was the case study of Sand, an early medieval site (10th century AD) located in Lower Austria (see SALIARI, FELGENHAUER-SCHMIDT, this volume).

Keywords: animal skin, leather processing, Antiquity, Medieval, leather and fur products

Introduction

Leather, skin, and fur belonged to one of the most important material groups in prehistory to serve different human needs (HARRIS 2014: 9–21; MICHEL 2014: 23–40; WELDMEIJER & IKRAM 2014: 115–122). Leather, similarly to textiles and wood, is a perishable material and rarely survives. Its role is sometimes underestimated (WILLIAMS 2006: 37–38), while objects made of bone, clay, glass, stone or metal often survive on archaeological sites in Europe.

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In Europe in general, the preservation of skin, fur and leather artefacts is limited due to the destructive effects of alternating wet and dry weather (for preservation of organic material see WILD 1988; GRÖMER 2016: 20–31). The full variety of raw materials used in prehistory is revealed only in serendipitous cases: the Bronze Age oak coffin graves, the bog finds from the first half of the 1st millennium AD in northern Europe, the findings from the salt mines in Hallstatt and Dürrenberg-Hallein, or dry areas in medieval castles. Medieval graves also yield important insights about leather and fur objects. Moreover, if leather or fur objects were deposited together with bronze and iron objects, then metal corrosion at the contact points of the copper or ferrous metals and the adjacent organic material may lead to their preservation.

In the present study we investigate the possible uses of animal skin. The starting point was the case study of the castle at Sand in Lower Austria, dated to the 10th century AD (see SALIARI & FELGENHAUER, this volume), where evidence for skinning animals has been found. Among the different materials deriving from animal skin, we concentrate on leather, supplemented by examples for fur and parchment. We begin by providing basic facts about the chaîne opératoire involved in skinning and skin processing and about the characteristics of the material obtained. We then seek to determine what kind of products could have been made. The focus is primarily on Europe, with some examples from the eastern Mediterranean, and mainly on the 1st millennium AD. This geographic and chronological restriction is necessitated by the high number of finds from various cultures. This also explains why we present only some of the most characteristic examples to specify the artefact groups.

Chaîne opératoire from raw material to the finished products

Skinning

Skinning is the activity in which the skin of an animal is removed from its body; it is carried out after the slaughter or hunt of the animal. The skin is usually detached from the animal body with a sharp tool. This can cause specific marks on the fleshside of the skin (MOOG 2005: 40–44; <http://www.lederpedia.de/rohhaute/rohware/rohhautegewinnung>, 01.10.2016) but also on the bones (BINFORD 1981).

Archaeozoological studies can provide decisive evidence in reconstructing the techniques of skinning. In particular, species identification, analysis of the skeletal element representation, the study of cut marks, and the existence of other finds – such as artefacts related to hide processing – can be used as reliable indicators for such activities (BINFORD 1981; MARSHALL 1989: 7–26; SERJEANTSON & WALDRON 1989; KNIGHT 2002; FAIRNELL 2003; SEETAH 2005: 1–8; BARTOSIEWICZ 2006, 2009; HARJULA 2015: 157–174).

Slaughtered animals are usually skinned as soon as possible because a skin can be peeled off much more easily when the animal body is still warm (MAUCH 2004: 17). Many

decisions must be made during this process, and various factors influence those decisions. The cutting (Fig. 1) during skinning can be done in many ways; the method used may vary by region and depend on local traditions or other external influences (MOOG 2005: 42). Another important step is the selection of the cutting scheme. The skin is separated from the animal body by severing the loose subcutaneous tissue between the corium and the animal body (http://www.lederpedia.de/rohhaute_rohware/rohhautegewinnung, 01.10.2016). Skinning yields a flat (sheet) or a bag-shaped material. Small animals are skinned like (tubular) hides (HERFELD 1990: 252–254).

Some animal skins are a by-product of meat production, while other animals are exploited mainly for their skin (*e.g.*, brown bear, squirrels). Further use of the skin requires subsequent processing because decay starts immediately after the animal's death. The treatment can be applied in the form of tanning. This process transforms the easily perishable skin into an opaque and flexible material which is more resistant against decay or putrefaction (MAUCH 2004: 17; MOOG 2005: 44). It is also possible to temporarily preserve animal skins with conservation methods such as drying, cooling or salting. This treatment type slows down harmful bacterial activity (HEGENAUER 2012: 29; MOOG 2005: 45). In this way, further processing (tanning) can be carried out later. After skinning, the product can be further processed into a ready sheet material, including (raw) skin, parchment, oil or fat-cured leather, tanned leather or fur.

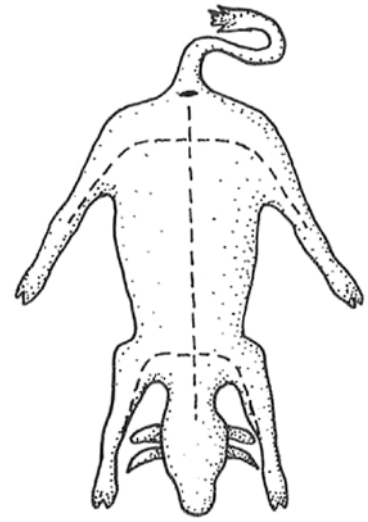


Fig. 1. Possible cutting to remove the skin from the animal: The animal is opened in the belly region and then along the legs (drawing: K. GRÖMER, after MOOG 2005: fig. 24).

Skin processing steps

Skinning yields a raw, perishable skin that becomes hard and stiff after drying. Transforming the raw skin into a useful material requires numerous steps. The properties of the produced material can be consciously influenced (to a certain extent) with the treatments applied in tanneries. If the hair remains on the skin, a fur is produced. Special attention is paid to ensuring that the hair maintains a strong hold onto the skin. If the production of a hairless material is desired, depilating is essential. There are several methods to loosen the hair, including liming with wood ash or lime. The most primitive method is based on the putrefaction of the hair roots, after which the hair can be removed. For this purpose, the skins need to be spread on a wooden beam and the hair is then removed with the blunt side of a tanner's two-handed knife (THOMSON 2006: 68).

On the flesh side of the skins, the remains of fat, flesh and subcutaneous tissue have to be removed. This is because they make the skin vulnerable to rot, are not tannable and

prevent the penetration of tannins into the hide/skin (MOOG 2005: 32–33). The liming process removes the unstructured proteins from the hide, yielding an untanned material known as *pelt* (German: *Blöße*). This more flexible raw skin serves as the starting material for manufacturing parchment and transparent leather (FASOL 1957) for drum linings.

A central step in leather production is tanning. The result is an opaque, flexible material which has a fibrous character in a dry state. A substantial advantage of leather lies in its chemical stability and its high resistance against enzymes and microorganisms under wet conditions (PAULIGK & HAGEN 1987: 120). For tanning, the pelts are treated with tanning agents. Several material groups are suitable, whereby the produced leather has – depending on the tanning agent – different properties.

A classic tanning method is vegetable tanning (MOOG 2005: 86). The pelts are immersed in tanning liquors with crushed plant parts containing tannins. The selection of specific plants depends on local availability. In Central Europe, several species of oak are mostly used, whereas in northern Europe, birch, willow, spruce and larch are available resources. In south Europe and the Mediterranean, sumac, valonia, various acacias and oak galls are favoured (THOMSON 2006: 70).

During the tanning process, raw skin is transformed to leather. This involves crosslinking collagen fibres and binding tannins to those collagen fibres (MOOG 2005: 86–92; RUSS-POPA 2011: 63). The pelts remain in the tanning liquor until they are fully tanned. In the case of oak-bark ground tanning, the skins of cattle remain in the pit for up to one year (THOMSON 2006: 70). Vegetable-tanned leathers are dense and resistant.

Another method to produce leather is to treat the hides with alum. Here, a paste of alum is kneaded into the pelt. Besides alum, the paste can obtain other ingredients such as salt, egg yolks, butter or flour (THOMSON 2006: 72). This process is repeated until the leather is tawed. The advantages of tawing versus vegetable tanning are: faster production, softer leather and lighter weight. These help explain why it was favoured amongst the craft conditions in Antiquity and the Medieval Period. The produced leather is white and therefore readily dyed (TROMMER 2008: 26). The disadvantage of this method is the washability of the alum. If the alum is removed by water, the leather again behaves like a raw skin and, for example, is prone to putrefaction. Due to the washability of alum, this method is considered to be a semi-tanning method. The origin of this method is assumed to be Asia Minor, with some evidence also from ancient Egypt. The Romans and Arabs therefore contributed significantly to its spread (TROMMER 2008: 24).

The production of chamois leather (oil tanning) is similar to that of tawing. This tanning material consists of fish oxidable oils or train oils, which are repeatedly trampled into the pelts. In between trampling periods, the skins are suspended in a warm room. Here, the oxidation of the oils or fats takes place: their reaction products and secondary products are responsible for crosslinking the collagen and thus for tanning the skins. When the leather is finished, the excess oils are washed out with an alkaline solution. Chamois leather is soft and washable. The chamois tanning may have been

discovered by arctic peoples because the corresponding oils and fats were available to the Inuit. In Europe, it has been known since at least the 10th to 12th century AD from whaling and trading with train oil, and was practiced by Basques and Frisians (TROMMER 2008: 23).

Other tanning agents for the production of chamois leather include butter, egg yolk, animal brain, rye, rapeseed and linseed oil (TROMMER 2008: 23) – these can be used alternatively. Fats or oils from other sources oxidize at higher temperatures, yielding greasy leather (German: *fettgar*). This treatment, however, is reversible because the fat or oil can be washed out.

When manufacturing furs, special attention is given to ensure that the hair retains its firm hold on the skin. The pre-tanning operations are similar to those of leather manufacturing. Traditionally, skins can be processed without tanning. They only receive preservative treatments that soften the skin and protect them from bacterial attack. For fur, tanning, tawing or treatment with oils is also possible (THOMSON 2006: 73); treatment with smoke [one of the most original processing methods, which is still practiced today (TROMMER 2008: 15)] is also an option.

After tanning, further steps are carried out to give the leather the typical properties that characterize the respective leather type (MOOG 2005: 102). To obtain the required thickness, shaving or splitting is necessary. This wet-end operation can include neutralizing and re-tanning. Dyeing the leather and fat-liquoring contribute significantly to a characteristic appearance of the leather. The drying takes place under controlled conditions. Staking the still moist material stretches and flexes it. “Finishing” summarizes the work on dry leather. This includes applications to the surface of the material – such as surface coating systems, applying pattern or shine, but also mechanical treatments of the leather surface such as dressing (MOOG 2005: 127; THOMSON 2006: 81).

Characteristics of raw skin, parchment, leather and fur

Raw skin is soft and formable in a wet state and retains its shape in a dried state. For many applications, these ductile properties are sufficient and tanning is not strictly necessary (TROMMER 2008: 16). It can already be used to produce objects such as straps or belts, but also moulded paddings like inside a container or as coating material, like sheets on chest coverings.

The writeable sheet material, termed parchment (made from cattle: *vellum* [HARRIS 2012: 10]), is an untanned skin: it is first dried under controlled conditions, then tensioned on a frame, and finally subjected to surface treatment (TROMMER 2008: 17). Parchment is unstable under warm and moist conditions (HARRIS 2014: 10).

Leather and fur have numerous positive properties, some of which are inherent in the starting material – the animal skin – while others are created only during the production, processing or refinement of the material. Each type of animal skin, leather or fur produces a unique set of characteristics. Thus, the shape is determined by the type of animal.

The size or the thickness of a skin cannot be increased, but they can be reduced. Solid and thick cattle hide leather is good for producing shoe soles but not for the soft, smooth and flexible leather needed for garments. Sheepskin, which is not particularly strong due to its structure, also cannot be used where sturdiness is required (MOOG 2005: 12). Depending on the purpose of the leather, the selection of the suitable raw material must be taken into consideration before production.

Leather consists of a three-dimensional structure of skin fibres with random orientations. This characteristic structure results in a specific fraying-resilience: if the leather is cut, the cutting line never frays, regardless of the direction of the cut. This makes a hem unnecessary, making the material well suited for shoe soles, belts, straps, open-edged pockets, leather clothing and the like. Due to this particular feature, seams can also be sewn close to the edge without the danger of tearing. This enables thin and soft leather to be sewn into gloves, for example (MOOG 2005: 12).

Leather also has specific criteria which can be summarized under the term “hygienic properties.” These include strength, ductility and elasticity, but also moisture absorption capacity, water vapor permeability and protection against external influences (MOOG 2005: 13). The hygienic properties of leather play a special role in shoes and clothing. This means that those chemical and physical properties ensure the feeling of well-being in the “second skin”.

Leather can be designed in many ways. Its shape can also be permanently altered, such as *cuir bouilli* (DAVIES 2006). It can be dyed, its surface painted, silvered, gilded or punched, and decorative stichings or rivets can be placed.

Finally, the fur of fur-bearing mammals can be used to produce warming, decorative or representative objects.

Products made of leather and fur – archaeological and historical evidence

This chapter examines the items manufactured out of leather or fur from the perspective of archaeological finds as well as pictorial sources from Antiquity to the Medieval Period. During that time, people employed similar solutions to tackle similar questions, problems and necessities. We also investigate written sources of the early medieval and medieval period to better understand the use of leather and fur. For the written sources, we advance some criticism regarding the aim of the original text or image (see *e. g.*, FUCHS & OLTROGGE 2013).

An overview of the objects produced from skin, leather, hair and fur is given in Figure 2. In our classification we distinguish between several object groups, each with distinct functions. The main function groups discussed in detail are:

- Costume and clothing
- Working equipment

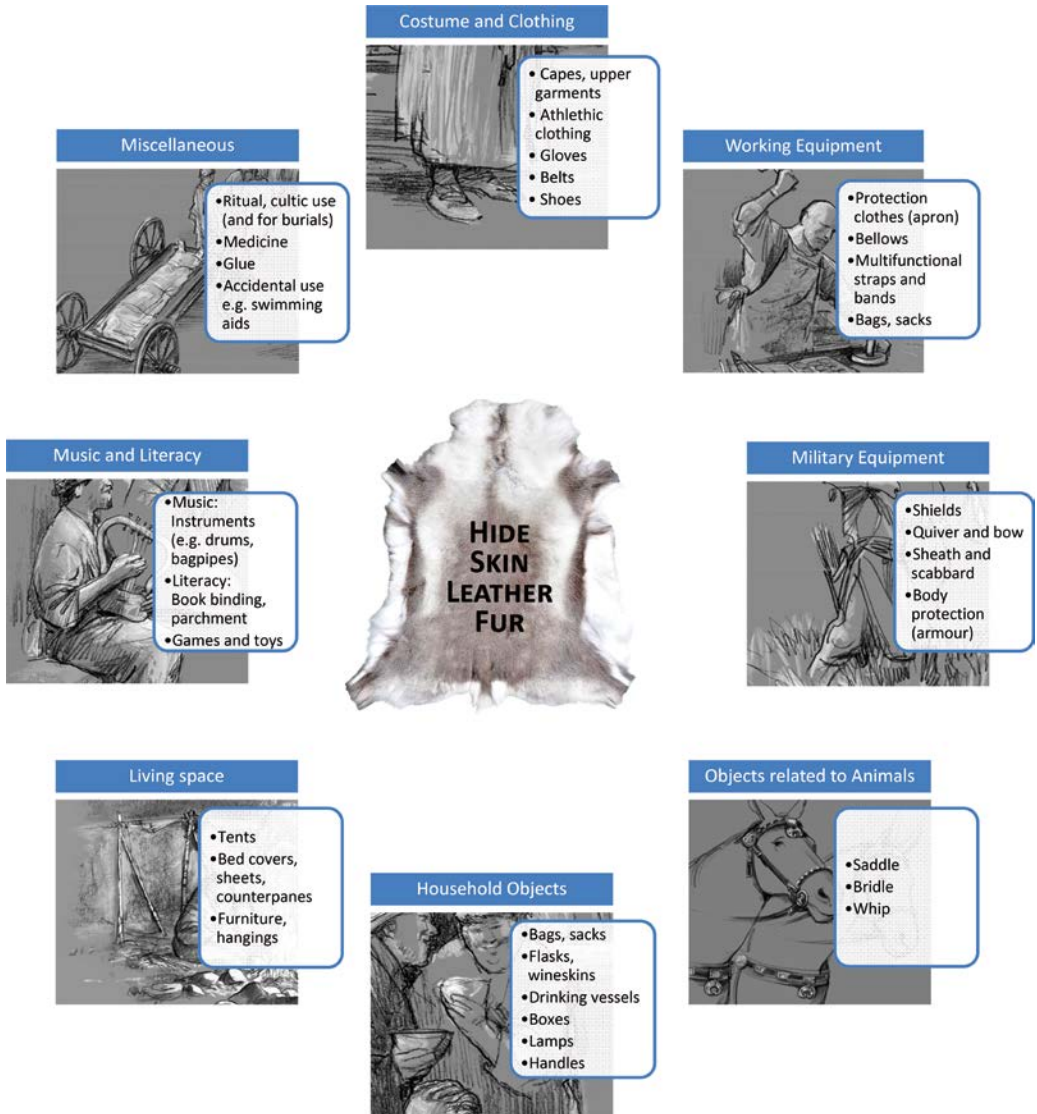


Fig. 2. Possible uses of skin, leather, hide and fur based on archaeological finds, written sources and iconography (image: K. GRÖMER, © NHM).

- Military equipment
- Objects related to animals
- Household objects
- Living space
- Education and entertainment

Clearly, some of the items can belong to more than one group.

Costume and Clothing

Costume and clothing are among basic human needs (Fig. 3), *e. g.*, garments are depicted for the 9th century AD in the Vivian Bible (*c.* AD 845), which is kept in Tours and in the Stuttgart Psalterium. In European history, different parts of the body were also covered with fur or leather elements, beside textile garments. This underlines the great variety of clothing and other relevant apparel. Among the most notable are cloaks, belts, and shoes. The examples studied in this subchapter derive from various archaeological sites including bog mummies, burials, settlements, but also historical texts and depictions.

One of the biggest groups of objects in the category skin is related to clothing. Using animal skin, fur, and leather has both advantages and disadvantages. For instance, leather keeps the body warm but, depending on material and cut, can be heavy and, compared with textiles, usually less flexible and more difficult to wash (KANIA 2010: 49).

On the other hand, leather and fur help to maintain the temperature and humidity conditions that human skin needs to function properly under changing conditions. Leather is windproof and has the ability to absorb substantial amounts of moisture from perspiration without feeling wet. Without this feature, moisture builds up on the surface of the skin, condenses into welding droplets, which form a moisture film and cause a sensation of discomfort (MOOG 2005: 12–15; RUSS-POPA 2011: 42).

Clearly, the benefits of this material outweigh its disadvantages. Moreover, in many parts of the world, leather and fur were the only available material that could protect people from very low temperatures.

Capes, upper garments and trousers

A significant part of the costumes in Iron Age Denmark were skin garments, discovered in the peat bogs of Jutland (200 BC–500 AD). The analysis of the findings demonstrate that the vast majority of the products were made out of the skin of domesticated animals; only a small percentage derived from wild species. A famous category was the skin capes, which can be categorized into two distinctive groups – symmetrical and asymmetrical. Capes found in Denmark exhibit traces of repair and indicate the presence of skilled craftspeople (MANNERING *et al.* 2012: 91–118).

Remains of animal skin related to capes have also been recovered from various burials in Anglo-Saxon England. They are often associated with metal fittings on which fragments of the animal pelt have been recorded (WALTON ROGERS 2007: 172). Remains of leather, which can probably be identified as part of a hood and cloak, came to light from the cemetery at Harford Farm in England (late 7th century AD), in Grave 28 (PENN 2000: 29).

Other parts of clothing were found at the chieftain grave of Poprad-Matejovce. The site is located at the northern part of Slovakia and is dated to the Early Migration period (late 4th/early 5th century AD). Organic material has been preserved, including textiles and leather. A high number of leather pieces have been identified as trefoil knots, loops, and strips. It

Fig. 3. Reconstruction of early medieval male clothing, based on the Vivian-Bible from Tours, *c.* 845, including leather elements such as belt, scabbard and shoes; model: Daniel BRANDTNER (photo: A. SCHUMACHER).

remains unclear from which kind of garments those pieces derive (ŠTOLCOVÁ & ZINK 2013: 85–92).

Complete leather garments are very rare, but in the dry and cold conditions of the steppes of Mongolia some interesting examples deserve mention. Archaeological findings from graves of the Mongols of the 1st millennium AD show a large variety of use of skin, leather, and fur. Both fur and skin were used for the trousers of the horse riders as protection and to enable movement flexibility on the horse. Many caftans and coats were lined with fur and sheepskin (STAUFFER 2012: 91–99). Magnificent examples are the findings from three burials at Duguj Cachir in Mongolia (10th–11th century AD). These include fragments of leather trousers and fragments of a coat made of sheepskin and leather (ERDENEBAT & AMARTÜVŠIN 2012: 285–313).

In addition to the archaeological evidence, written sources contribute regarding the people who were professionally engaged in processing, trading and selling of leather and fur. In the book *Schachzabelbuch* by Konrad von Ammenhausen in Germany, one scene is entitled “*a furrier, a hat-maker, and a saddler*” (WLB Cod. poet. 2, fol. 203, dating to the 15th century AD). It captures the daily moments of people variously involved in producing equipment made from animal skin.⁴ At this scene, a special focus is on the furrier – a renowned medieval profession – who was the person responsible for sewing the fur onto clothes.

Also, various head covers were made from leather and fur. Some specific cases are discussed in Chapter about Military Equipment.

Athletic clothing

Female athletes of ancient Rome wore leather bikinis because nudity was not acceptable (CLELAND *et al.* 2007: 13). Archaeological evidence of leather briefs has been found at Queen’s Street and Shadwell in London in a 1st century AD context (CROOM 2002: 95).



⁴ <http://www.bildindex.de/bilder/mi03017c12a.jpg>

Briefs could have been worn alone or in combination with a breast-band. They would have been used for exercises in the bathhouses. However, it remains unclear whether they would have been worn in the water as well. The idea of *bikini* in the ancient Roman world can be followed quite well based on various depictions. For example, the mosaic from the Villa Romana del Casale in Italy (4th century AD) represents breast-bands and briefs worn by female athletes, acrobats, and other entertainers (CLELAND *et al.* 2007: 23).

Gloves

Impressive findings have been unearthed from the early medieval (480–520/530 AD) graves at Unterhaching near Munich in Germany. The analysis of Grave 5, which belonged to a woman, exhibited remains of fur next to the fingers, which probably derive from a member of the Mustelidae (weasel) family. The find has been interpreted as being part of sleeves or gloves (NOWAK-BÖCK & VON LOOZ 2013: 173–180).

During the 1950s at the Cathedral of Cologne in Germany, archaeologists detected and studied the early medieval grave B808, which belonged to a 28 year-old woman. Among the objects that accompanied the body, remains of leather were discovered, which have been interpreted as gloves (RISTOW 2012: 78–98).

Belts and straps

An important item relating to clothing is the belt. It is among the most well-known accessories and is found in many variations in different cultures. Belts are among the findings that often come to light at archaeological excavations because leather remains can survive attached to metal belt hooks, belt plates and the like. The following are examples of such artefacts.

Luxurious textiles and leather objects derive from the Merovingian burials in Saint Denis Basilica (France) dated at around the 6th and 7th centuries AD (FLEURY & FRANCE-LANORD 1998; VOLKEN 2009; RAST-EICHER 2010; DESROSIERS & RAST-EICHER 2012: 1–8). The basilica had been used as a burial site for the royal family. The organic remains of Queen Aregonde yielded fascinating findings. Among them is a leather belt embroidered with silk and closed by a gold and silver buckle with garnets. This clearly demonstrates that belts also had a decorative purpose beside the purely functional role to close garments. In combination with belts, various other leather straps were used to hold clothing in the desired position. On Queen Aregonde's legs, silver garter fittings closed around her shoes; the shoes were made of decorated goat leather straps.

From the Avar cemetery (750–800 AD) at the Nuštar/Dvorac site in Croatia, a leather fragment with fine decoration was found on a belt buckle together with two different types of textiles. The belt was excavated at the pelvic region, so that the function of the leather is obvious. The leather fragments belonged to the belt, which was closed by

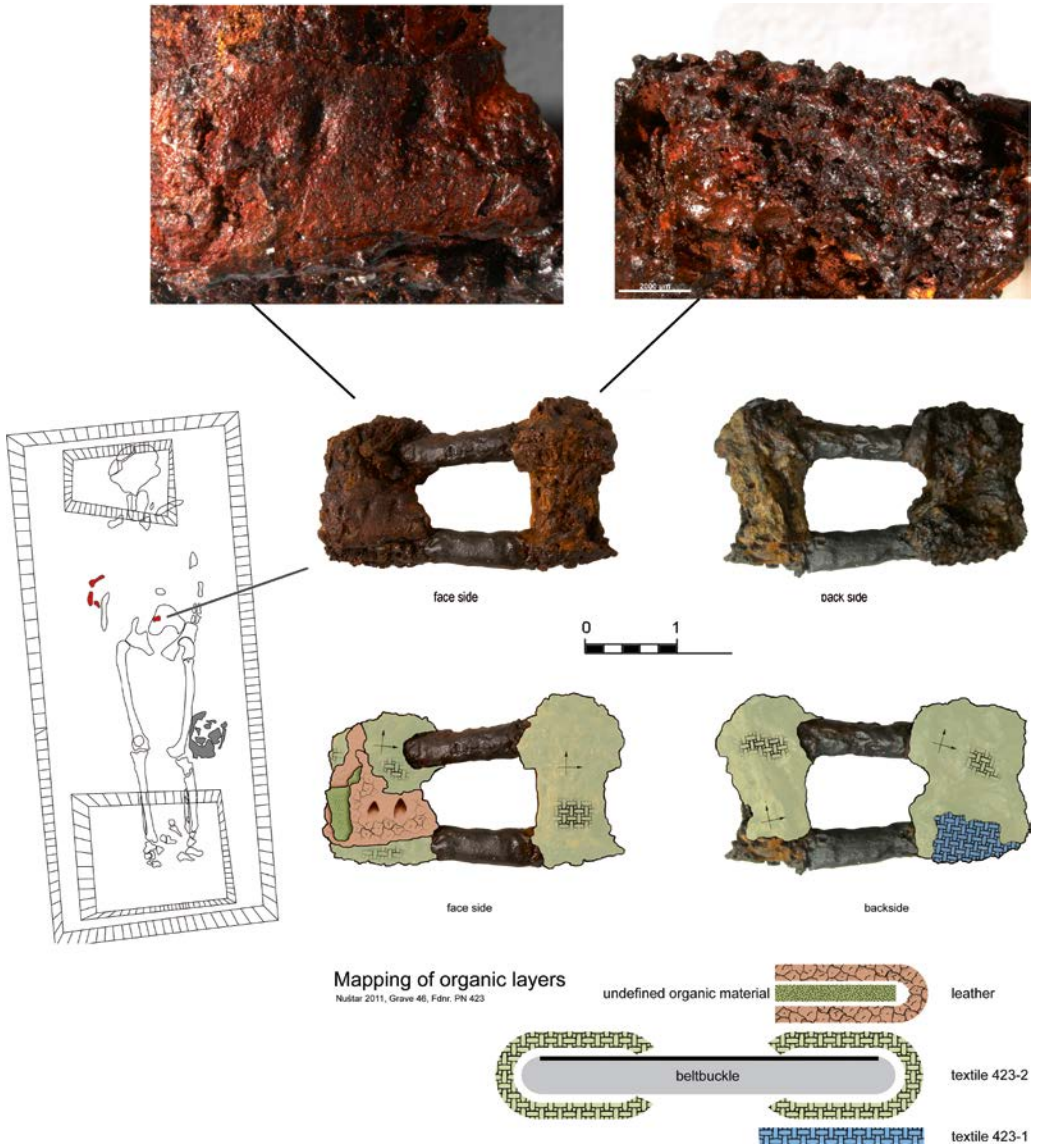


Fig. 4. Remains of a leather belt from an archaeological context: Avar cemetery (750–800 AD) at Nuštar in Croatia, Grave 46 (after GRÖMER & RAPAN PAPEŠA 2015: fig. 8, pl. 4).

the buckle (Fig. 4). The decoration and the fact that belts played an important role in social status among the Avars, are indications that the belt was worn in order to be seen (GRÖMER & RAPAN PAPEŠA 2015: 51–83).

Interesting belt finds have been identified during excavations at the early medieval monastic cemetery of Landough, north of Penarth and about 3.5 km from the centre of Cardiff in the UK. An iron artefact was interpreted by the archaeologists as a hernia

belt (HOLBROOK & THOMAS 2005: 1–92).⁵ Nowadays, before surgery the patients wear a belt in order to reduce the pain and keep the organs in the correct position. According to archaeologists, similar findings come from early medieval France, Germany, Switzerland, and Spain. This kind of belt is very characteristic and, according to some parallels, leather straps were used to better fasten the device.

A find from Scandinavia during the Viking Age exhibits the symbolic dimensions of the belt. In Dollerup in Denmark, a small metal fitting dating to the first half of 10th century AD has been unearthed. Leather remains were detected on the back side of the fitting. The most probable interpretation is that the fitting was fastened to the flap of a leather bag and functioned as a fastening in connection with a strap. This strap would have been used to bind the bag with the belt. The significance of this object is twofold because it indicates trade and contacts with the East, and because it might have functioned as a symbol of rank in a warrior elite class (KRAG 2010: 113–116).

Concerning historic texts, a belt scene is also presented in the Codex Manesse (c. 1300 AD), *i. e.* the famous depiction of Dietmar VON AIST⁶. In this context, belts have an erotic connotation and are related to the connection between man and woman (SCHOPPHOFF 2009: 162).

Shoes

Numerous shoes have been unearthed from various sites in Europe. The study of footwear includes not only the material found during excavations, but also written sources, statues, frescoes, and many sources where footwear is mentioned or depicted. In the 1st millennium AD, different types of shoes with various versions and elaborations already co-existed (*e. g.*, GREW & DE NEERGAARD 2001; GROENMAN-VAN WAATERINGE 1984; VOLKEN 2014). Their use depended on social status and other practical considerations such as climatic conditions, walking surfaces, *etc.* Different shoes would have been worn by different people, among them soldiers, farmers, children, or prisoners. The appearance of a new fashion and the re-use of older types or features is also a factor. For instance, the Late Roman *carbatinae* represents a type that preserves features found since the Iron Age. Moreover, many types that were no longer in use in one region might have been used and copied at a later time and someplace else (VOLKEN 2014).

Findings from the Roman Iron Age in Denmark (Risehjarup, Arnitlud) reveal the co-existence of an older type of shoe (pre-Roman) and a new one. Although the later type seems to have been inspired by Roman footwear, differences regarding the technique attest to a local production (MANNERING *et al.* 2012: 91–118).

No discussion of shoes is complete without the numerous findings from Haithabu (Schleswig-Holstein, Germany). The site has been interpreted as an early medieval city of northern Europe. Among the many different items made out of leather, the most

⁵ There are many types of Hernia. Most of the times it is related to a weakness at the abdominal wall.

⁶ <http://digi.ub.uni-heidelberg.de/diglit/cpg848/0123>

abundant and significant category is that of footwear. Information concerning the various types and techniques applied during the manufacture of the shoes was gained by studying the different parts of the shoes: foxing, sole, laces, and knots (GROENMAN-VAN WAATERINGE 1984: 25–36). The analysis of these leather remains has demonstrated that most shoes were manufactured out of the skin of domesticated animals, especially sheep/goat. Some of the shoes present a combination of different leathers for the different parts of the footwear (GROENMAN-VAN WAATERINGE 1984: 13).

Working Equipment

Aprons, presumably made of a durable material such as thick leather, as protective pieces of clothing, are depicted on Roman tombstones (*e. g.*, grave monument from Ostia, blacksmith with tunic and apron: ZIMMER 1982, no. 11), and in medieval books. An example for medieval iconography is the scene “Blacksmith at work” (Harley 6563 f. 68v) in the *Book of Hours* (1320–1330 AD).⁷

Other interesting examples regarding the role of animal skin in everyday working equipment are known from manuscripts. The *Nürnberger Hausbücher* contains depictions of metal processing (Amb. 317b.2, f 65v, 1600 AD). Bellows, which are used to furnish a strong blast of air, were manufactured out of leather. Leather bellows of this type might have been in use at least since Antiquity and also in early medieval iron production sites.

Another multifunctional group of items that belongs to this category of artefacts is pieces of leather straps and bands that were used for various purposes. Frequently, the interpretation of such items is difficult when found in the archaeological record. One example for an initially unclear use of leather straps as working equipment is the leather band used by aulists in ancient Greece to avoid deforming their face when blowing the instrument (GANTZ 1993: 95).

Military Equipment

A very important contribution of leather was its utility during battle and in other activities associated with prestige and power (CHESHIRE 2014: 41–76).

For example, the Roman army had a high demand for leather during the expansion of the Roman Empire. Individual objects and parts of equipment were made out of leather, including hats, protective armour and head covers, saddles, bags, weapons, shield facings, various other accessories for the battle, and sometimes even tents. Such finds derive from Vindonissa in Switzerland (GANSSE 1942; GROENMAN-VAN WAATERINGE 1974: 68–72), Cologne, and Mainz in Germany. The skins of cattle, calves, sheep, and goats were mainly used. Fur and leather seem to have been a very important part of the

⁷ <http://www.bl.uk/catalogues/illuminatedmanuscripts/ILLUMIN.ASP?Size=mid&IllID=28880>

Roman military dress and were often used as a marker of status and symbol of bravery⁸ (CLELAND *et al.* 2007: 76, 171–172).

With regard to head covers associated with military equipment, one example stems from the Isle of Wight in the UK and dates to the 6th century AD. In the grave of a male warrior, traces of skin were found at some areas on the inside of the helmet. Due to the poor preservation of the material, the identification and the interpretation of its utilisation are not clear-cut, but the presence of skin products to improve comfort, protection, and sometimes substituting other materials is a distinct possibility (HOOD *et al.* 2012: 83–95).

Scabbards belong to the items that are frequently found in graves, as indicated by leather fragments of a distinct shape, positioned next to a sword, dagger or knife (MOULD *et al.* 2003). The graves of the early medieval cemetery (late 10th – early 11th century AD) of Bodzia in central Poland (BUCO *et al.* 2013: 423–441) yielded a battle knife from Grave E58 that was in contact with skin or fur. The conclusion was that the scabbard was lined with fur or the knife was wrapped in it (with hair inside) to remain protected. Anglo-Saxon sword scabbards, for instance, were made of different materials, including sheep or goatskin (WALTON ROGERS 2007: 227). One item from late 12th century London is a scabbard (No. 372) made of calf leather with plaited decoration (COWGILL *et al.* 2000: 115).

Leather was also used as handle covers for weapons and for the production of sheath (NOWAK-BÖCK & BARTEL 2014: 74–110). This is demonstrated by the early medieval cemetery at Ergolding in Bavaria, Germany, which contained more than 400 burials dating between the 7th and 8th centuries AD. One of the noble burials is Grave 244, where three male skeletons were unearthed and a variety of organic material recorded.

Wooden or leather scabbards, and sheaths, have also been unearthed from graves of the 12–13th centuries AD from nomad burials in the Black Sea Steppes (ŚWIĘTOSŁAWSKI 1999: 50).

Anglo-Saxon cemeteries have brought to light findings about military equipment, especially shields. At the cemetery of Boss Hall, leather or skin was identified upon the fittings of six shields (CAMERON & EDWARDS 2004: 3). In the Anglo-Saxon context, the type of leather used for specific purposes was important. According to the Laws of King Athelstan (926–930 AD)⁹, no shield-maker was allowed to put sheepskin on a shield (LEAHY 2010: 89).

Bows (Fig. 5 right) constitute a very specific category of weapons, and they often played a decisive role in the course of an attack. Leather was applied as a cover for certain parts of the bow or even for the whole bow. Alternatively, other materials were used as well, such as tendon or bark (DE WAELE 2005: 154–160). Quivers (Fig. 5 left) would have also been manufactured out of leather. Fragments of quivers have been discovered at the early medieval city of Haithabu in Schleswig-Holstein, Germany (GROENMAN-VAN WAATERINGE 1984: 38–40). Additionally, Mongolian graves have yielded whips, quivers, and bags made of leather (ERDENEBAT & AMARTÜVŠIN 2012: 285–313).

⁸ Also known from the Greek mythology

⁹ King of the Anglo-Saxons (924-927 AD) and King of the English (927-939).



Fig. 5. Reconstructions of early medieval bow and quiver, on display at the NHM (photo: A. Schumacher).

Objects related to animals

A series of important equipment relating to animals was at least partly manufactured out of fur or skin. Archaeological findings unearthed in the High Altai Mountains contained the famous leather saddles discovered at Pazyryk (5th–4th centuries BC). They were used by the Great Steppe nomads (ŚWIĘTOSŁAWSKI 1999).

In medieval Europe, saddles were partly made from leather and partly from wood (Nürnbergger Hausbücher Amb. 317.2, f. 124 v, 16th century AD). They are depicted in various manuscripts as objects or as a symbol for saddlers.

Apart from the saddles, additional leather items were in use, especially with respect to horses. Leather was applied as a protective cover for horses by the Mongols (ŚWIĘTOSŁAWSKI 1999). One of the various purposes that leather straps served is as part of bridles (MOOG 2005: 16) and whips.

Household objects

An important indication for the use of leather, skin or fur for household objects are written sources. From England, the Ælfric's *Colloquy* (955–1010 AD) describes life in the countryside during the Anglo-Saxon period. According to the text, a tanner buys hides and skins to make – among other things – baskets, flasks, bottles, spur, halters, bags, and pouches (LEAHY 2010: 83).

Such leather objects, however, are difficult to identify in the archaeological record due to their perishable nature. Moreover, all of the aforementioned items are among household objects which have also been found to be made of other materials such as ceramic, glass, or metal.

Finds related to household objects came to light from the Anglo-Saxon cemetery of the late 7th century AD at Harford Farm in England. They contained a wide variety of (parts of) preserved objects made of leather, wood, and other organic materials. Grave 7 produced findings, including remains of a box or chest, which can be associated with leather, textile, and wood (PENN 2000: 11). At the same grave, iron rivets were detected with traces of textile, leather, and antler; combined, these items were interpreted as part of a comb, found on a wooden box (PENN 2000: 12). Grave 18 brought to light a cylindrical “relic box” associated with fragments of leather (PENN 2000: 19). The study of a leather sheath from Grave 25 indicates that cattle leather was probably used. The same grave yielded an iron awl with a wooden handle and traces of leather – perhaps a container for the tool (PENN 2000: 25). Remains of a leather case were also unearthed at the Anglo-Saxon cemetery of Boss Hall (CAMERON & EDWARDS 2004: 3).

Living space

Written records, accounts, manuscripts, and archaeological finds demonstrate the important contribution of leather as part of the living space. A wide variety of different boxes and chests have been found and are depicted as keeping and protecting daily equipment as well as precious items. Leather was typically applied to the surfaces as protection against humidity. It was especially prized for carrying belongings on journeys over long distances.

Some of the earliest written evidence with information concerning the use of skin and leather for living space derive from Greek Antiquity. Already Homer, in *The Odyssey*, refers to skin: seats, protective equipment for the legs, covers for sleeping, and equipment for storing were made of hide (Rhapsodies Ξ 23, A108, Ω 228-229, Γ 440, B380).

Important findings are also derived from the early Christian cemetery (7th century to early 8th century AD) at Harford Farm, near Caistor St Edmund (Norfolk). The cemetery exhibited 47 burials in 46 graves, in which furnishings interpreted as pillows and beds of textile, leather or other organic materials were found (WILLIAMS 2006: 65–78).

Education and entertainment

Music

Animal skin is used even today for the manufacture of instruments. The archaeological record often yields parts of instruments made of clay or metal, but the organic material is usually not preserved.

Drums constitute a very famous category of the membranophones with a long-lasting tradition starting from prehistory. Their construction often involves the use of animal skin (POMBERGER 2016). Drums usually consist of at least one membrane or drum skin, which is stretched on a surface and, through vibrations, produces sound. A wide variety of drums of various shapes can be played with the hands or sticks. Drums are included in the traditional music of many cultural groups and were also in use during the Roman and medieval periods.

For example, medieval manuscripts from the 13th century known as *Cantigas de Santa Maria* include 420 poems with musical notation written in the medieval Galician language during the reign of Alfonso X (El Sabio) (FERREIRA 2013). Manuscript E depicts two people playing drums with a stick. The drums are tied around their bodies with a string.

Traces of wind instruments came to light from the foundations of a moated castle in the area of Rittergut Schlettwein in Sweden (Fig. 6), dating to the 13th century AD (HAKELBERG 1995: 188). The instrument has been interpreted as a fingerhole-horn, and one reconstruction shows that it is highly possible that a wind-bag made out of animal skin fitted with it.

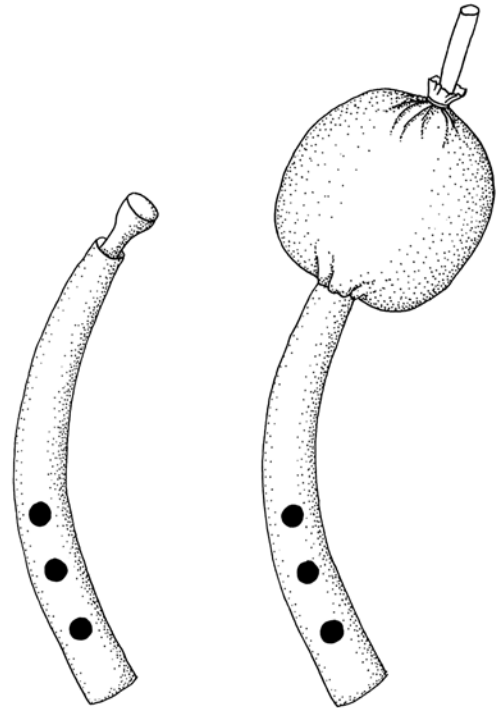


Fig. 6. Wind instrument from the 13th century AD, based on a find from Schlettwein in Sweden (drawing: K. GRÖMER, after HAKELBERG 1995: 188).

Literacy

Leather has also been used for manufacturing parchment and binding books. Parchment was made of animal hide and its preparation was a complicated process (DE HAMEL 1992: 8). Different types of manuscripts, such as chronicles, deliver various scenes related to parchment. Some of these depictions illustrate the specific shops where parchment was sold, different stages of the preparation, or even people inspecting pieces of parchment before buying. There are also accounts and references regarding the price per parchment, based on the different qualities. The finest parchment (*vellum*) was made from calfskin (KOEHLING 1999: 85; LEAHY 2010: 90).

From the 1st millennium AD there is a plethora of manuscripts, chronicles, codices, and a large variety of documents made out of parchment. They are housed in various monastic libraries and museum collections throughout Europe. Some famous examples



Fig. 7. Parchment document from 14.03.1323 (© St Stephen's Cathedral in Vienna).

for books are the *Lex Salica*, the civil law code written by Clovis (500 AD), and the *Historia Francorum* (in ten books) by Saint Gregory of Tours (6th century AD), who narrates the history of the Frankish kings of the 6th century AD. Another example is the Stonyhurst Gospel (8th century AD), a tiny gospel book written in Latin. It is one of the very few Anglo-Saxon books that still carries its original binding, which consists of vegetable-tanned goatskin (LEAHY 2010: 93). A codex dating to the late 9th century AD is exhibited today at the Collection of St Stephen's Cathedral in Vienna, Austria.¹⁰ It is a Carolingian Evangelistary comprising 187 parchment sheets with wooden cover and leather binding (SALIGER 1987: 33–41).

An example of an early parchment document is also stored at the St Stephen's Cathedral in Vienna (Fig. 7). It is a document from Friedrich VON ATZENBRUGG and his wife Adelheid and is dated to 14 March 1323 (for the document and its translation see WEINBERGMAIR 2016).

Games and toys

Leather was also used in manufacturing games and toys. Playing is a very important part of daily life, especially for children. A popular category of games was ball games, which

¹⁰ Archiepiscopal Library Vienna (Erzbischöfliche Bibliothek Wien, Cod. Lat. 5723).

were very popular in ancient Rome. Frescoes in villas and tombs show a variety of ball games and thus many types of balls. These balls were made of flexible material such as feathers, hair, and seeds covered in leather (ERMATINGER 2015: 545). Leather balls have also been found at medieval sites, but most of the preserved objects date to later periods of the Middle Ages (EGAN 2010: 295–296).

The *Book of Games* (*Libro de los Juegos*, Spain, 13th century AD; MUSSEY GOLLADAY 2007) shows the playing of three games – namely the games of skill, of chance, and of both skill and chance. The dice belong to the games of chance and are related with various cultures and traditions. Dice were often placed in leather cups.

Miscellaneous

Animal skin was also an important aspect of different symbolic actions. The Anglo-Saxon cemetery at Snape in England yielded light coverings made of animal skin or leather, used at the base of some of the graves (WALTON ROGERS 2007: 224–225). The grave of a noble person was excavated at Welwyn Garden City in England. The analysis of the findings showed that the corpse had been wrapped in bearskin (ALDHOUSE-GREEN 2015).

An example revealing important information about beliefs, rituals, and practices dates to the first half of the 1st millennium AD in Denmark (PRICE 2014: 162–195). After experimental efforts, based on relevant findings from bogs, the archaeologists reconstructed animal sacrifices. The skin, head, and hooves of the animals (such as horses) were strung up on trees. This form of offering was practiced around bogs or wetlands.

Another custom, which traces its roots to the Etruscans, is the *bulla*, a locket made out of metal or leather containing an amulet. This was worn by Roman children around the neck as a symbol of protection (CLELAND *et al.* 2007: 26). *Bullae* have also been found at the Anglo-Saxon cemetery of the late 7th century AD at Harford Farm. A festoon of rings, beads, and *bullae* – from Grave 22 – is associated with remains of a leather backing (PENN 2000: 51).

Leather and glass were two of the materials used for the manufacture of diadems and crowns of Byzantine Emperors, especially in periods of poverty, invasions, and civil war (FREESTONE 1991: 37–56; KARALI & SALIARI 2014: 255–262).

Some of the usages of animal skin are very difficult to prove, especially when they constitute part of a substance that cannot be easily investigated and identified. Animal hide and hair can be used during the preparation of medicaments and glue. Glue made of animal products has been used for various purposes. Just to name one example, this material was decisive for the construction of Ottoman Turkish bows – together with other raw materials such as wood, horn cores, and sinew. This type of bow glue derives almost exclusively from faunal material; it is rich in collagen, including the skin of mammals and fish, sinews, and bones (KARPOWICZ 2013: 71, 73–74).

Summary and perspectives

This paper provides an overview of products made of skin, leather, fur or parchment, based on the published archaeological findings and the historic record. Different kinds of daily, sacral, practical, and symbolic objects were at least partly manufactured of animal skin and/or fur. The underlying handicraft can be reconstructed through contexts and historical documents.

The comprehensive data compiled here provide a good basis for future research: Important aspects concerning leather and fur are related to the properties of the material, the reasons for the popularity of leather, as well as how the material culture and the biography of objects provide information about the people directly engaged in producing and distributing animal skin and the group of people who purchased and used it.

The functional groups studied here (clothing, working and military equipment, household objects...) should be explored in relation to the types of skin/leather/fur used as well as to the different animals contributing the material.

The relevant crafts should be discussed in combination with tradition, accessibility, availability, practicability, technology, and prestige. All these factors reveal aspects of the socio-political dynamics. This includes information about status and identity – who uses and wears what kind of fur, leather or objects made out of them. What are luxury goods in that context? For deeper insights, written sources from the early medieval and medieval times have to be studied. Clearly, animal skin was used in many practical and symbolic ways. For example, the production of a cloak with fur from rare animals – very precious and thus affordable only by a few people – was a strong social symbol for prestige and status. Another important question is from which period on can we trace specialized craftsmen for different production steps from skinning and tanning to the furrier, shoemaker and the like. Such craftsmen are present, for example, in handcraft guilds in the medieval and after AD 1500.

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