

News on the geographical origin of the Gerum cloak's raw material

Through the study of ancient textiles we can address issues ranging from aesthetics and style to gender, from technological development to production, and trade (Good 2001). A number of new and exciting tracer methods and techniques that aim at investigating archaeological finds now also expand into the field of archaeological textile research. Some have been applied to Swedish archaeological material. Particularly, new information was gathered from archaeological textiles, such as for example on weaving techniques, and some studies were directed to fibre and dye analyses/characterizations (e.g. Franzén & Lundwall 2006, p. 283; 2008).

One of the new methods applicable to wool is based on the strontium isotope system and has recently been developed and presented by Frei et al. (2009). Their study aimed at addressing questions regarding possible trading routes of ancient textiles in prehistory within the realm of Scandinavia.

Today, strontium isotopes are widely used in archaeology and have proven to be good tracers for human and animal mobility in prehistory (Ericson 1985; Price et al. 1994; 2001; Grupe et al. 1997; 2003; Ezzo & Price 2002; Knudson et al. 2005; Bentley 2006; Evans et al. 2006; Price & Gestsdottir 2006; Sjögren et al. 2009). This paper presents a possible interpretation of the provenance of the wool in the best-preserved garment from the Swedish Iron Age, the Gerum cloak.

The Gerum Cloak

The cloak was found by peat diggers in 1920 at Gerumsberget in Västergötland, south-western Sweden (fig. 1). It was recovered along with three small stones, which were probably meant to keep the garment under the water when it was deposited in the Hjortmossen lake. It has been radiocarbon dated to 360–100 cal BC, the Pre-Roman Iron Age. The Gerum cloak is an important piece of textile, as it is a nearly intact garment from Swedish prehistory (Franzén &

Lundwall 2006, p. 283). The cloak is now in the Museum of National Antiquities in Stockholm (inv. no. 16719) and has been displayed in the permanent exhibition “Forntider” since 2005.

During the evaluation period to test the potential of the strontium isotopic system for provenance studies of ancient textiles, we choose to incorporate three important Scandinavian prehistoric garments, including two very small thread fibre samples from the Gerum cloak (a piece of weft and warp, weighing only 12.88 mg and 4.48 mg, respectively). Analytical details are contained in Frei et al. 2009.

The strontium isotopic values of the warp and the weft thread pieces of the garment are very similar and average a $^{87}\text{Sr}/^{86}\text{Sr}$ ratio of 0.7198. Analyses of the pore water of the lake in which the cloak was found and the bioavailable (weak acid leachable) strontium fraction of the soil from the find spot were conducted in order to obtain a signature of the site-specific strontium isotope signature and to check for possible contamination. These analyses resulted in an average $^{87}\text{Sr}/^{86}\text{Sr}$ value of 0.7166 (Frei et al. 2009), which is considerably lower than the value of the threads. This circumstance led us to propose that the raw material (wool threads) are not local to the Gerumberget area, but most probably better suited to match the Precambrian shield signatures, not the Phanerozoic sedimentary realm developed within the Graben-structures of Västergötland. The lack of a strontium isotopic data base on archaeological material prevented us from elaborating further and more closely on the origin of the wool at that time.

Comparing data and interpretation

Here I approach the question regarding the Gerum cloak's wool provenance by comparing our data (Frei et al. 2009) with those of a very recent study by Sjögren et al. (2009). They analyzed the strontium isotope composition of human and faunal archaeological remains from south-western Sweden. Their study aimed at delineating



Fig. 1. Map of south Sweden, showing the Gerumberget locality in the Falbygden area where the Gerum cloak was found. The grey ellipse represents the probable area of origin for the Gerum cloak's wool, south of a strontium sampling location at Torpa Stenhus.

possible areas of origin of the Neolithic people found in the two megalithic regions in south-western Sweden (Falbygden in the inland and Bohuslän and Halland on the coast). This enabled the investigation of the relationships between the local society and its neighbours. The article provides background information on the biologically available strontium isotopic signature of different geological areas in south-western Sweden. Furthermore Sjögren et al. (2009) concluded that $^{87}\text{Sr}/^{86}\text{Sr}$ values below 0.716 can be used as a threshold and are indicative of biologically available strontium from the region of Falbygden, which is dominated by Phanerozoic sedimentary rocks.

Values higher than 0.716 were interpreted by these authors to indicate food sources outside the Falbygden area. Similarly, the Gerumberget soil $^{87}\text{Sr}/^{86}\text{Sr}$ ratio of 0.71604 compares well with Sjögren et al.'s results. This value is also in agreement with the geology of the area, in that

the east side of the Phanerozoic sedimentary island (Graben infills) characterizing the region of Falbygden is predominated by Precambrian granites and the west side by Precambrian orthogneisses. Both of these types of crystalline basement rocks are likely to have high $^{87}\text{Sr}/^{86}\text{Sr}$ ratios (exceeding 0.716) compared to the Phanerozoic island area of Falbygden, as this fault bounded area is characterized by younger sediments with likely lower strontium isotopic signatures ($^{87}\text{Sr}/^{86}\text{Sr} \sim 0.704\text{--}0.709$; Sjögren et al. 2009). When comparing the average strontium isotopic signatures of the Gerum cloak's raw material with average regional values of Sjögren et al. (2009), it becomes evident that the Torpa Stenhus site ($^{87}\text{Sr}/^{86}\text{Sr} \sim 0.718$), approximately 60 km to the south of the Gerumberget site (fig. 1), matches the former best.

Still the match between these two signatures is not perfect. If we consider the movements of the ice during the last Ice Age and the conse-

quences of these movements for the composition of the top soils (a mixture of debris from Phanerozoic sedimentary rocks with debris from Precambrian basement rocks), then it seems reasonable to assume that the grazing area was situated further to the south of the Torpa stenhus site. This would explain the higher strontium isotopic value of the Gerum cloak's raw material, as we predict that the farther south we move away from the Falbygden area, the more radiogenic the soil strontium isotopic signature will get. This means that by moving south from Falbygden, we should encounter soils with bio-available strontium that potentially matches the isotopic signature of the Gerum cloak's wool fibres.

Conclusion

The strontium isotopic database of archaeological material in southern Sweden is not yet very comprehensive. However, based on the similarity of strontium isotopic ratios between wool samples from the Gerum cloak (Frei et al. 2009) and archaeological material from several sites in south-western Sweden (Sjögren et al. 2009), I deem it likely that the wool from the Gerum cloak (both warp and weft) most probably originated from sheep that once grazed in an area just south of Torpa stenhus.

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