

DNA from ancient reindeer antler as marker for transport routes and movement of craftspeople, raw material and products in medieval Scandinavia

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Abstract

This pilot project is a joint venture between natural and cultural scientists that share a common interest in exploiting whether available DNA technology makes it possible to trace back archaeologically found reindeer antler from medieval urban comb production sites to its original provenance. The provenancing of reindeer antler, used in the production of combs and other personal accessories during the Middle Ages, may be a key factor in the study of the identity and the organization of medieval combmakers. Hereunder routes of transportation used by these craftspeople and their products are important. Provenancing will also enhance the understanding of the social and economic importance of the different reindeer mass trapping systems in medieval Scandinavia.

Introduction

Reindeer constitute a biological resource of great importance to the physical and cultural survival of many communities in Arctic and sub-Arctic areas, and have been exploited for food and other subsistence commodities for thousands of years (Kofinas, Osherenko, Klein, & Forbes, 2000; Huntington & Fox, 2005). In early medieval Norway reindeer antler was mainly used as raw material for hair combs (Fig. 1) and other personal accessories made by itinerant craftspeople (Hansen, 2005; Hansen, in prep.). In Norway and in other parts of Scandinavia and Northern Europe, combmakers functioned as a motor for the dissemination of style and fashion among

ordinary people. As such, these artisans were important medieval actors. They are, however, hardly known, except through their products and manufacture debris were left behind at urban and rural sites. Combmakers are typical representatives for what one may call 'anonymous actors' of the Middle Ages; people that, due to their relatively low status in the social hierarchy, seldom or never were given a voice through written records or pictorial sources (Hansen, 2015). We know little about who the combmakers were in terms of ethnicity, social and economic position etc., where they came from, how far and how often they travelled, and the socioeconomic networks they were part of. However, the archaeological sources show that they were recurrent visitors in Norwegian and other Scandinavian towns, where they left behind production debris such as antler off cuts and worn out tools. Combs made



Fig. 1. Hair comb (BRM 104/2275) from mid. 12th century Bergen. Photo: S. Skare, University Museum of Bergen

Wild reindeer exploitation

Knut H. Røed & Gitte Hansen



Fig. 2. Early 13th century comb production waste sampled for DNA (BRM 76/13865, 76/21550) and discarded comb tooth segments and connection plates from the mid. 12th century Bergen. Photo: G. Hansen (left) and S. Skare (right), University Museum of Bergen

of reindeer antler are found in urban as well as rural consumer contexts, spanning large geographical areas from Northern Norway in the north to Schleswig in the south and from Lund in the east, to Orkney and the Faroe Islands in the west (Hansen, 2005, 2014). How these products ended up in consumer contexts spanning such large areas is a question to be pursued in further research.

In the provenancing of antler debris from combmaker workshops (Fig. 2) lies a key to understanding who the craftspeople using reindeer were. Knowledge of where the combmakers got their raw material from opens for a possibility to identify the transport and trading networks they followed. With this knowledge at hand yet another piece in the puzzle of these “voiceless” craftspeople will be available.

Through recent years of research detailed knowledge has been achieved about the trapping of reindeer that took place in mountainous areas both in South and North Norway especially in the Middle Ages (Indrelid, Hufthammer, & Røed, 2007; Sommerseth, 2009). Archaeological investigations of trapping systems as well as of refuse heaps at butchering/carving sites give evidence of exploitation of reindeer on

a large scale (Mikkelsen, 1994; Barth, 1996; Jordhøy, Binns, & Hoem, 2005; Indrelid & Hufthammer, 2011; Hufthammer, Bratbak, & Indrelid, 2011). Osteological investigations of bone from such refuse heaps show that in the medieval assemblages, antlers are strongly underrepresented compared with other bone elements (Hufthammer et al., 2011), as particularly illustrated by the bone assemblages at the Sumtangen site at Hardangervidda mountain plateau in South-Central Norway (Fig. 3). Antlers have thus not been regarded as butchering waste but rather as valuable raw materials that were transported from the outfield (Indrelid &

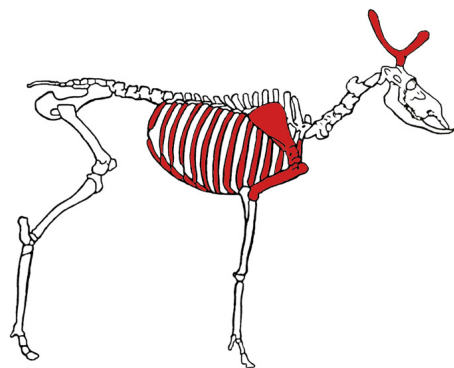


Fig. 3. Bone elements missing from the refuse heaps (red coloured) at Sumtangen site at Hardangervidda during early medieval (from Hufthammer et al., 2011)

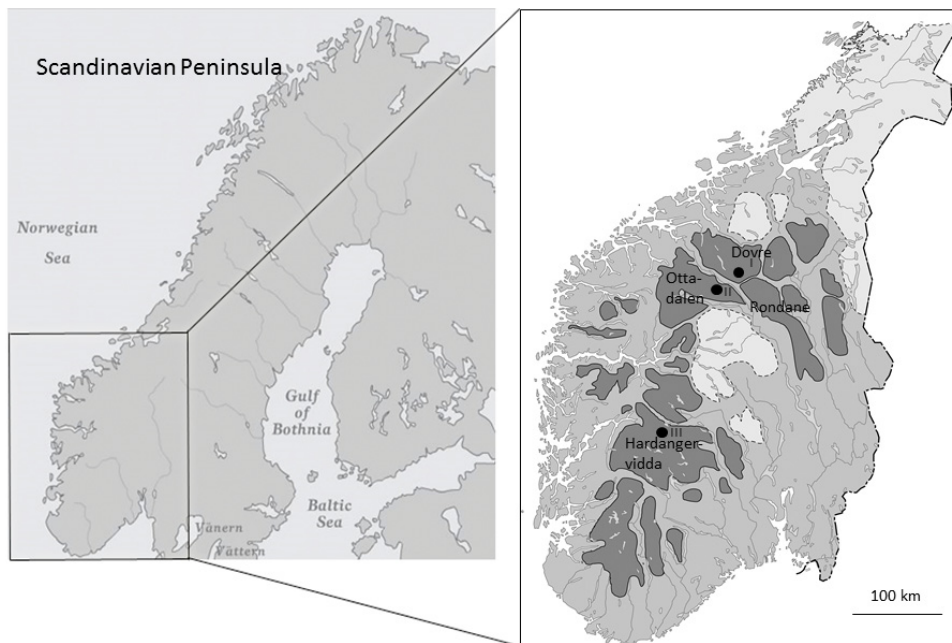


Fig. 4. Location of sampling sites of archaeological reindeer material from mountain areas in South-Central Norway (I = Vesle Hjerkin in Dovre, II = Slådalen in Ottadalen and III = Sumtangen at Hardangervidda) together with areas with extant wild reindeer (dark shaded) and domestic reindeer (light shaded)

Hufthammer, 2011; Hufthammer et al., 2011). Where, in particular, the antler from different parts of the mountainous areas of Norway ended up is addressed in this pilot project.

Genetic variation is brought about by mutation, which is a permanent change in the DNA providing individuals and populations with distinct characteristics. These characteristics make it possible to assign individuals or remains of individuals back to its original provenance. The recent development of analyzing endogenous DNA from archaeological findings opens for tracing back reindeer antler from medieval comb production sites to its original provenance. However, this presupposes both presence of endogenous DNA in the actual archaeological reindeer material and genetic distinctness of the different alternative provenances.

Presently, the wild reindeer in Norway exist and are managed in 23 more or less separate sub-populations (Jordhøy, Strand, Gaare, Skogland, & Holmstrøm, 1996) and the extant

genetic variation among several of these are characterized by being highly structured with particular genetic distinctiveness (Røed, Mossing, Nieminen, & Rydberg, 1987; Røed et al., 2008; Reimers, Røed, & Colman, 2012). The main genetic structure appears to be a trisection with the wild herds in the mountain areas of Rondane/Dovre in central Norway (Fig. 4) on the one hand, the wild herds at Hardangervidda mountain region on the other and those with a more pure domestic reindeer ancestry on the third hand (Fig. 5).

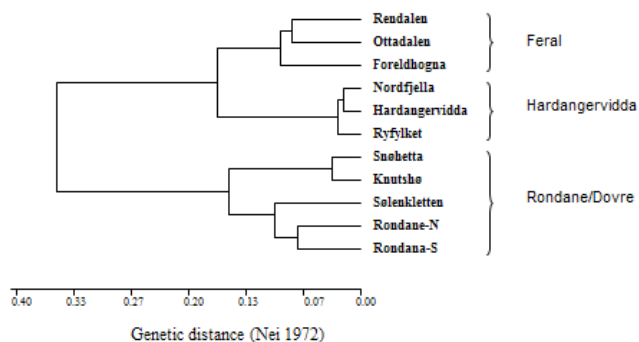


Fig. 5. Genetic distance between reindeer populations in South Norway based on analyses of twelve microsatellite loci

Table 1. Frequency of mtDNA haplotype clusters (I-IV) in extant and early medieval wild Hardangervidda reindeer and in extant domestic herds. N = number of samples analysed (from Røed et al., 2011)

Herds		N	Haplotype cluster				
			I	Ib	II	III	IV
Wild	Ancient	51	0.863	0.000	0.000	0.137	0.000
	Extant	68	0.279	0.265	0.441	0.000	0.015
Domestic	Extant	42	0.024	0.262	0.714	0.000	0.000

The distinctiveness of this structure makes it possible to trace, with statistical significance, individual material back to at least one of these trisection units.

The genetic structure of today's wild reindeer may, however, not be representative of the genetic structure during the Middle Ages. Recent genetic characterization of the genetic variation of ancient Hardangervidda reindeer based on archaeological bone material dated to the Middle Ages suggests that the Hardangervidda population has gone through rather dramatic genetic deteriorations during the last millennium (Table 1). The domestic reindeer in Fennoscandia appears to be dominated by particular genetic lineages which are phylogenetically distinct from the ancestral native wild lineages (Røed et al. 2008; Røed, Flagstad, Bjørnstad, & Hufthammer, 2011; Bjørnstad, Flagstad, Hufthammer, & Røed, 2012) and the genetic change in the Hardangervidda reindeer population is probably due to considerable introgression of the domestic gene pool during the last two centuries when reindeer husbandry was practised in this mountain region (Røed et al. 2011). The genetic changes between the medieval and extant herds, as detected in the Hardangervidda case, pinpoint the importance of relatively accurate genetic characterizing of the different medieval reindeer source populations in southern and northern Norway.

Status and strategies

Presently, we are working on testing whether it is possible to trace raw material debris from comb production workshops in the medieval towns of Bergen, Trondheim, Oslo and Skien back to the reindeer source population. As genetic marker we are using the nucleotide sequence variation in the control region of the mitochondrial DNA. This is a particular appropriate marker due to its relatively high presence in general, including in bone and teeth material, which opens for using archaeological material, and also due to the relatively high mutation rate in this DNA segment, which may be displayed as genetic distinctiveness of populations as seen in reindeer (Flagstad & Røed 2003; Røed et al., 2008, 2011).

The genetic characterizing of the medieval Hardangervidda reindeer (Røed et al., 2011) is based on the Sumtangen material where radiocarbon dating revealed that these were from a relatively short time span during the last half of the 13th century (Indrelid & Hufthammer, 2011). We are also working on similar genetic analyses of the ancient reindeer herds in Rondane/Dovre and Ottadalen mountain areas (Fig. 4, Røed et al., 2014). Both areas are characterized by extensive remains of previous reindeer trapping systems suggesting previously large wild reindeer populations (Jordhøy et al., 2011). As representative for these we prioritize reindeer remains obtained from the Vesle Hjerkin site in Dovre and the Slådalen site in Ottadalen (Fig. 4) which both are dated to the early medieval period (Weber, Molaug, & von der Fehr, 2007; Jordhøy, et al., 2005) and may possibly represent the source populations for the raw material at the sampled workshops in the towns. In the Middle Ages, Bergen, Trondheim, Oslo and Skien were important urban centres in Norway. Today medieval culture layers in these towns display favourable preservation conditions for organic materials. Extensive archaeological

excavations have documented both combs made of reindeer antlers and antler debris from comb production workshops (Flodin 1989; Myrvoll 1992; Hansen 2005; Wikstrøm 2006). Samples of antler debris from 12th and early 13th century workshops in Bergen, Trondheim, Oslo and Skien have been obtained and are in the process of DNA extraction. DNA profiles of the debris will be compared with the ancient profiles of the Hardangervidda, Ottadalen and Rondane/Dovre reindeer populations.

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