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From flint to quartz: Organization of lithic technology in relation to raw material availability during the pioneer process of Scandinavia

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ABSTRACT

Formal technologies and intensified reduction are often seen as responses to increased mobility and low abundance of lithic raw material of good flakeability and controllability. In this paper, we discuss an alternative explanation to this hypothesis using the change in tool raw material experienced by flint-using pioneers, as they had to go from a formal blade technology to a simple flake technology as they settled in Scandinavia. The region is dominated by quartz, and we use use-wear data as a means to evaluate the role of this type of raw material compared to the use profile of flint assemblages in the home territories of the pioneers. Although the technology changed through simplification and loss of formal production rules, due to the low workability of quartz, we conclude that changes in the foraging range into areas of different quality tool raw materials does not need formalization of the technology. The quartz in our sample was produced with a simple platform/bipolar technology and used for a wide variety of activities in every aspect comparable to the range of uses identified in the contemporaneous blade assemblages based on flint. Instead of formalization of the lithic technology to cope with different quality raw materials, it was diversified and simplified. The organisational dimensions and design criteria of the bone technology, whereby simple flakes were used as insets in slotted tools, did not have to change in this process.

1. Introduction

The pioneer settlement of northern Scandinavia in the early Holocene has been debated since the early days of archaeology (Bøe et al., 1936; Luho, 1956). The discussions, involving a number of scholars from Scandinavia (Bjerck, 1994; Nuñez, 1987b), have been mostly concerned with the origin and direction of the immigration, but questions pertaining to adaption have also been addressed (Rankama, 2003, p. 38). A main controversy has been the origin of the north Finnish population and their relation to the early migrants to the Norwegian coast. Norwegian scholars promote the idea that the migration route goes from the Norwegian coast into the unsettled areas of northernmost Finland. Finnish archaeologists, on the other hand, favour the idea that the origin lies in the south or southeast with more eastern predecessors. Both opinions reflecting cultural bias (Rankama, 2003, p. 39).

Recent research on this topic in Norway, Finland and Sweden has considerably changed the conditions for the interpretation of this long-debated, large-scale process (Jussila et al., 2010; Sørensen et al., 2013; Damlien, 2014; Tallavaara et al., 2014). This new research has introduced a number of new questions, one of which will be discussed in this paper: How did the migrating hunter–gatherers adapt their lithic technology to the raw materials encountered in the new landscape? We will in this paper focus on the change from a complex pressure blade technology based on flint to a simpler quartz industry among hunter–gatherers moving into areas with vein quartz typical for the Fennoscandian shield covering most of Finland and northern Sweden (Rankama and Kankaanpää, 2011; Jussila et al., 2012) (Fig. 1).

Based on a micro-wear analysis of quartz assemblages from 33 Mesolithic sites in eastern Central Sweden (Supplementary data) we will critically assess the idea that the use of a technology providing low carrying costs, raw material conservation and the decreased need for resupplying may not necessarily have been the

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Fig. 1. Raw material used for tools available in different parts of the North European continent. Carboniferous flint: from Upper Paleozoic layers; Cambrian/Ordovician/Silurian flint (P): from Lower Paleozoic layers; Cretaceous/Maastrichtian flint (C): from Mesozoic layers; Quartz: from Fennoscandian Shield (Precambrian); Igneous rocks: from The Scandinavian Igneous Belt (Precambrian Volcanic). The distribution is shown on a map showing the approximate coastline of Scandinavia at 9000 BP prepared by Geological Survey of Sweden (Johan Daniels). Arrows indicate the preboreal (yellow) and boreal (green) human migration routes into areas dominated by quartz.

optimal solution entering a landscape with unknown raw materials (c.f. Andrefsky, 2005).

2. Culture-historical background

To provide a background for our study it is important to contextualize it in relation to the general pioneer settlement history of Scandinavia. The archaeological evidence, mainly lithic assemblages, speaks in favour of a western and an eastern route into Scandinavia in the early Holocene. West of the remaining ice cap along the Scandinavian rugged coastline, it is related to the continental Ahrensburgian Late Palaeolithic, or the early Maglemosian lithic tradition. These groups used a direct percussion blade production technology mainly based on local ice-transported beach flint sources from the south of Scandinavia to produce their edged tools (Bjerck, 2009; Glørstad, 2013; Damlien, 2014; Eigeland, 2015). Further north, as far as to the Varanger fiord area in northeastern Norway, blade technology is in continuous use but adapted to local quartzites and cherts (Sandmo, 1986; Johansen, 1990).

On the east side of the remaining ice cap in eastern Finland, we find sites with evidence of a lithic pressure blade technology related to imported Cretaceous flint from southern Lithuania or Belarus, Carboniferous flint from north-western Russia (Zhilin, 2003, 2005), and even Palaeozoic flint from Estonia (Takala, 2004, p. 127–128; Jussila et al., 2006, p. 56–58; Kriiska and Lõugas, 2009, p. 171). This material is identical to and originates from the Late Palaeolithic/Early Mesolithic cultural complex southeast of Lake Onega and in the upper Volga basin (Oshibkina, 1997, 1999; Zhilin, 2003) (Fig. 1).

The Late Palaeolithic and Early Mesolithic sites in western Russia with pressure blade technology represent the westernmost extension of this technology assumed to have its origin in easternmost Siberia, China or Mongolia some 20 000 years ago (Desrosier, 2012; Inizan, 2012; Pitulko and Nikolskiy, 2012). It is related to an inset technology (Inizan, 2012, p. 24) developed as a response to changing from mammoth hunting to smaller prey such as reindeer at the Last Glacial Maximum (LGM), whereby small blades or bladelets are glued into a slot in the edges of a bone tool. Excavations throughout Siberia (Pitulko and Nikolskiy, 2012), show