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Leather, Fur and Skin Technology in the Iron Age Salt Mines at Dürrnberg near Hallein, Austria and Chehrābād, Iran

Introduction

Iron Age leather technologies are the focus of this dissertation project, which is based on finds of leather, fur and skin from the Iron Age salt mines at Dürrnberg near Hallein, Austria, and Chehrābād, Iran. Similar taphonomic processes operate at both sites, and the economic backgrounds are directly comparable. Objects made of organic materials, including leather, fur and skin, are a very rare find category in archaeology. Under normal conditions they are exposed to natural decomposition processes. The rare conditions that may favour their preservation include salt, water and ice, aridity and contact with metals (see Geijer 1979, 265-270; Fischer 1997, 1). In prehistoric salt mines, the biocidal and dehydrating properties of NaCl, the prevailing low temperatures and the air-tight embedding in salt rock provide an ideal environment for the preservation of organic finds. Many types of organic material are preserved: leather, fur, skin, hair fibres, textiles, wood, tree bast and bark, as well as botanical remains and excrement. Leather, furs and skins were the raw materials used for producing various objects that could be used in the mine. Footwear, headgear, capes, bags and cases served as personal equipment of the miners. Leather and fur were also employed in technical functions, for instance as raw materials for manufacturing various devices and carrying bags for the transport of salt.



Fig. 1. Dürrnberg, Austria. Excavation in the salt mine (© Deutsches Bergbaumuseum Bochum).



Fig. 2. Dürrenberg, Austria. Archaeological finds embedded in the salt rock “Heidengebirge” (© Deutsches Bergbaumuseum Bochum).



Fig. 3. Dürrenberg, Austria. Knife sheath made of calf skin (Photo: Andreas Rausch, © Deutsches Bergbaumuseum Bochum).

Straps and belts played an important role for many purposes in the context of salt mining and finger cots were used as safety clothing. The PhD project described here aims to conduct a thorough investigation of such finds at the sites of Dürrenberg and Chehrābād.

Dürrenberg near Hallein, Austria

The site of Dürrenberg near Hallein is located in the Salzach valley of the Austrian-Bavarian border area. Salt mining started there in the 6th century BC. The region was connected to important prehistoric trade routes in central Europe: east-west along the Danube and south-north from the Mediterranean across the

Alps and further north (cf. Penninger 1972, 15-17; Maier 1974, 326-347). The Dürrenberg was the second biggest salt producer in the eastern Alps after Hallstatt. The salt deposit consists of alpine rock salt and is part of the ‘Hallstatt Zone’ extending from the Viennese Forest to North Tyrol.

Evidence for mining technology at Dürrenberg suggests that the miners possessed considerable skills right from the beginning of operations. The exploitation of the Dürrenberg deposits is assumed to have been initiated by groups of miners from the alpine foothills and the Salzburg basin. In addition to the mining methods, the consistency and efficiency of the miners’ tools and personal equipment bear witness to a high level of standardisation within the mining operation. The Dürrenberg was an economic centre of its time and remained so until the late La Tène period, when mining ceased: finds rarely date later than the middle of the 1st century BC (Moser 2008; Stöllner 2008). Settlement areas and related cemeteries have been found directly adjacent to the mining area at Dürrenberg. A total of 227 artefacts (assigned to 151 find numbers) from the 2001 to 2012 excavation campaigns are the objects to be examined in this study. They include parts of shoes, a sheath, numerous straps and belts in differing dimensions, as well as hair bundles and smaller and larger leather, fur and skin fragments whose function is still unclear.

Chehrābād, Iran

The site of Chehrābād (province Zanjan) is situated in the north-western part of Iran, where salt rocks have been mined from antiquity to the present day. The rock salt deposits are characterised by a high level of purity and are embedded in a soft and unstable mix of clay and gypsum. The salt is easily accessible due to tectonic activity and its close proximity to the surface. Archaeological excavations indicate intensive use of the mine during the late Iron Age (*i.e.* Achaemenid period). The situation in the Arsacid period remains unclear until now due to the lack of significant finds for the mining activity itself. Carbon dates also suggest mining activities from the Sassanian period up to early Islamic times (651-1036 AD). The ancient mining operations at Dürrenberg and Chehrābād are contemporaneous and comparable in terms of technology. Both follow salt deposits. Only the absence of wooden scaffolding or supports at Chehrābād represents a significant technological difference.

The lack of supports made the work dangerous: miners who lost their lives in accidents have been preserved as mummies and are evidence of the instability of the pit. A total of six human bodies in various states of preservation have come to light at Chehrābād. In



1994, a first mummy was discovered during modern salt production and was partly destroyed. A further salt mummy was destroyed in 2004, but led to the launch of large-scale rescue excavations. Three other salt men were found during the course of subsequent investigations. Parts of a sixth corpse were recovered during an international research campaign in 2010. The bodies date to the Achaemenid (6th-4th century BC), Arsacid (3rd century BC-3rd century AD) and Sassanid (4th-6th century AD) periods. In addition to the well-preserved and clothed mummies (Mummy 4 from the Achaemenid period, for instance, was found with shoes, woolen trousers and tunic, fur cape and sheath (Aali, Stöllner, Abar, Rühli 2012), there are a large number of different-sized fragments of hide, leather and skin. The latter are similar to contemporary finds from the Dürrnberg. Samples of 14 objects of skin, leather and fur from Chehrābād, the purpose of which is unclear, will be analysed within the scope of the project (Ruß-Popa, 2015).

Research questions and aims

The project aims to research the selection and supply strategies of the raw materials at the two sites. In so doing, it hopes to reveal important information on the characteristics of the raw materials and to shed light on some aspects of resource management in prehistoric mining operations. The techniques that were used in the production of the materials and the processing of the hide, leather and skin into objects will also be investigated. Another aspect of the project is the typological classification of the finds, which is ongoing, together with a comparison of the material with similar finds from the Iron Age salt mines of Hallstatt in Upper Austria. The project will also include comparisons with leather, fur and skin objects from other archaeological sites, focussing on similarities and differences in the production and use of such objects. Specific finds such as women's and children's footwear suggest that their owners were working in the mine. With this knowledge, the leather, fur and skin finds from the Dürrnberg can be used to address questions of labour division.

The finds have already been examined with regard to animal species for a first overview of the fur supply chain. Questions include whether the animals were domestic or wild, and if they were local or delivered from further afield. To transform the fur of an animal into a durable and usable material, certain operations are necessary, such as de-fleshing, removal of hair and tanning. Evidence for the knowledge and skill involved in these steps will reveal details of the technological know-how of the day. Investigating what kind of leather was prepared and which techniques were used



Fig. 4. Chehrābād, Iran. Rock salt deposit (Photo: Gabriela Ruß-Popa).



Fig. 5. Chehrābād, Iran. Foot of the salt mummy 4 with shoe (Photo: Gabriela Ruß-Popa).

will also help us to understand the craft technologies of early societies; these are fundamental skills that are still relevant today. The prehistoric technologies of leather preservation (*i.e.* tanning techniques) will be examined via a scientific analysis of tannins.

Leather and fur were used to produce various artefacts in prehistoric times. In addition to those mentioned above, there are many objects found in the salt mines whose function remains unclear. Based on the production technique and use-wear, the project also hopes to determine these further uses.

Traces on the finds themselves will help us to determine what kinds of tools were used to process them. This is a particularly exciting question because specialised tools for leather working have been discovered that date to the Central European Iron Age. In addition, traces of repairs will provide valuable information on the recycling of finished objects. Investigating whether objects of a specific type were made regularly from the same animal should reveal details of the properties of the raw materials. This project, with its

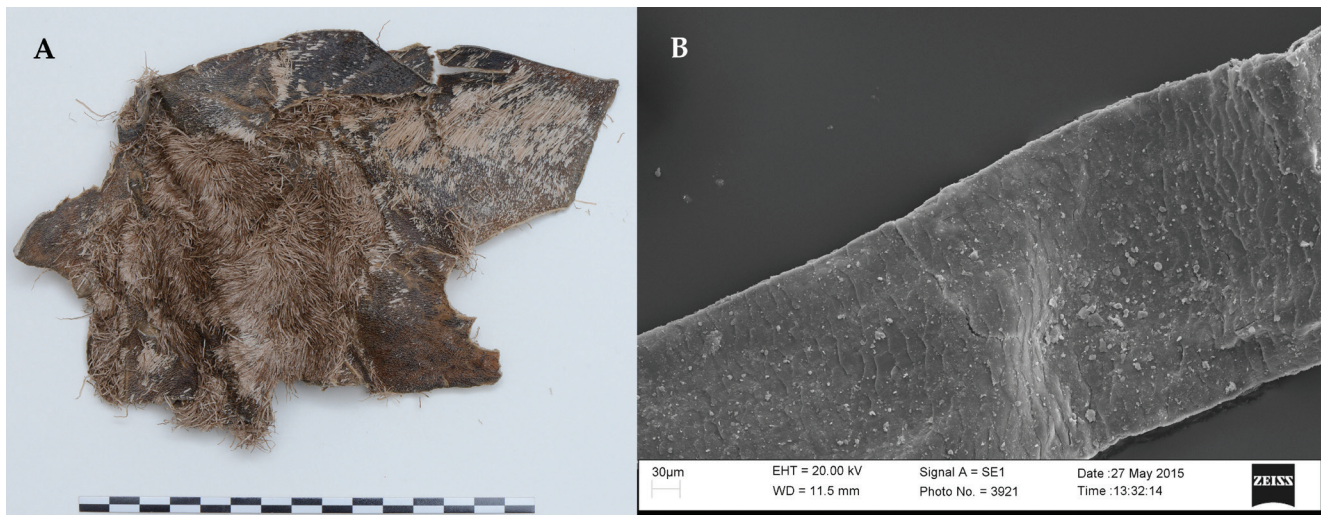


Fig. 6: Dürrenberg, Austria: A) Find No 3680, fragment from an elk fur (© Deutsches Bergbaumuseum Bochum). B) Find No 3680, SEM-picture from an elk hair fibre (© Antionette Rast-Eicher, Archeo Tex, after: A. Rast-Eicher, in press).

research on skin, leather and fur objects, represents a contribution to the history of craft technology and economy, shedding light on the economic background of prehistoric salt mining.

Preliminary results

Studies conducted thus far on the species of animals used at the two sites demonstrate that both at the Dürrenberg and in Chehrābād it was almost exclusively domestic animals that were processed into leather, fur or skin¹. Calves and adult cattle as well as sheep and goats were the most commonly-used animals for objects at the Dürrenberg. Despite the numerous pig bones found in the Dürrenberg settlement, domestic pigs are absent as raw material for skin and leather objects in the salt mines (cf. Groenman-van Waateringe 2002). A single skin find from the Dürrenberg was derived from a wild animal (Elk). Four objects from the Dürrenberg originally attributed to the material group 'skin, leather and fur' were later identified as internal organs such as bladder, bowel and omentum, presumably of animal origin. A comprehensive discussion of the results with detailed documentation will be published after the completion of the dissertation project.

Notes

1. Refers to the material, that was examined for this PhD project.

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