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Korta meddelanden

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Introduction

In *Fornvännen* 2003:1 I argued (in Danish) that the neolithisation of south Scandinavia took place through immigration. In the following, the effects of climate on this process are discussed. An explanation is suggested for the rapid expansion of the TRB from Holstein across south Scandinavia to the Lake Mälaren area and the Fjord of Oslo. Other issues, including radiocarbon calibration problems and the Continental background, are also discussed.

Climate

Post-glacial warming since c. 13,000 cal BC has not proceeded linearly. Temperature fluctuated until c. 9,000 cal BC. Thereafter mean July temperatures rose from c. 14°C to c. 19°C in the late 5th millennium cal BC. This was 2–3° warmer than the mean temperature in Denmark during the past 40 years. Then, however, climate changed again. July temperatures fell slightly, and at the same time climate became more continental with colder winters (cf. Berglund 1991, p. 69).

The melting of the inland ice and the subsequent rise of the land led to dramatic changes in the contact of the Baltic Sea with the Atlantic. This affected salinity. The Baltic was a fresh water lake (the Ancylus Lake) from c. 8,400–6,500 cal BC. Its drainage point into Kattegat varied. Then the modern straits of the Belts and Øresund formed, permitting the entry of salt water into the Baltic basin. About 4,000 cal BC, salinity was once again reduced in Kattegat and the Baltic due to rising land and lessening tidal effects. Together with the colder winters, this must have meant that straits and sea often froze over. Such was the case, for instance, in AD 1657–1658, which permitted King Carolus X of Sweden to invade Denmark on horseback. This happened during the "little ice age" from c. AD 1550–1700, a period with a mean temperature only 0.5° lower than current temperatures (Aaris-Sørensen 1998, p. 202).

Comparison of Bornholm and Gotland

Bornholm and Gotland are islands in the Baltic located 40 and 80 km respectively from the Swedish mainland. Archaeology's views of them are both similar and different. Bornholm appears to have become depopulated in the Early Mesolithic, probably because of isolation. The island's inhabitants may have been too few to make the necessary change to fishing and sea mammal hunting and survive. Big game populations had declined (Aaris-Sørensen 1998, p. 127–128; Vang Petersen 2001). The repopulation of Bornholm c. 4,400–4,300 cal BC must have taken place from Scania across the ice during cold winters. The isolation from Scania during the following centuries would be due to the warm spell in the late Atlantic chronozone. The fact that TRB appeared almost simultaneously in Scania and on Bornholm must mean that winters had become colder again, forming ice bridges. Such bridges were a requisite for the close contacts during the Neolithic, when large amounts of flint were imported to Bornholm. Finds of TRB pottery from the bottom of the Baltic (some of them quite far from the direct route between Scania and Bornholm) indicate that there was also maritime traffic during the Neolithic. This may have to do with occasional mild winters – one does not exclude the other.

Gotland was populated c. 7,500 cal BC, at a time when northern Sweden was still under the ice sheet. The waters around the island must have been frozen for part of the year, permitting seal hunters and fishers to immigrate across the ice. Their economy persisted on Gotland, where there were no mammals larger than the hare and fox (Lindqvist & Possnert 1999). It appears unlikely that boats such as those depicted in Stone Age rock carvings in the circumpolar parts of Norway, Sweden and Russia could have been used when Gotland was populated. Many of the rock carvings (as suggested by Lindqvist 1994, p. 218) depict boats

similar to Inuit umiak, consisting of seal skins stretched over a wooden framework. They could be used safely in coastal archipelagos but not on the open sea. The settlement of islands off the coast of northern Norway c. 8,500 cal BC (Hesjedal et al. 1996) also presupposes boats. Skin boats are so far unknown from more southerly Scandinavian waters.

After the re-salinisation of the Baltic Sea and the climatic improvement in the Atlantic, Gotland probably became isolated due to an absence of ice bridges. No finds are known for a millennium after 5,300 cal BC. Then – roughly contemporaneously with the repopulation of Bornholm – finds suggest the immigration of a Late Mesolithic population from the mainland. Colder winters after 4,000 cal BC probably recreated the ice bridges. TRB finds from Gotland have been dated as early as 3,800 cal BC. Travel by boat in summertime to Öland or the Swedish mainland appears unlikely in these centuries. The distance seems too great to be crossed in a skin boat or dugout canoe.

The development on Bornholm in the Late Mesolithic and Early Neolithic can only be explained if the island's contacts with the mainland were determined by the existence of ice bridges. The same conclusion can be drawn for Gotland, unless, as seems unlikely, there were seaworthy boats for voyages in summertime in this period.

The spread of the Neolithic across Scandinavia

Ice bridges must have been a requisite for the rapid spread of TRB culture from Holstein across Lolland to Zealand, from Jutland to the Danish Isles and onward to Scania. The spread to the Lake Mälaren area and along the west coast of Sweden to the Fiord of Oslo probably took place along ice-bound coasts. Frozen straits and seas solved the problem of transportation for people, livestock and seed grain. Immigrants along either coast of Sweden settled in areas with good conditions for agriculture, mainly in the lower reaches of river valleys (cf. Malmer 2002).

Many scholars have suggested that there were boats more seaworthy than dugouts in Late Mesolithic south Scandinavia. This would be a requisite for the hypothesised close contacts

with agricultural societies in northern Germany. I have argued against this idea in *Fornvännen* 2003:1, i.a. on the basis of archaeological finds. There was no ice bridge to the south in the late Atlantic chronozone.

What was the scale of the immigration?

In recent years a number of archaeologists have conceded that a certain amount of immigration into Scandinavia may have taken place in the Early Neolithic. They have, however, insisted that this happened only on a small scale (Price 2000, p. 293; Fischer 2002, p. 381; Malmer 2002, p. 178).

This discussion is difficult without a shared definition of how large a small scale is. For neolithisation to reach such a large area so rapidly, it would have taken a sizeable migrant population, possibly larger than the native Mesolithic one. Extensive swidden agriculture laid claim to large areas. Even if there was population expansion within this area it can hardly explain the rapid expansion. Immigration probably went on for quite some time, possibly more than a century. Late comers had to travel farther before they could settle.

How long did the spread of agriculture take from Holstein to Lake Mälaren?

Many radiocarbon dates for Early Neolithic finds and contexts calibrate to 3,950 or 3,960 cal BC. This applies to Jutland, Zealand, Scania, the Lake Mälaren area and Norway (cf. Price 2000, p. 271, 284, 287; Fischer 2002, p. 346, 358). The explanation should probably be sought in the widespread use of the CALIB computer program from Seattle. CALIB often points out a single year as the calibrated date even when the probability distribution behind it is skewed. This also happens in cases where wiggles in the calibration curve produce (typically) three equally valid calibrated dates for one date BP. Many have thus received the impression that neolithisation hit the southern third of Scandinavia explosively (cf. Pettersson 1999). This cannot be true. On the basis of calibrated radiocarbon dates, Fischer (2002, p. 355–356) has concluded that the year 3,950 cal BC marks both the abrupt end of the EBK and the instant onslaught of the TRB. This view appears weakly founded.

If there were a wide consensus that the spread

of a certain culture or economy took place from a certain direction – in this case, from the south (cf. Malmer 2002, p. 176) – then we might choose among the probability maxima along a wiggle in an OxCal graph, taking the geographic location of the site under study into consideration.

CALIB gives the shortest contiguous time period during which the probability is 68% or 95% that a sample's true date should fall. OxCal displays a probability distribution where the interval of confidence is often divided into several separate periods with the same marginal probability. Wiggles are easily identified when one uses OxCal. This is important, as wiggles on the calibration curve within the margin of uncertainty for a radiocarbon measurement is the rule, not the exception.

Accepting the above, it appears that it took TRB c. 200 years to travel from Holstein to the Lake Mälaren area and the Fiord of Oslo.

The Continental background

It is commonly accepted that agriculture reached Europe in Greece from Anatolia c. 7,000 cal BC. 1,500 years later it reached the Iberian Peninsula across the Mediterranean Sea and present-day Hungary across the Balkans (Price 2000). Here the Linear Pottery Culture (LBK) appeared, and during 200 years spread across the great plains of loess soil in Central Europe, northern Germany, the Ukraine, the Netherlands and Belgium. The majority opinion among scholars seems to be that this expansion could only have been possible through migration. Other areas appear never to have been populated before the arrival of Neolithic populations. Many believe that the spread of LBK was a result of the Mesolithic populations' acceptance of the new culture, perhaps after a period of reciprocal acculturation.

After 5,200 cal BC the northern limit of neolithisation in northern Germany was largely stable for more than a millennium. Mesolithic population density was relatively high here as well as in south Scandinavia, based on a solid fisher-hunter economy. The eventual northward expansion

from Holstein took place with a speed and across an area that can only be compared to the expansion of the LBK.

Where did the migrants come from during these two episodes? The only possible explanation seems to be that the population expansion that followed upon neolithisation first used up nearby marginal soils. More intensive agriculture could also put food on the table for a time. Eventually, however, emigration began to look more and more appealing.

Translated from Danish by Martin Rundkvist.

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