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Diet and mobility among Mesolithic hunter-gatherers in Motala (Sweden) - The isotope perspective

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ABSTRACT

Recent excavations at the sites of Strandvägen and Kanaljorden in Motala, Eastern Central Sweden, have unearthed complex and varied funerary remains from the Mesolithic. The two sites are situated on opposite banks of the river Motala Ström. While geographically close and roughly covering the same time span (c. 8000–7000 cal. BP), the funerary remains reveal differences and similarities in the treatment of the dead between the two localities. While at Strandvägen human bones were mostly found either scattered along the river bed or in inhumation graves, Kanaljorden contains wetland depositions of disarticulated skulls. We have conducted multi-isotope analyses of $\delta^{13}\text{C}$, $\delta^{15}\text{N}$, $\delta^{34}\text{S}$ and $^{87}\text{Sr}/^{86}\text{Sr}$ of human and animal remains with the aim of reconstructing the dietary patterns, geographic provenance and mobility of the interred. A series of faunal reference samples and, in the case of $^{87}\text{Sr}/^{86}\text{Sr}$, soil samples have been analysed in order to establish relevant isotopic baselines. The results show a protein intake dominated by aquatic resources, probably consisting of both freshwater and marine fish in varied proportions. The strontium isotope data indicate an interesting distinction between the individuals buried on either side of the river Motala Ström. Five out of six sampled individuals from Strandvägen have isotope ratios consistent with a local provenance, whereas ratios from seven out of eight Kanaljorden individuals indicate a non-local origin. The $\delta^{34}\text{S}$ analysis proved problematic as a majority of the samples appear to be affected by diagenesis. This is probably the result of contamination by exogenous sulphur from surrounding fluvial and lacustrine sediments, as has previously been reported from other waterlogged sites.

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1. Introduction

Archaeological excavations during the past two decades in Motala in the province of Östergötland, Eastern Central Sweden, have unveiled a series of diverse Mesolithic burial and ceremonial contexts from c. 8000–7000 cal. BP. The region around Motala has seen comparatively little archaeological research, and no regional Mesolithic traditions have yet been defined. The materials discussed in this paper were contemporary with the Lihult/Nøstvet Culture of South-West Sweden and South-East Norway (Andersson and Wigforss, 2004; Glørstad, 2010; Nordqvist, 2000) as well as the late Kongemose Culture of Southern Scandinavia (Johansson, 2000; Sørensen, 1993). The Motala assemblages have certain general traits in common with these traditions (e.g. microblade technology), but differ in other respects (e.g. an

absence of geometrical microliths). There are also both similarities and differences with the “quartz and pecked axe complex” found further NE in Central Sweden (Lindgren, 2004; Pettersson and Wikell, 2013; Åkerlund, 1996). In constituting both a border- and a transition-zone between different geographical environments and adjacent cultural traditions, the Mesolithic remains at Motala have been suggested to represent a mixture of cultural contacts (Carlsson et al., 2005).

The last few decades have seen a rise in archaeological fieldwork in Östergötland, and several Mesolithic settlements have now been excavated. All those that have yielded ^{14}C -dates contemporary to the funerary remains at Motala were located along lakes and watercourses in the interior (Browall, 1999; Carlsson, 2014; Larsson, 1998, 2003). Coastal sites are known from the preceding phase (Molin, 2005; Wikell et al., 2009), but are lacking from the period 8000–7000 cal. BP. It is believed that this is an apparent rather than real absence, and that many coastal localities dating to the 8th millennium BP remain to be discovered. It may be that the missing coastal sites are hidden under sediments

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deposited during the Early Litorina transgression (Knutsson et al., 1999), however, all too few excavations have been undertaken at relevant altitudes along the raised beaches of the Litorina Sea.

Whereas Mesolithic human remains are rarely found elsewhere in central Sweden, the local geological and hydrological (waterlogged) conditions in Motala are favourable for the preservation of organic remains. The presence of preserved human bones and teeth has opened up possibilities for a diversity of scientific and analytical approaches that can shed light on the life of the Mesolithic hunter-gatherers. Recent DNA investigations on some of the best preserved human remains recovered from Motala have yielded the first Mesolithic human genome data from the Scandinavian peninsula, and demonstrate that the Motala population have ancestry from both eastern and western European Mesolithic hunter-gatherers, which form a cline across Europe (Haak et al., 2015; Lazaridis et al., 2014). In this paper we present the results of stable and radiogenic isotope analyses of the Mesolithic human remains, as well as of associated fauna, soil and water samples, to investigate diet and mobility.

1.1. Setting

Motala is situated by the outlet of Lake Vättern into the river Motala Ström in Eastern Central Sweden. Vättern is the second largest lake in Sweden, and it has only one outlet connecting it to the Baltic Sea 70 km away. However, during the period around 8000 cal. BP the distance to the Baltic (at that time the Litorina Sea) was only c. 30 km (Carlsson, 2008, cf. Fig. 1). The excavations in Motala have unearthed several Mesolithic sites, two which are in focus here: Strandvägen and Kanaljorden (Fig. 2). These are situated on opposite sides of the river Motala Ström, c. 300 m downstream from Lake Vättern. The sites are contextually different, but interestingly contemporaneous with each other. The Strandvägen site was and is located on the south bank of

the river, and comprises settlement remains and primary burials as well as ceremonial deposits on the river bed (Carlsson, 2008; Gummesson and Molin, in press; Molin et al., 2014). The site Kanaljorden lies 100 m to the north of the river, on the edge and bottom of a small lake, which was not connected to Lake Vättern or the river at that time (Hallgren and Fornander, in press). Kanaljorden comprises ceremonial depositions on a stone-packing on the bottom of the small lake, with no coeval settlement remains.

1.2. Strandvägen

At Strandvägen a cemetery with 19 identified burials has been excavated. These include several different burial features, such as bone pits, a cremation pit and primary burials in supine, crouched and sitting positions. In addition, disarticulated human remains have been recovered from the water along the shoreline of the river. These had been intentionally deposited in the water along with more exclusive finds of ceremonial character, and in connection to constructed stone-packings on the river bed. The bones in the graves at the cemetery are poorly preserved, whereas the preservation of bones deposited in the water is somewhat better. Approximately 25 human bone finds (NISP: 108) recovered in the latter context represent at least three individuals (Gummesson and Molin, in press). Some of these bones exhibit fractures indicating that they were broken while the bones were still fresh (cf. Johnson, 1985; Outram, 2001; 2002) and others are burned, attesting to different taphonomic histories and different handling of the bones prior to deposition.

1.3. Kanaljorden

The assemblage of human bones from the stone-packing in the lake at Kanaljorden consists of 32 finds, most of which are single

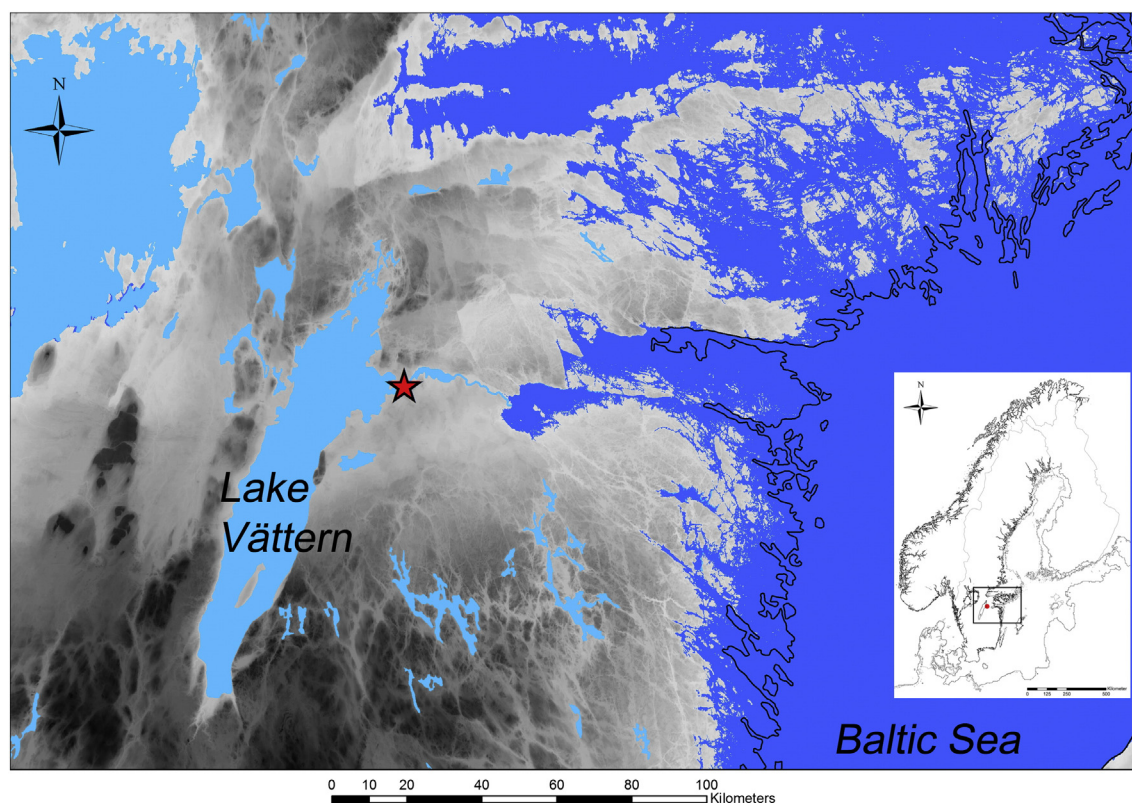


Fig. 1. Topographical map of the region surrounding Motala with a coastline 50 m above present sea level, approximating conditions at c.7800 cal. BP. Dark line: present coastline. Dark blue: the Baltic Sea. Light blue: freshwater lakes and rivers. Elevation is displayed in shades of grey, darker colour indicate higher elevation. The location of Motala is denoted by a red star. Map by Fredrik Hallgren, based on digital data from Lantmäteriet (license no. MS2012/02954). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

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