



The vitrified wall of Broborg hillfort in Uppland, Sweden – A comment on Sjöblom et al. (2022)

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ABSTRACT

Recently, Sjöblom et al. assessed the cause of the vitrified wall of Broborg, the 5th century CE hillfort in East Middle Sweden. By exploring possible incentives and competence to melt stones together, as well as the genesis of the vitrified material, the authors suggested that the builders of Broborg used vitrification as a construction method to strengthen the wall. In this comment, I critically examine the line of arguments presented in support of this claim. The conclusion reached is that there is no convincing evidence to warrant a construction hypothesis.

1. Introduction

In volume 43 of the present journal, Sjöblom et al. (2022) seek to reignite the idea that vitrification was included as a construction technique of the inner enclosure wall of Broborg, the 5th century CE stronghold in Uppland, East Middle Sweden (for excavation reports, see Löfstrand 1982; Fagerlund 2009; Englund 2018). Their paper is an effort to contextualise the results of petrographic analyses of the vitrified material, carried out by several of the authors and published widely over the past few years, in a cultural-historical context. In this comment, I argue that there are concerns with the presented construction hypothesis relating to the evidence from the topographic setting of Broborg and from the military architectural traditions of 5th century CE Eastern Sweden.

2. Broborg revisited

Over the years, the string of “boxlike” c. 2x1 meter of fused masses of stone in the core of Broborg’s inner enclosure wall have gained reputation of being something of an enigma. The hypothesis that this vitrification was an intentional attempt by the builders to strengthen the wall is not new. Ivar Schnell (1934, p. 30–32) suggested that massive bonfires had been arranged on top of the wall to which additional stones were added to melt and solidify the crest. Schnell’s suggestion made no impact on the archaeological community of his time. Through the works of geologist Peter Kresten, the idea was revitalised in the 1980s and early 1990s. In his scenario, a dry-stone foundation was constructed on top of

which a “...layer consisting of about equal parts of amphibolite (a type of rock needed for vitrification, my comment) and gneissic granite, with beds of charcoal (...) was ignited. Forced draught was applied by bellows from the outside of the rampart, with the soil-covered inner face and top providing the necessary confined space, similar to a metallurgical furnace” (Kresten et al. 1993, p. 23; see also Kresten & Kero 1992, p. 40–41). This suggestion has not been widely accepted in Swedish archaeological research. Sjöblom et al. do not offer any further suggestion of their own as to how the vitrification would have been accomplished in practice in a constructional process, but indicate that they find parts of the Kresten scenario plausible.

The idea that prehistoric builders intentionally heated stones in walls to strengthen the construction has been examined on military architecture from the 5th to the 7th century CE in other regions of Sweden. Johan Engström (1984) discarded the idea in his important work on Torsburgen (Gotland). So did David Damell and Lorin (2010) in their synthesis of 30 years of studies of the forts and strongholds of Södermanland and Närke. Michael Olausson, the central figure of Swedish fort studies for 40 years, was highly sceptical to the construction hypothesis overall (Olausson, personal communication 2017 and 2018). Sjöblom et al. pass over these perspectives in silence by emphasising that their study concerns Broborg and Broborg alone since “hillforts are different”. Of course, it is sensible not to include sites of other periods or cultures in this discussion. However, to explore Broborg as an alien entity isolated from the traditions and trajectories of 5th century East Middle Sweden is a luxury not afforded to archaeology today. As we shall see below, Broborg was part of a fortification tradition

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with a specific architectural design centred on, for this region, advanced dry-stone masonry techniques. In other words, Broborg as a stronghold, was not unique.

3. Three queries

To put it bluntly, analyses of the vitrified material alone cannot conclude whether it was intentionally produced or an unintentional by-product of a heavily burnt wall. Sjöblom et al. recognise this by developing a conceptual approach focused on the questions of a) incentive; b) competence; and c) the character of the burnt wall itself. For the hypothesis that vitrification was in fact a constructional method to be justifiable, the authors say, these three issues need to be satisfactorily explained.

3.1. Why vitrify?

Their first question – what the incentive was to construct Broborg by means of vitrification – is explored through the geographical and political landscape. According to the authors, a stronghold was needed at this place to control a major waterway (called *Långhundraleden*) and defend an important border. However, none of these premises is correct. The notion that *Långhundraleden* was a maritime highway linking the heartland of Uppland with the Baltic Sea in the east as late as 500 CE is a modern myth. Due to the land-rise (i.e. the isostatic recovery), an unbroken waterway ceased to exist by c. 250 BCE (Edberg 2007, p 84-85; Risberg & Alm 2011). As for the area being a borderland, the authors seem to assume that the districts (*folkland*) of medieval Uppland had been established already by the 5th century. That would be 500–700 years earlier than what is commonly believed as the first reference to this administrative organisation dates to 1103 CE (Lovén 2020). This claim would need much fuller justification to be accepted. Therefore, their suggestion that the use of an exceptional vitrification technique was because of Broborg's unique position cannot be sustained.

The practical reason vitrification was deployed as a building method at this particular site, it is argued, was supposedly because the stones available were rounded and not suitable for constructing dry-stone walls. This is a misunderstanding of how this type of defensive wall was built. Within the fortification tradition of 5th century mainland Sweden, there were three types of dry-stone masonry walls (two with timber-lacing), all related to the same idea of carefully laid faces with a rubble core of irregular and rounded stones of different sizes, sometimes including gravel (Fig. 1). All types could be used at the same site depending on the local topography: the principle was for the outer wall face to reach 2–3 m in height. Broborg's inner enclosure wall was constructed as a semi-terrace wall as the outer wall face was set in the slope and the wall normally reached only c. 0.5–1.0 m above the inner ground

surface (Fig. 2). A layer of soil/turf seem to have been laid on top of the wall and over the inner wall face, probably to facilitate movement onto its crest. Excavations on other forts and strongholds have produced evidence that terrace walls and semi-terrace walls were reinforced internally by transversal and longitudinal timbers, to ease the pressure of the rubble core against the outer wall face (e.g. Hemmendorff 1985; Olausson 1995, p. 133-134; Petré, 1997). The slightly rounded stones Sjöblom et al. mention were used for the rubble fill and the larger naturally angular stones, some of which are still *in situ*, were used in the wall face. Hence, there was no site-specific need to melt stones together to construct the walls of Broborg.

3.2. Who vitrified?

The authors' second question – if the competence to vitrify defensive walls existed in Migration Period Uppland – is crucial. As mentioned, Broborg was not alone of its kind, not even in central/southern Uppland. In this region, excavated strongholds and forts of the same type and date include Darsgårde, Sjöhagsberget, Trollberget, Runsa borg, Sjöbergsborgen etc. The defences of these sites all include timber-laced walls (a and/or b in Fig. 1), sometimes combined with freestanding drystone wall-and-fill ramparts (c in Fig. 1). Not one of these show any sign of constructional vitrification (e.g. Ambrosiani 1958; Olausson 1995, 1997). Not even if we expand our view to include Sweden as a whole was there any architectural tradition that included vitrification – military or civilian. The authors should consider this. Instead, they argue that competence in large-scale constructional vitrification, which, if it existed, would be an extremely rare skill, is indicated by knowledge of widespread crafts such as iron production, forging, casting and tar production. The relevance of this analogy escapes me.

3.3. What indicates constructional vitrification?

The main argument of their final question – the genesis of the vitrified material – rests on the assumption that amphibolite, a prerequisite for the vitrification, was deliberately selected, added to the wall and melted *in situ* in a construction process. Importantly, amphibolite occurs naturally on the hilltop Broborg was built on (Englund 2018 with reference therein). It would have been odd if this type of stone was *not* included in the wall. As for the premise that the wall contained larger proportion of amphibolite than would have been expected if material was gathered randomly, indicating a conscious selection, this is based on a quantitative ocular assessment of the frequency of stones in the wall and in the surrounding area (published in Kresten & Kero 1992; Kresten et al. 1993). However, much of the inner enclosure wall has collapsed and fallen downslope, thereby making any assessment of the stone types underneath the top layer problematic. In addition, large parts of the

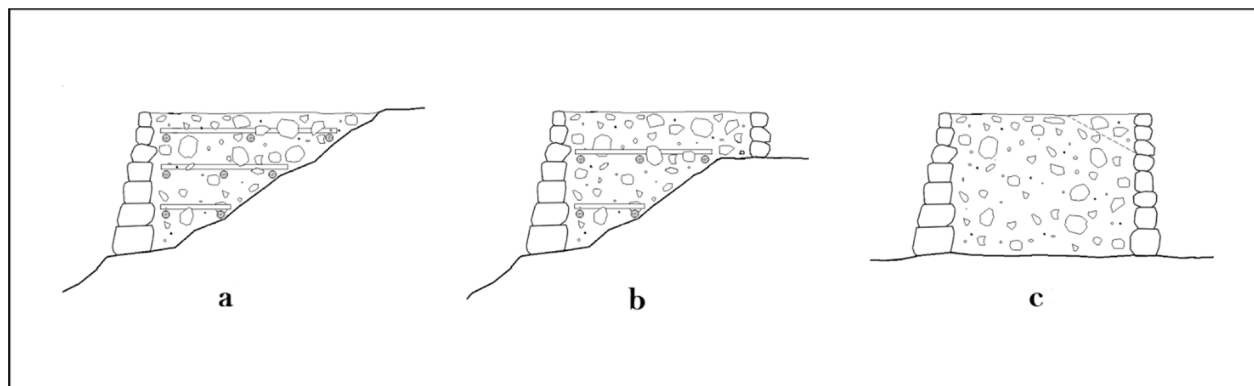


Fig. 1. Schematic cross sections of the walls of 5th century CE strongholds of mainland Sweden: a) terrace wall; b) semi-terrace wall; and c) freestanding drystone wall-and-fill rampart (sw. *skalmur*). The wooden parapet is not included in these drawings. Broborg's inner enclosure wall was constructed as (b). Drawing by Anders Bornfalk Back.



Fig. 2. Partly preserved outer face in the western part of Broborg's inner enclosure wall. The scale bar (1 m) stands on the ground surface of the slope: note the difference in elevation with the level summit of the hill behind the wall. Photo by Anders Bornfalk Back (May 2022).

upstanding wall are covered by turf making non-destructive survey impossible. If the wall was enriched with amphibolite, it is yet to be verified.

The stratigraphic observation that a thin cultural layer seem to cover some of the residues of the vitrified material, which the authors view as evidence that the vitrification took place in an early construction phase, is inconclusive. Many of the 5th century strongholds were reused during later periods – Broborg is not an exception. A glass bead found at the site and typologically dated to the 8th century indicates later occupation (Fagerlund 2009, p. 19–21). This may be supported by the result of two thermoluminescence analyses of fire scarred stones (gneissic granite) sampled from the area by the burnt wall, both dated to $AD\ 740 \pm 100$ (Mejdahl, 1993, p. 362–363; Kresten & Kero 1992, p. 32; for reservations on the TL-dates see Kresten et al. 2003).

4. Conclusion

The explanations of the three queries presented by Sjöblom et al. fail to convince. In accordance with the authors' own reasoning, this should undermine the hypothesis that vitrification was used as a construction method at Broborg. Instead, possible causes for the wall to burn could for example be sought in conflict or in ceremonial practices prior to abandonment, some of these perspectives have been explored in relation to burnt forts from various periods in the British Isles (e.g. Toolis & Bowles 2016; O'Brien & O'Driscoll 2017). While this is not the place for a comprehensive discussion of this field of research, a likely interpretation in keeping with the available data is as follows: Broborg, like numerous of the contemporary strongholds in this region mentioned above, was set fire to in a deliberate and hostile act. Amphibolites, naturally present amongst the stones used in construction, melted as the

internal wooden framework was consumed in the fire. The “boxlike” structures associated with the vitrified material are the negative imprints of this wooden framework (an explanation indicated already by Ralston 2006, p. 157). The soil/turf on top of the wall crest and over the inner wall face formed the confined environment needed for high enough temperatures to be reached for the stones to melt. The burning was probably conducted systematically in a highly determined and time-consuming effort that took place after the stronghold had already been taken, rather than an accidental or tactical consequence of battle (cf. Armit 1997, p. 59; Harding 2012, p. 189). Such total destruction was both strategic and a symbolic act of power, reflecting the *modus operandi* of 5th to 7th century conflict in East Sweden.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

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