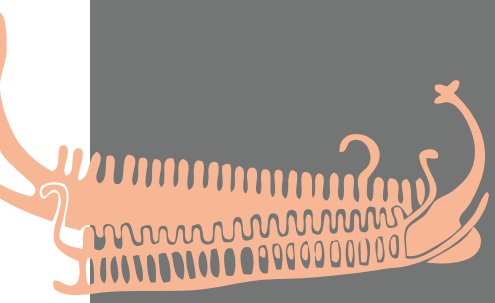
CURRENT SWEDISH ARCHAEOLOGY



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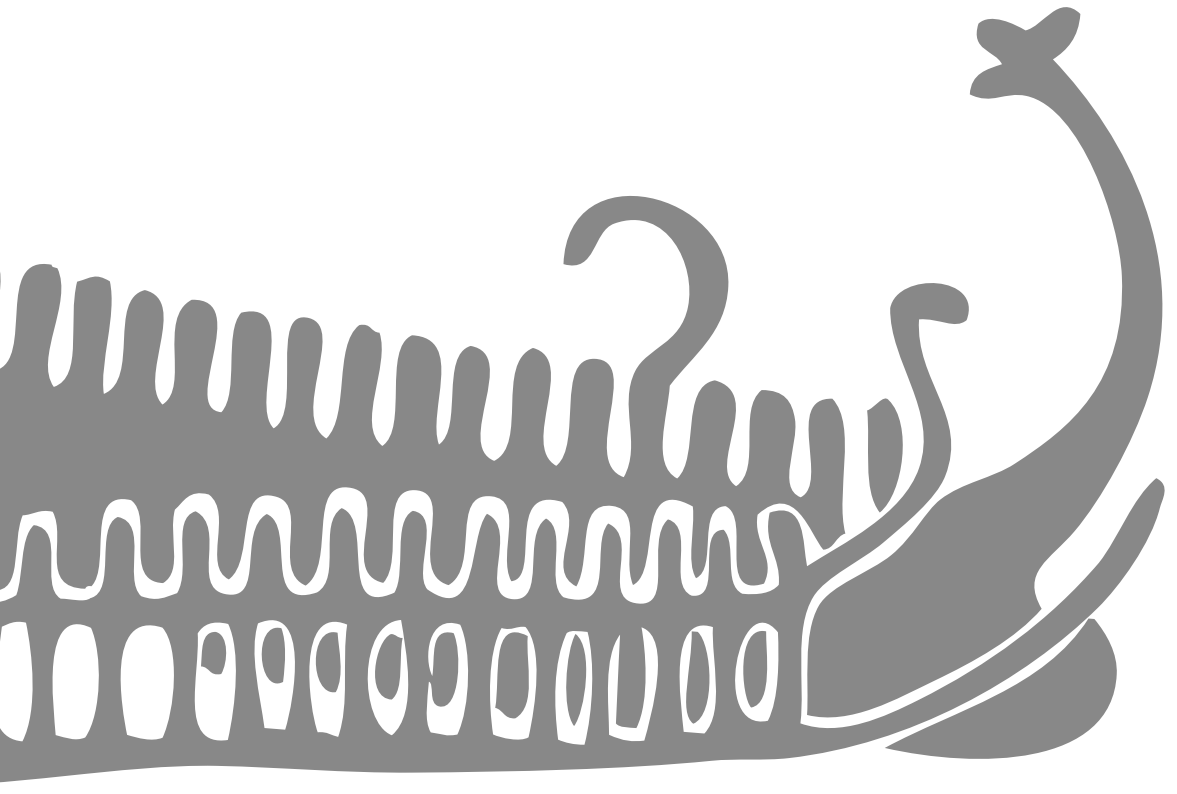

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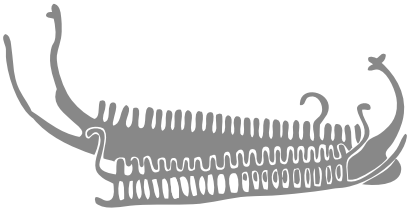

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The Swedish Archaeological Society

Vol. 32 2024

Editors:
Ing-Marie Back Danielsson
& Elisabeth Niklasson

The Swedish Archaeological Society

In 1947 the first meeting to establish the Swedish Archaeological Society was held at the Museum of National Antiquities in Stockholm. The Society is the common body for professional archaeologists in Sweden, regardless of specialism. According to the statutes the purpose of the Society is to further Swedish archaeological research and to support this research by granting scholarships. The Society is especially tasked with attending to the vocational interests of archaeologists. This task is to be carried out by taking part in public debate, by influencing public opinion, and by being a body to which proposed measures are submitted for consideration. The Society also arranges discussions and seminars on archaeological topics. The Society's board currently has sixteen members from universities, museums and archaeological institutions in various parts of Sweden. Mikael Eboskog from Bohusläns Museum is the present chair.

In 1993 the Society began issuing its annual journal *Current Swedish Archaeology*. Since then the journal has presented articles mirroring current archaeological research and theoretical trends.

Contents

REVIEWS & NOTICES

Editorial

We are delighted to invite you to explore issue 32 of *Current Swedish Archaeology*. It features seven original research articles, six book reviews, and three notices. This edition highlights the breadth of archaeological research in Sweden, its main geographical focus. It also discusses archaeological phenomena in other areas, such as Norway, North-Eastern Europe and even the Circumpolar North. All contributions demonstrate the richness and possibilities of different methodological and theoretical underpinnings, and how they bring out new knowledge. At the surface, these studies deal with everything from graves and burial practices, to animal migration and figurines. At their core, they challenge taken-for-granted ideas about environmental, human, and multispecies conditions and relations, while exploring new pathways to understand lived experiences in a constantly evolving world.

In the first part, Lars Gustavsen provides a reassessment of the visual symbolism of Iron Age burial mounds through a detailed study of Halvdanshaugen in Norway. By incorporating vegetation as a visual barrier in his viewshed analyses, Gustavsen challenges generalisations about mounds as eye catching, landscape-wide symbols. Instead a more nuanced, context-specific understanding is proposed, highlighting diversity in mound construction and use and its link to sensory and spatial relationships in the mounds immediate surrounding terrain. The article 'Moose Trappers' by Lars Göran Spång, Wiebke Neumann, David Loeffler, and Göran Ericsson also starts from landscapes as an active agent in shaping relationships, in this case between animal migration patterns and human foraging strategies. Through Agent-Based Modeling they revisit assumptions about Neolithic hunter-gatherer lifeways in northern Sweden, examining how moose, wolves, and human hunters coexisted in delicate ecological balance. Their findings challenge earlier migration models and highlight the complex interdependencies that shaped territoriality and hunter-gatherer resource use. In 'Groundbreakers', Alison Klevnäs, Cecilia Ljung, Astrid

A. Noterman, and Emma Brownlee integrate osteological evidence with radiocarbon dating to better understand mortuary practices on Gotland during the late Viking Age and early medieval period. The results show a prolonged use of both early churchyards and traditional burial sites, along with the reuse of ancient graves. This challenges simplistic divisions between pagan and Christian traditions, showing innovation and adaptation rather than a clear rupture between religious systems. Completing the first part of the issue, Fredrik Fahlander likewise investigates burial practices, but here focus is set on the ritual roles of animals in Late Iron Age cremation assemblages at North Spånga, Sweden. He challenges binary classifications of animals remains in graves, such as friends versus food, focusing instead on their placement and fragmentation. Based on this he suggests that animals made generative contributions to funerary practices, playing protective and transformative roles.

The next part of this issue is a special section. It has its own editorial, but in short, it examines figurines through ontological, new animist, and new materialist lenses, shifting away from traditional representational interpretations. Erik Solfeldt and Anna Naglaya's paper highlights the animistic role of Siberian figurines, viewing them as animated beings within ecological and spiritual relations. Tobias Lindström's study on Neolithic anthropomorphic figurines suggests they were "interactable" beings that influenced human actions. Helen Chittock and Andrew Meirion Jones challenge the decoding of non-representational imagery, proposing it reflects affective potentials rather than fixed meanings. These contributions underscore a shift in figurine research towards a material, relational, and ontological focus, advancing archaeological theory and connecting to broader fields like anthropology, ethnology, and art history.

Together, these articles push the boundaries of archaeological inquiry, opening new avenues to understand the dynamics of human, object, landscape and multispecies interactions. They highlight the rich diversity of archaeological research in Scandinavia and beyond, emphasizing the dynamic interplay of cultural, environmental, and ritual practices over time.

This issue's book and dissertation reviews similarly demonstrate the incredible breadth of contemporary archaeological scholarship in Sweden, showcasing innovative methodologies and interdisciplinary approaches to long-standing archaeological questions. László Bartosiewicz lauds Stella Macheridis' *Animal Husbandry in Iron Age Scania* for setting a high standard in zooarchaeological research, shedding light on animal-human dynamics during times of environmental and social change. Sophie Bergerbrant reviews *In the Darkest of Days*, edited by Matthew J. Walsh, Sean O'Neill, and Lasse Sørensen. The anthology offers diverse perspectives on human sacrifice in the prehistory of southern Scandinavia from the Mes-

olithic to the Viking Age, with a strong focus on the Iron Age. Charlotte Damm discusses Aija Macāne's dissertation, *Stone Age Companions*, which explores diverse human-animal relationships in hunter-gatherer burials across northeastern Europe from the eighth to the third millennium BCE. Daniel Löwenborg reviews Paola Derudas' dissertation on innovative digital methodologies, showcasing how integrating 3D models with excavation documentation fosters multivocal interpretations and reuse of archaeological data. Christina Rosén reflects on Anton Larsson's *Landslide Archaeology*, which examines the dual impacts of landslides on archaeological heritage, offering valuable insights for cultural heritage work. Lastly, Marianne Skandfer reviews Carina Bennerhag's *Steel Making Hunter-Gatherers in Ancient Arctic Europe*, an innovative study of early metal production in the Arctic, emphasizing the value of meticulous documentation and interdisciplinary collaboration.

As always, do not miss our notices at the end of the issue. Read about how Susanna Carlsten's report can help Swedish museums prioritize collections for evacuation during disasters, and Ashley Green and Christian Horn's announcement on the launch of a new and improved website for Svenskt HällristningsForskningsArkiv, and Neil Price, Charlotte Hedenstierna-Jonson, and John Ljungkvist introduction of The World in the Viking Age, a new Centre of Excellence at Uppsala University.

Lastly, a note on the development of *Current Swedish Archaeology*: we are excited to introduce Online First publishing. Once an article is peer-reviewed, language revised, and typeset, it becomes immediately available online, often months before the print edition. These articles, complete with unique Digital Object Identifiers (DOIs) for easy citation, can be found on our webpage. This ensures faster access to important discoveries and aligns with our Open Access (OA) principle, making archaeological research easily accessible to academic, professional, and public communities. Since CSA's founding in 1993, OA has been a core value, offering free access to research long before it became mainstream. In light of the rise of Article Processing Charges (APCs) at large publishing companies, which can exclude researchers from underfunded regions or institutions and undermine the inclusivity OA promises, CSA remains committed to providing unrestricted access to high-quality research at no cost to authors or readers. As part of Publicera, Sweden's national platform for scholarly journals managed by the National Library of Sweden, we can uphold our values, and with support from institutions like the Swedish Research Council, we continue to champion OA and the excellence of Swedish archaeological research.

Elisabeth Niklasson & Ing-Marie Back Danielsson
editors of *Current Swedish Archaeology*

ARTICLES

Changing Perspectives

On the Visual Properties of an Iron Age Mound

Lars Gustavsen

This paper presents a reassessment of mound visibility through the analysis of Halvdanshaugen, a substantial Iron Age mound in Norway. In line with conventional views, the mound's visibility covers a considerable swath of the surrounding terrain, although views are limited by topographic features from certain directions and specific parts of the landscape. However, a refined viewshed analysis, incorporating vegetation as a visual barrier, suggests that the mound's visual impact extends no more than a few hundred metres from its base. This sees the mound placed in an enclosed setting which alters the mound's visual characteristics, emphasizing details of both the mound and activities nearby. In contrast to traditional interpretations that emphasize landscape-wide symbolism, this study advocates for a more reflective perspective, and calls for a multi-sensory understanding of the fluid relationship between mound and landscape. It rejects the idea of universal placement rules and proposes more contextual interpretations that acknowledge the diversity observed in mound construction and use.

Keywords: Iron Age, mound, visibility, viewshed analysis, GIS, rivers, remote sensing

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Introduction

Large mounds from the later parts of the Nordic Iron Age (*c.* 400–1000 CE) are traditionally interpreted as mortuary structures constructed for and by social elites, and are seen as the physical manifestations of the increasing social stratification and centralization of power believed to have occurred during the first millennium CE (e.g. Bratt 2008:170; Gansum & Oestigaard 2004:73; Myhre 1992:311; Skre 1998:323; although see Fallgren 2023). However, few of these mounds have seen excavation as per modern standards, and their interpretations often rest solely on their external and physical attributes, as well as their placement in the landscape. These factors, it is claimed, held some shared symbolic meaning intended to be communicated to an audience, and this was achieved through sheer size, or by placing the mounds in topographically prominent places or near communication routes (Forseth & Foosnæs 2017:54; Gundersen et al. 2023:171; Larsen & Rolfsen 2004:65; Ringstad 1987:74).

The significance attributed to the visual characteristics of the mounds is predominantly derived from qualitative approaches, which rely on subjective experiences of the present landscape, while the application of quantitative methods to support these claims is rare. Furthermore, the presumption that visual impact was a determining factor in how people interpreted, or 'read', the landscape, overlooks the cultural and contextual factors shaping people's perceptions over time and space. Indeed, archaeological evidence in the form of excavations and geophysical surveys often contradicts the notion that visual prominence served as a primary determinant of mound placement (e.g. Bill & Rødsrud 2017:214–215; Gustavsen et al. 2020:1524–1527; Schneidhofer 2017). These demonstrate that mounds may be situated in diverse landscape settings, where visual prominence is often negligible, suggesting that other placement strategies may have been at play (as also highlighted by Gansum et al. 1997:15).

Thus, it is clear that a new approach to interpreting mound placement and form, where physical characteristics and relationships with their surroundings are assessed more contextually and holistically, is needed. This study aims to demonstrate how this can be achieved through a reassessment of the visual characteristics of Halvdanshaugen, a substantial Late Iron Age mound in South-East Norway (Figure 1). It involves investigating whether the mound was intentionally constructed and placed to be seen from a distance, and whether there were specific parts of the landscape from which the mound was meant to be experienced. This will be achieved through a GIS-based visibility analysis, as well as a quantitative exploration of directionality and size perception, and I will demonstrate how the integration of remote sensing technologies can improve our understanding of how the

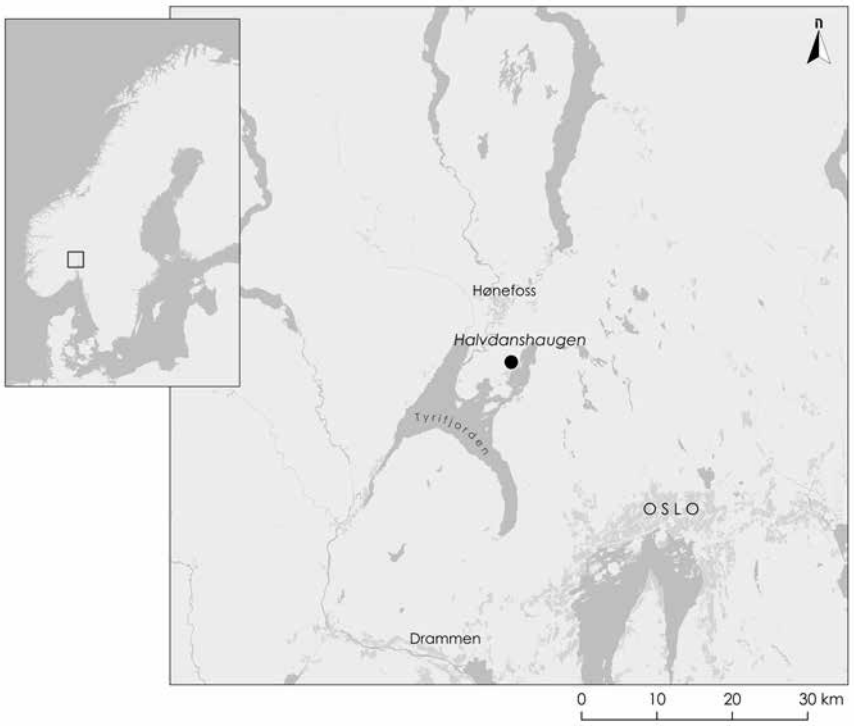

Figure 1. Location of Halvdanshaugen. Background map: Norwegian Mapping Authority, 2024.

physical environment surrounding the mounds may have affected their visual characteristics. Furthermore, I aim to highlight the potential dangers of placing too great an emphasis on visual range alone, while challenging conventional ideas about the visual impact of mounds on their surroundings.

BACKGROUND: THE VISUALITY OF MOUNDS

In Norwegian archaeological discourse, the visual qualities of mounds have historically been tied to ideas about status, both of the individual presumed to have been interred inside and their kin. Originating in eighteenth- and nineteenth-century topographical descriptions, these ideas were seized upon by early archaeologists, but only rarely extended beyond descriptions of aesthetics or fields of view. Notable exceptions do however exist, such as the discussion of the 'atypical' placement of the Oseberg mound (Brøgger 1917), and Georg Sverdrup's (1933:31) critical evaluation of the placement of Bronze Age mortuary structures.

Following an extensive lull in mound research in the decades after the Second World War, a resurgence in popularity occurred as the bonds between archaeology and history re-strengthened (Skre 1997:8). Herald-

ing a greater emphasis on the symbolism of the mounds themselves, this allowed for a more reflective exploration of the relationship between mound construction and the dynamics presumed to be behind their construction (Gansum 1997:33; Hagen 1985:26; Myhre 1992:311; Skre 1998:322–326). Here, visuality was key:

> For the people who built large burial mounds and burial cairns, it was essential for the monument to be seen. There is something obvious about this when building big. The importance of being seen is also evident from the fact that large burial monuments are often located in prominent places where they dominate their surroundings (Ringstad 1987:73 [my transl.]).

Accordingly, large mounds were seen as the physical manifestations of a hierarchical social structure, where their external appearance and placement served as visual expressions of status, and where their construction was tied to the ability to garner resources, people, expertise, and the organizational and logistical capacity required for such an undertaking (Ringstad 1987:75; Skre 1997:37–38). A greater focus was thus placed on the relationship between the mounds and their setting in the physical landscape and, notably, a formal approach to visual landscape studies was developed, in which terms and concepts adopted from landscape architecture were introduced (Gansum et al. 1997). These described how the landscape can be defined in terms of 'landscape rooms' and outlined a qualitative method for evaluating the visible relationships between these and the archaeological structures they contain. Furthermore, the placement of archaeological structures could be defined through how they visually 'addressed' the landscape, that is, whether they overlooked or could be seen from certain parts of a landscape. From this, it was argued, archaeological structures can be codified using dichotomous qualities such as 'introvert/extrovert', 'inclusive/exclusive' and 'public/private'. This method laid the ground for a more formalized approach to archaeological visibility studies, which found particular relevance in cultural landscape management (Jerpåsen 2009), although it also faced criticism, primarily for adopting a synchronous perspective on the landscape and assuming an ocularcentric stance (Solli et al. 2010).

Despite these developments offering the potential for a more sensorial approach, mound studies have largely remained centred on socio-political aspects, where the function of mounds was to serve as symbolic markers of social standing or identity, or to demonstrate some form of (largely undefined) power in the landscape (Bratt 2008; Drageset 2017:183; Forseth & Foosnæs 2017; Gansum 2013:53; Gansum & Oestigaard 2004:64; Gundersen et al. 2023:174; Gustavsen et al. 2020:15–16; Larsen 2016; Moen 2011:32–33; Myhre 2015:158; Reiersen et al. 2023:89; Sæbø 2020:49). A parallel line of interpretation sees mounds as the visual affirmations of land ownership

or the farm holder's right to inheritance (Ødegaard 2010; Østmo & Bauer 2018:245; Pedersen 2006:351; Rødsrud 2020:219; Zachrisson 1994).

Within these interpretational approaches, it is argued that mounds were deliberately and strategically placed in prominent places to ensure visibility from a wide swath of the landscape, or near communication routes, such as roads, sea lanes or rivers, or near central nodes in the landscape to be observed by those passing by (Cadamarteri 2022:105; Ellingsen & Sauvage 2019:407; Forseth & Foosnæs 2017:54; Gansum & Oestigaard 2004; Reiersen et al. 2023:89; Skre 2018:776; Thäte 2007:131–162).

Considering the emphasis placed on the visual characteristics of mounds, it is somewhat surprising that the application of quantitative methods to underpin this is limited, a fact that cannot be attributed to a shortage of suitable datasets or software solutions, or the lack of comparative studies of mortuary structures elsewhere (e.g. Ballmer 2018:101–102; Bourgeois 2013:111–114; Kuna et al. 2022; Llobera 2007; Wheatley 1995). That said, a few noteworthy, published examples from the Nordic region do exist where viewshed analyses have been used, largely involving investigations of placement strategies for cairns and mounds from the Bronze Age (Lagerås 2002, 2005; Løseth 2010; Løvschal 2013; Risbøl et al. 2013) and the Iron Age (Drageset 2017:181; Ellingsen & Sauvage 2019:407; Larsen & Heide 2020:8–10; Maher 2014:91–92). Although demonstrating the applicability of the method, these examples are largely restricted to establishing simple visual relationships between observer and landscape, and they occasionally exhibit an uncritical approach to interpretation and method application, perhaps due to the absence of a solid theoretical and interpretative framework.

CASE STUDY: HALVDANSHAUGEN IN RINGERIKE

To provide an example of how viewshed analyses can be integrated into a more holistic approach to mound placement, in which the sensorial impact of the mound is considered, I have chosen to focus on the mound Halvdanshaugen (Halfdan's Mound) in Ringerike, South-East Norway (Figures 1 and 2). The rationale for selecting this particular mound lies in its historicity, its interpretation as a high status burial due to its size, position in the landscape, and its visibility, as well as its position in a non-urban landscape in which modern infrastructure only to a degree affect its visual qualities.

Taking its name from the petty king Halfdan the Black, Halvdanshaugen comprises a circular mound 55m in diameter and 5.5m high, situated on the fertile Steinssletta lowlands on the northeastern shores of Lake Tyrifjorden. It holds a prominent position in the present landscape, and the historical narratives associated with the mound have given it particular recognition in the archaeological and historical discourse (e.g. Larsen & Rolfsen 2004). According to this, Halfdan was a member of the Ynglinga

Figure 2. Halvdanshaugen is located in open farmland on the Steinssletta lowlands. Photograph: Hans A. Rosbach, 2020 (CC BY-SA 4.0).

dynasty and held dominion over large parts of southeastern Norway during the ninth century. Upon his dramatic demise, his body is said to have been dismembered and the various body parts interred in mounds across his realm in the belief that this would ensure bountiful harvests. One of these is the mound on Steinssletta, in which Halfdan's head was supposedly buried, although it has been argued that the entire account is a medieval fabrication (Stylegar 1997).

The mound was partially investigated archaeologically through a keyhole investigation and soil coring campaign in 1997, which revealed a complex structure composed of several layers of turves, clays and charcoal. Radiocarbon dates from the deposits indicate that the mound was raised in at least two phases between the fifth century and the tenth. As for any evidence of a burial, the excavators left empty-handed, as neither artefacts, constructional elements, nor osteological material were retrieved.

A comprehensive volume produced in connection with these investigations presented the results of the project and placed Halvdanshaugen into a broader cultural-historical and comparative context. In the brief discussion on the placement of the mound within its physical environment, it is maintained that it finds itself in an open landscape, which affords a wide view in all directions, including towards the lake to its east. While it is acknowledged that views to the south are somewhat limited by a sharp rise in the terrain, an onsite assessment demonstrated that the mound was clearly visible from the rise itself (Larsen & Rolfsen 2004:45). As for the mound's placement in the landscape, the authors find this 'very peculiar' because it is not located on elevated land, which they claim, without offering substantial comparisons, is common for burial mounds. However, it is argued that this is a characteristic shared with the richly furnished burial

mounds at Gokstad and Oseberg, and it is used to highlight the alleged similarities between the three mounds:

> The Oseberg Mound is placed at the base of a wide valley, and the Gokstad Mound on a flat expanse. We would argue that there are views both to and from both of these mounds – much like the situation for Halvdanshaugen. The most important thing to consider here is that all three mounds are located in relatively open landscapes and not on ridges. Another common trait is that they are placed near routes of communication (Larsen & Rolfsen 2004:67 [my transl.]).

Thus, it is claimed that the visual qualities of the mound reflect its status and its current potential significance. It is held that the mound was intentionally constructed in a flat, open landscape to be seen and its prominence was reinforced through its strategic placement near historical thoroughfares. Assessing the validity of these claims, however, poses a challenge because they rest solely upon subjective, onsite observations. In the following, therefore, I will present a relatively straightforward quantitative approach which will assess the visual characteristics of this mound specifically and question the significance of mound visibility in general.

Method and Concept

CUMULATIVE VIEWSHED ANALYSIS

The conventional approach to GIS-based viewshed analyses of mounds entails placing an observer point directly on the part of the Digital Elevation Model (DEM) that represents the highest point of the mound, provided that the resolution is sufficiently high to do so, and then calculating a viewshed from this. No offset in height is assigned to the observer point, whereas the height added to the terrain is set to an approximation of the eye height of an adult human – typically 1.6–1.7m. Datasets generated using this setup consist of binary raster data, where pixels with a value of 0 represent non-visible areas, and pixels with a value of 1 show areas visible from the observer point. By assuming visual reciprocity between the observer point and the terrain, it follows that the results can be reversed to show from which parts of the terrain the observer point, and thus the mound, is visible. While this approach offers a straightforward means of assessing visibility, the results will be exaggerated because the locations from which even small parts of the mound can be seen will be included in the viewshed. This, in turn, may lead to an over-optimistic interpretation of the visual impact of the mound on its surroundings.

To counter this, an alternative approach was devised, in which the visibility of the *entire* mound structure was considered. This entailed a cumu-

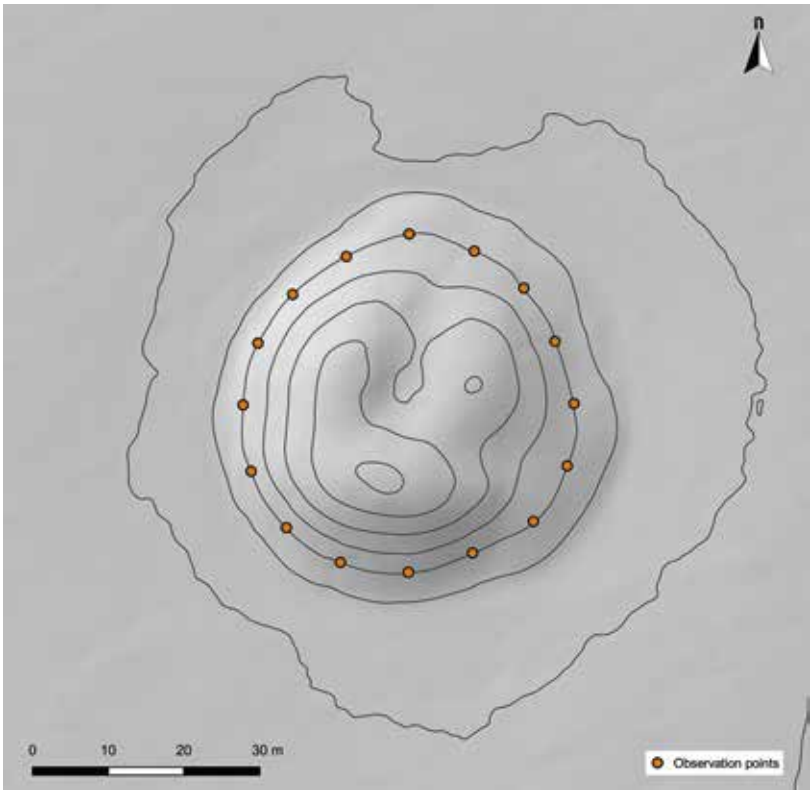

Figure 3. High-resolution LiDAR model of Halvdanshaugen showing the observation points. Background: Norwegian Mapping Authority, 2024.

lative viewshed analysis (Wheatley 1995) of a series of observation points along the mound's base. The individual viewsheds from these points were then summed to create a binary map showing areas in the landscape from where the mound was either in or out of view. The analyses were performed on high-resolution LiDAR data from the National Elevation Model program of the Norwegian Mapping Authority, comprising pre-processed, bare-earth digital terrain models in raster format with a resolution of 1m per pixel, resampled from a 5 pt/m point dataset. For the viewshed analyses, 16 observer points with no height offset were placed around the base of the mound, using the first 1m contour above the surrounding terrain as a guideline, and aligned with the mound's cardinal, intercardinal, and secondary cardinal axes (Figure 3). Placing the points along the first contour line was deemed necessary to avoid potential challenges posed by small-scale obstructions close to the mounds, which could impact the resulting viewsheds.

A cumulative viewshed analysis was then conducted using the open-source *Visibility Analysis* extension developed for QGIS (Čučković 2016),

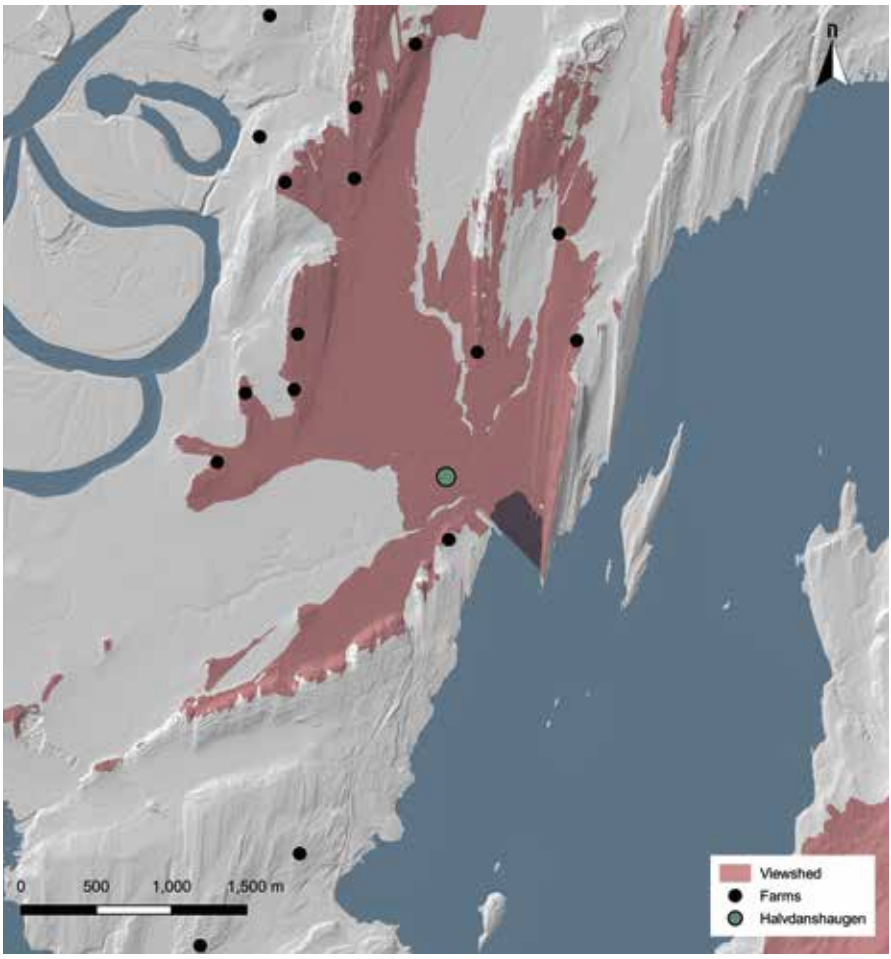

Figure 4. Binary viewshed generated from a cumulative viewshed analysis of Halvdanshaugen. Background data: Norwegian Mapping Authority, 2024.

applying a height offset of 1.65m to the surrounding terrain to simulate the eye height of an adult human observer in the landscape. The maximum extent of the analyses was set to 7000m to exceed Dennis Ogburn's (2006:410) limit of human recognition acuity of 6880m. Considering the nature of the terrain in which the mound is located and the physical characteristics of the mound itself, this number is excessively high but serves as a useful guideline for limiting the range of analysis. The binary viewsheds generated from each point were then combined into a single viewshed containing up to 16 distinct classes, classified according to how many observer points on the mound had 'seen' the corresponding pixels. Here, classes with

a value below five were excluded to ensure that only data representing at least 1/4 of the mound structure were included in subsequent analyses.

The results from these initial analyses indicate that despite its low-lying position on the flats, the mound can be seen from a considerable swath of the landscape, particularly to the north and northwest (Figure 4). Conversely, views are somewhat restricted by sharply rising ridges to the south and east and by a slight rise in the terrain west of the mound.

QUANTIFYING VISUAL PERCEPTION

The viewshed analysis suggests that the mound is theoretically visible from several kilometres away. However, observations made during site visits have shown that this requires specific knowledge of where to look and what to look for. Moreover, its appearance from a distance may not significantly affect the observer's senses. Therefore, a more refined and nuanced approach to the viewshed analysis is needed, one that quantifies visibility while integrating qualitative descriptions obtained from several distances.

While established approaches such as those outlined by Peter Fisher (1994) and Ogburn (2006) have been developed to quantify falloff in visual clarity due to atmospheric phenomena, these have not been adopted for this study since the focus is on assessing the *visual impact* of the mound, rather than the maximum theoretical distance from which it can be seen. I have instead opted for an approach in which the change in size perception with distance is considered since this is a more or less fixed measurement of visual clarity. The approach chosen is a variant of that suggested by Marcos Llobera (2007:58), in which visual zones were defined according to the visual angle covered, or *subtended*, by a barrow at given ranges and using the width of a clenched fist at an arm's length as a visual reference. To add resolution to the approach, I have included measurements corresponding to the tip of a little finger, two and four fingers, and an extended hand held horizontally, all at 65cm from the eye, as reference units. The visual angle (α) for these can be calculated as

$$\alpha = 2 \times atan\left(\frac{\frac{Object\ size}{2}}{Object\ distance}\right)$$

to give the following measurements:

Table 1. Visual angles for different parts of a human hand held at an arm's length (65cm).

	Little finger	Thumb	Two fingers	Four fingers	Vertical hand
Width (cm)	1.50	2.00	4.00	8.00	18.00
Visual angle (°)	1.32	1.76	3.52	7.04	15.77
Percentage of 120°	1.10	1.84	2.94	5.87	13.14

This demonstrates how different parts of the hand subtends portions of the nominal human visual field of 120° when held 65cm from the eye. For instance, a little finger measuring 1.5cm in width will subtend a visual angle of 1.32°, or just over 1 per cent of the human visual angle, while an 18cm long hand held horizontally at the same distance subtends 15.77°, representing just over 13 per cent of the human visual field.

Using these values together with the width of Halvdanshaugen (55m), the distances at which the mound subtends the corresponding visual angles to the parts of the hand can then be calculated as

$$Object\ distance = \frac{\frac{Object\ size}{2}}{\tan\left(\frac{\alpha}{2}\right)}$$

to produce the following ranges:

Table 2. The distance at which the visual angle of Halvdanshaugen can be correlated to the values calculated in Table 1.

Distance (m)	Rounded (m)	Subtended by mound (°)	Rounded (°)	Equivalent constant	Percentage of 120°
198.563	200	15.77	16.0	Vertical hand	13.14
447.060	450	7.04	7.0	Four fingers	5.87
894.965	900	3.52	3.5	Two fingers	2.93
1790.352	1800	1.76	2.0	Thumb	1.47
2387.219	2400	1.32	1.0	Little finger	1.10

This demonstrates that, when viewed from a distance of 200m, the mound subtends a visual angle of approximately 16°, which corresponds to an 18cm long hand held horizontally at an arm's length. At the other end of the spectrum, at 2400m, the mound subtends only 1.32° of the visual field, akin to a 1.5cm wide little finger held at arm's length. By adding these bands to the previously generated viewshed, we gain a clearer understanding of how the mound's perceived size changes with distance, and how this influences an observer moving through the landscape (Figure 5).

Given that landscape practices associated with mounds are likely correlated with distance (Llobera 2007:58), the analysis serves as a helpful entry point for discussing the potential visual impact of Halvdanshaugen on its surroundings. This necessitates a short exploration of how the mound and other landscape elements are perceived from the established distance ranges.

The initial range is defined by a 200m band extending from the mound. Within this range, attention is directed to the visual qualities of the mound itself and on individuals interacting with it, and to a lesser degree to the

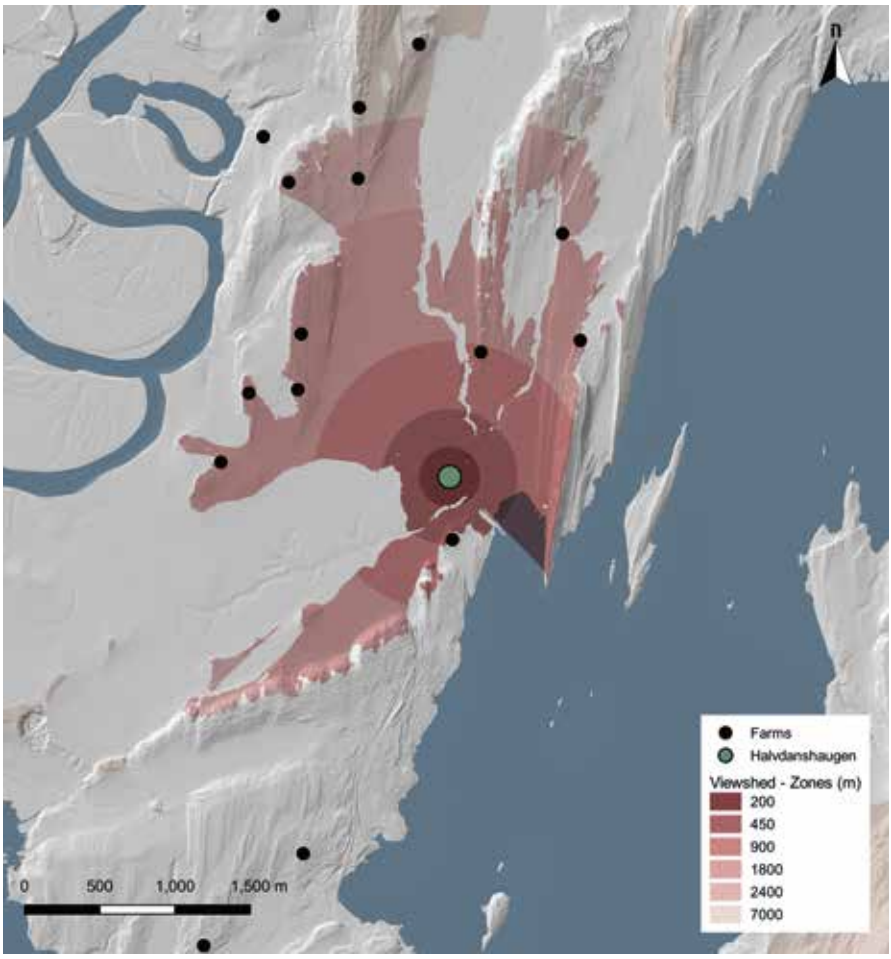

Figure 5. Visual bands added to the viewshed. Background data: Norwegian Mapping Authority, 2024.

broader physical environment. The characteristics of the mound's surface, including grass and small-scale vegetation, can be observed. Leaves and branches on trees can be seen moving, and the wind can be heard blowing through the trees. The physical details of people are readily discerned, and the nature of activities taking place near the mound can be perceived. Essentially, the range embodies immediacy and senses beyond mere sight.

Within the second range, spanning from 200 to 450m, the mound remains clearly visible, albeit with some loss of detail. The trunks, branches, and foliage of trees on and around the mound can still be identified, but they begin to appear indistinct and may not always be readily visible. While the details of individuals remain observable, it may be difficult to work out the

Figure 6. Halvdanshaugen as seen from a vantage point some 700m to the north. The mound is in the centre of the picture. In its present landscape context, it appears indistinct against the background, and its visual impact on its surroundings is negligible. The photo is taken with a 50mm lens to simulate a field of view similar to the human eye. Photograph: Lars Gustavsen, 2024.

specifics of their activities, and along the outer limits of the range, senses other than vision begin to play a lesser part. Overall, the scene begins to resemble the middle ground of landscape art.

Further out, the third range covers the distances between 450 and 900m away from the mound. Here, clusters of trees and single, very large trees can be recognized, but only as outlines. Human figures, while recognizable as such, gradually blur into the broader backdrop. Likewise, the mound is still recognizable, but its visual clarity begins to decline. Depth of field is lost to the observer, and the mound starts to blend into the general backdrop, particularly in adverse atmospheric conditions. At this point, the visual impact of the mound is arguably negligible (Figure 6). To paraphrase Tadahiko Higuchi (1983:12), the observer 'sees but does not feel'. Beyond this range, visual clarity is greatly reduced, and visual identification of the mound becomes difficult without prior knowledge of its existence. In short, it seems that the visual impact of the mound can be largely confined to the first two ranges, that is between 0 and 450m from the mound. Here, details of the mound, the landscape elements and the people and their activities can be readily identified, and senses other than just the visual are engaged in the experience.

SIMULATING PALAEOLANDSCAPES USING LIDAR

Several processing and visualization methods have been developed to overcome problems such as occlusion and directional illumination inherent in

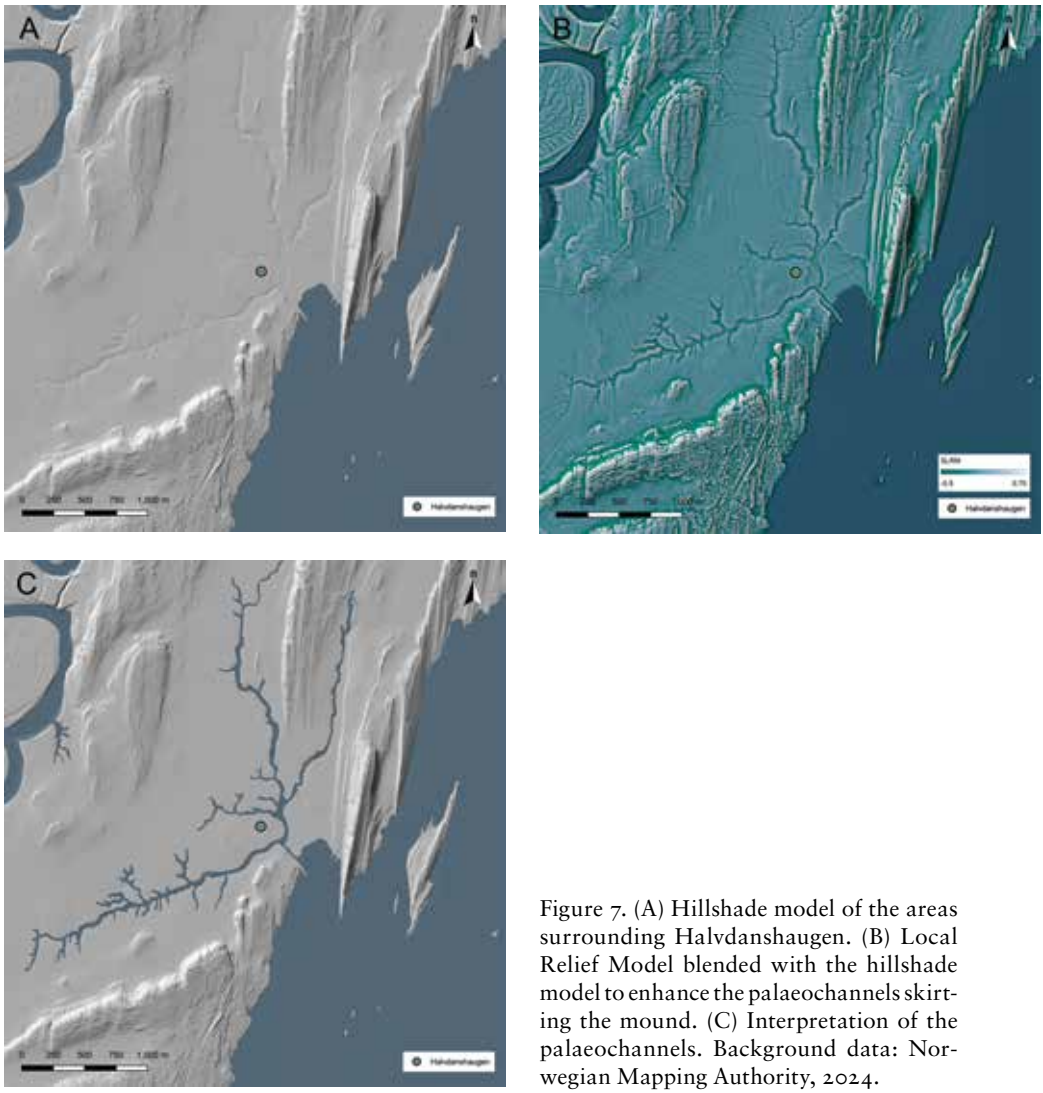

Figure 7. (A) Hillshade model of the areas surrounding Halvdanshaugen. (B) Local Relief Model blended with the hillshade model to enhance the palaeochannels skirting the mound. (C) Interpretation of the palaeochannels. Background data: Norwegian Mapping Authority, 2024.

common DEM relief shading techniques (Kokalj & Somrak 2019). One such approach is the Local Relief Model (LRM), a trend removal method in which a smoothed terrain model is subtracted from the original, high-resolution model to create a new dataset containing the local deviations from the overall landscape forms (Kokalj & Hesse 2017:20–21). The resulting datasets emphasize subtle elevation changes, and while originally intended to enhance small-scale archaeological features, LRM has also proven to be highly suitable for revealing extensive but subtle landscape forms such as palaeochannels.

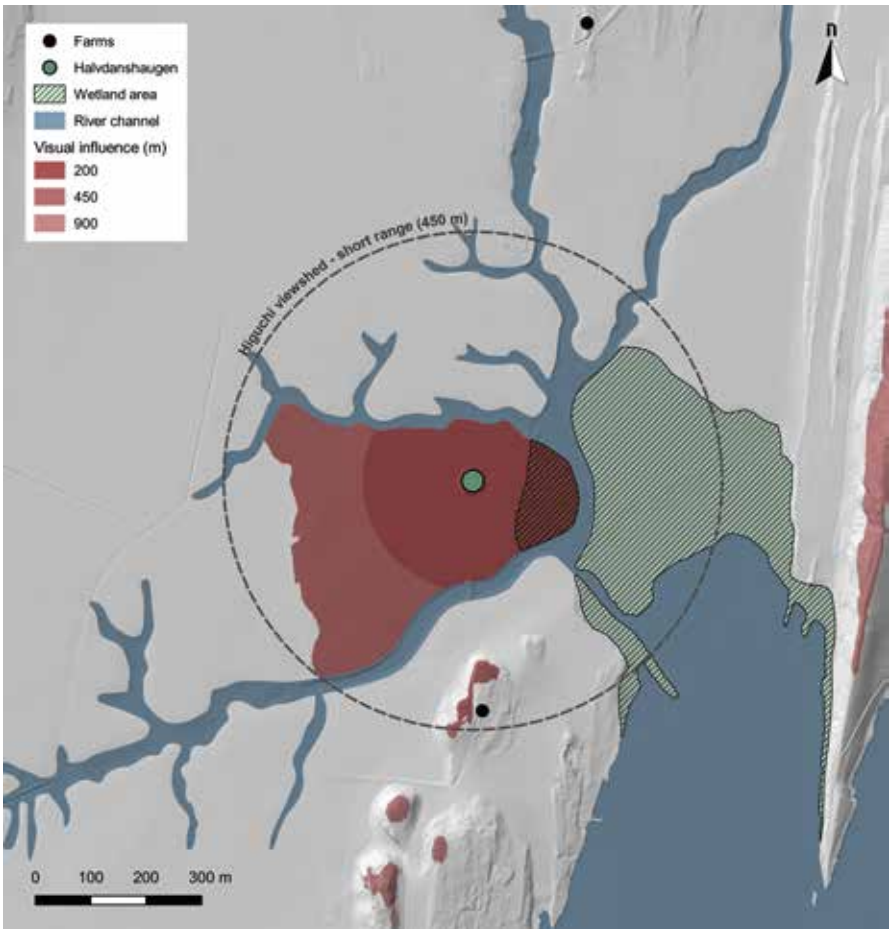

Figure 8. A refined viewshed restricted by riparian vegetation surrounding the mound. Background data: Norwegian Mapping Authority, 2024.

As can be observed in Figure 7 (A), the DEM for the Steinssletta lowlands include details of a palaeolandscape which can be difficult to discern through standard hillshade modelling. To enhance these, therefore, an LRM was generated using the Relief Visualization Toolbox extension for QGIS (Kokalj & Somrak 2019). An appropriate colour ramp was then added to the model and a fairly narrow histogram stretch (-0.5–0.75) was used to add contrast to the visualization (B). This was then combined with the hillshade model, and the enhanced palaeochannels could be digitized for further analyses and interpretation (C).

In these visualizations, at least four former, infilled river channels can be seen incised into the clayey soils which dominate Steinssletta, demonstrating that the area was not as homogenous as the present landscape sug-

gests. Two of these river channels pass the mound to the north and south respectively and form a confluence with two additional river channels east of the mound before entering the nearby lake. Naturally, the rivers cannot be dated using the LiDAR data alone, but their position about the mound suggests a plausible coexistence. This has a considerable impact on how the placement of the mound should be interpreted both in terms of its relationship with its natural surroundings, but also considering how these elements might have impacted the visibility of the mound.

To simulate the impact of vegetation on the viewshed, the information from the LiDAR visualizations was used to increase the corresponding raster values in the DEM by a fixed value of 10m, to serve as a proxy for a combination of dense undergrowth and fairly tall, riparian vegetation such as willow, hazel and alder. A new cumulative viewshed analysis was then carried out using the same parameters as before, and as seen in (Figure 8), this has a drastic impact on the visibility of the mound, reducing the viewshed from covering large swaths of the Steinssletta lowlands to an intimate landscape room covering the mound's immediate surroundings.

Discussion

QUANTIFYING AND QUESTIONING VISIBILITY

The visibility analyses of Halvdanshaugen demonstrate that the mound is theoretically visible from a large swath of the landscape, which is largely due to the mound being situated in flat and open terrain with few visual barriers, particularly towards the north. Topographic features of the terrain limit views from the west, south and southeast, and have the effect of restricting the mound's visibility from the nearby lake. This means that, if approached by boat, the mound would not have been seen in its entirety until the wetlands on the northern shores of the lake had been reached, and it questions whether the mound was intended to be experienced from the lake at all. Another interesting aspect is that the mound appears to be visible from nearby farms which, on toponymic grounds, may have their origins in the Iron Age. The significance of this relationship should, however, be treated with some caution since the temporal relationship between the mound and the farms cannot be readily determined and may simply be due to the physical characteristics of the modern terrain rather than any intentionality on the part of the mound builders.

Moreover, observations made on site indicate that, while it is physically possible to see the mound from this distance, the sensorial impact on the observer is not very significant. Thus, it was deemed necessary to refine the viewshed by dividing it into separate ranges from which the details of the

mound and its surroundings could be assessed. The results from these explorations indicated that the visual impact of the mound is limited to a distance of less than a few hundred metres, within which details of the mound can be readily seen and identified, along with details of vegetation, and of people and activities taking place. Beyond this distance, the mound begins to blend in with the overall landscape and contrast to the general background is lost. Eventually, it is not possible to see the mound without prior knowledge of its existence, or without resorting to other clues in the landscape.

Here, the ideas formulated by Higuchi (1983:12–17) serve as an interesting comparative approach. According to this, the near-distance range can be determined by a radius equivalent to 60 times the size of the dominant tree species. In the case of the Steinssletta lowlands, this is the common silver birch (*Betula pendula*), which typically has a crown diameter of 6–9m. Using the average of this, the Higuchi near-distance range for Steinssletta is determined to be 450m, which covers both of the previously calculated near ranges for Halvdanshaugen. This range has been described by David Wheatley and Mark Gillings (2000:16) as one in which objects are 'perceived as being immediate and close to the viewer, engaging all of their senses', while beyond this, the viewer 'does not feel, but merely views'. Despite the limitations of the Higuchi approach due to the broad and imprecise ranges it produces, it is noteworthy that the near-distance range aligns closely with the ranges identified in comparable studies, such as those carried out by David Fraser (1983:299) on megalithic buildings in Orkney, and by Llobera's (2007:58) work on round barrows in the Yorkshire Wolds, where similar zones were established.

At this point, it is worth emphasizing that the quantitative analyses were conducted on a bare-earth model of the landscape which, free of visual hindrances, will return exaggerated results. As can be seen from the LiDAR visualizations, however, Halvdanshaugen is skirted by two clearly defined infilled palaeochannels, which merge with two additional channels before entering the nearby lake to the east. Thus, assuming that mound and rivers coexisted, the mound would have been constructed on a raised spit of land at the confluence of flowing bodies of water, and not in a wide-open landscape as its present situation implies. If we can further speculate, riparian vegetation such as alder, willow and birch, along with dense shrubs might have lined the river banks, forming dense visual barriers and restricting views to and from the mound. To evaluate the potential effect of this, a new viewshed of the mound was therefore generated, in which the presence of vegetation was included.

For simplicity, I chose to represent vegetation along the riverbanks with a solid and opaque, digital 'wall'. While this model did account for variations in height, foliage density, or seasonal changes, it effectively demonstrated

the effect of tall and dense riparian vegetation that might have populated the river channels, the results revealing that views to and from the mound would have been greatly reduced and largely confined to the spit of land upon which the mound was placed.

These findings have important implications for how we understand the placement of Halvdanshaugen in relation to its surroundings, and they highlight the active role of rivers in shaping and structuring the physical, visual and cognitive landscape around the mound. At the very least, the rivers and the vegetation along their banks formed an immediate, enclosed space into which the mound was placed, and likely engendered an embodied, multimodal experience of the mound and its surroundings. It has been argued that mounds served as 'ritual arenas' (Gansum 2002:278–280; Price 2010:138–140; Sundqvist 2013:89–92), and without venturing too deep into speculation, perhaps this enclosed landscape room should be interpreted as a continuation of this into the wider surroundings, serving as communal places where activities related to the mound such as feasting, ritual performances, or processions may have taken place (Llobera 2007:58; Murphy & Nygaard 2023).

Moreover, the presence of rivers dictated movement in the landscape, requiring interaction as people had to navigate alongside or around them, or by crossing them. According to Matt Edgeworth (2011:69), these engagements may have involved symbolic acts that included ablution rituals or votive deposition, and it points to the mound forming part of a ritual landscape in which natural elements were an integral part. Thus, an active, agential landscape can be suggested, which aligns with a growing appreciation and understanding of the cognitive significance of rivers and wetlands in prehistory (e.g. Bradley 2017:184–185; Edgeworth 2011:67–70; Fredengren 2011; Frost & Beck 2023; Hooke 2017; Leary & Field 2010:149–150; Lund 2010; Raffield 2014). Furthermore, a spatial and visual relationship between prehistoric mounds and bodies of water has been noted (e.g. Brøgger 1917; Harrison 2007:176; Maher 2014:89; Mees 2019:90–98; Moen 2011:26–27; Schneidhofer et al. 2017:427; Wessman 2010:69–75; Williamson 2008:106–112), and these are certainly a line of enquiry worth pursuing since they have the potential to inform us of landscape engagement in the past and how this relates to cosmological beliefs and ritual practice.

CONTRASTING IDEAS

The ideas presented above stand in contrast to ideas about mound visuality and placement in which these factors are typically seen as conforming to some underlying 'rule', and where ideas of status and power are conveyed through prominent visibility. As these ideas tend to be based on onsite, subjective evaluations alone, however, they are both conceptually and theoretically problematic.

From a conceptual standpoint, the interpretations tend to overlook the dynamic nature of landscapes, which are constantly shaped by natural processes and human activities. Thus, the current landscape is a result of millennia of alterations and, although the 'bones of the land' remain (Tilley 1994:73), it is likely quite different from its appearance at the time of the mounds' construction. A pitfall common for quantitative and qualitative analyses alike, a failure to account for these changes may lead to a misreading of the landscape, and the visibility of a mound may be misinterpreted as being unrealistically high. Similarly, visibility is typically assessed either from the mound itself or from an unspecified point nearby (Gansum 2013:40; Larsen & Rolfsen 2004:45; Moen 2011:41–43), the assumption being that there is a symmetrical relationship between the portions of the landscape seen from the mound and from where the mound can be seen in the landscape. However, this assumption does not necessarily hold true in practice. While it may be possible to observe a distant physical element such as a farm from a mound, it does not automatically follow that the mound is easily observable from the farm – as demonstrated by the analyses in this article.

More pressing are the underlying theoretical foundations underpinning these interpretations, which are related to how we approach mounds and their connections to the landscape, as well as how we consider vision as part of the human experience of the world. By focusing exclusively on the physical attributes of the mounds – such as their size or appearance – we remove them from their original contexts and elevate them as human-built constructions detached from the landscapes of which they formed an intrinsic part (Gansum et al. 1997:25). This approach overlooks the active and cognitive role of the landscape (Tilley 1994:25–26), which is evident in how and where mounds are placed in relation to 'natural' features (if such a thing exists). Similarly, this detachment ignores the generative and reiterative qualities of the context into which the mounds were placed (Jones 2012:21). Mounds reference their landscape settings, but by virtue of being placed into the landscape, these contexts change, and the process is reiterated through referential construction, reshaping or reuse. Again, this is evident in the archaeological record, which shows temporal diversity within single mound sites (Østmo 2020), as well as phased construction and reuse of individual mounds (Thäte 2007; Cannell 2021). Thus, neither site nor mound can be seen as static 'stamps' onto the landscape, constructed with a specific function, but rather as fluid components of similarly fluid landscapes.

Another theoretical concern, which is pertinent to both GIS-based and analogue visual studies, is the emphasis on vision as the dominant mode of understanding the world. In this *visualism*, vision is compartmentalized, separated from the rest of the sensory modalities, and reified. However, as argued by Yannis Hamilakis (2014:9), vision is not an autonomous

field, but rather 'a perceptual mode closely entangled and interwoven with all other senses in a synaesthetic, experiential manner', underlining that human engagement with the world cannot be reduced to the act of merely *seeing* (Frieman & Gillings 2007). This is not to argue that vision is unimportant in human perception; however, it never operates independently of the other senses. It is culturally and historically situated, and thereby not objective (Gillings & Goodricke 1996:1.4). Thus, the importance attributed to vision and its elevated position in the hierarchy of the human sensorium within modern, Western culture cannot be universally transposed onto other cultures, whether past or present.

Conclusion

In this article I have sought to challenge the common understanding of mounds as visual symbols in the landscape. Through the quantitative approach presented in the article, coupled with existing knowledge of mounds – their construction methods and their artefactual and osteological contents (or lack thereof) – a more complex range of interpretations becomes possible. Using the Late Iron Age mound Halvdanshaugen as an example, cumulative viewshed analyses were performed, considering the entire mound's visibility based on high-resolution LiDAR data, multiple observer points placed along the mound's base and the impact of potential palaeoenvironmental conditions.

The results from these analyses suggest that the primary focus of the mound's construction lay in creating an intimate, perhaps multisensory, experience for those interacting with the mound and its surroundings. Consequently, communicating symbolism across the landscape was unlikely to be a primary concern. This prompts us to question the significance traditionally attributed to the visual characteristics of Iron Age mounds in general, and to what degree these aspects governed the placement of mounds in the landscape. If mounds were *not* constructed to be visible over a great distance, then why were mounds placed where they were? What made one location more suitable or right for siting the mound than another?

The answers to these questions are undoubtedly diverse because, despite similarities in external appearance, mounds show variation in construction method and content. Consequently, their intended meaning is also likely to be diverse (Gansum 1997:31), making the exercise of finding universal rules for their placement arguably futile. As Terje Gansum and Terje Oestigaard (2004:64) have pointed out, it is unlikely that mounds were placed in the landscape without some forethought. However, instead of seeing this as tied to aspects such as communicating social roles, or economic factors,

I argue that the location 'strategies' should be interpreted from a perspective where the mounds formed an intimate part of their natural surroundings, perhaps entwined with and referencing these.

By rejecting the idea that mounds were constructed to convey some universally recognized symbolism of social or political status, new and perhaps more fitting avenues of interpretation become available to us. To investigate these avenues, however, a more reflective approach to mounds is needed. This should highlight the relationship between the mounds and their natural surroundings, while embracing a multimodal approach that extends beyond the visual. Furthermore, it should recognize placement as contextual, situated and diverse, reflecting not just temporal and environmental aspects, but the culturally and socially dependant experiences of the people who built and used them.

In this respect, it is interesting to note that alternative and more nuanced approaches to mounds are emerging, in which the focus has shifted to the significance of the mound construction itself, as well as the mounds' interaction with the physical landscape, allowing for a wider spectrum of interpretative possibilities (e.g. Cannell 2021; Leverkus 2021:72–73). These lines of enquiry hold the promise of a greater understanding of the original appearance of the mounds and could potentially be used to enhance our understanding of their original visualities. Were, for instance, particular materials used to make the mound stand out against its background (Bradley & Fraser 2011:44–45), or were they chosen to make the mound blend in with its surroundings? Were the surfaces of the mounds maintained through grazing or was regrowth encouraged (Lagerås 2002:188)? In short, did their visualities really matter? Ultimately, by adopting such a perspective, which transcends traditional interpretations and embraces the complexity of these structures within their environmental and cultural contexts, a more nuanced understanding of Iron Age mounds may be achieved.

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The Moose Trappers and Hunting Grounds of Vilhelmina

ABM-Simulation of Annual Cycles During the Stone Age

Lars Göran Spång[1], Wiebke Neumann[2], David Loeffler[3] & Göran Ericsson[4]

Archaeological research in northern Sweden has customarily proposed models based on assumed migration patterns to portray resource utilization of prehistoric hunter-gatherers. An average hunting household needs about 500km² for its subsistence. This assumption, as well as the temporal and spatial distribution of animal resources available for hunting households in the interior of Northern Sweden, is investigated using Agent Based Modelling (ABM) with explicitly identified factors and conditions. ABM simulations were run in order to analyse the relationships between hunters, moose (*Alces alces*), predators, landscapes and how human migration patterns could be adjusted in order to coincide with moose migrations. The results suggest that wolves and human hunters could coexist if the landscape had a moose density of 0.6 moose/km² or more and if each hunting household possessed territories of 400–500km². In accordance with the model's parameters, the simulation identifies those factors that are particularly sensitive to change and those factors that are necessary in order to maintain an ecological balance between hunters and their prey.

Keywords: Norrland, Neolithic, social organization, subsistence strategies, Agent Based Modelling

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Introduction

Archaeology is a science and thus a creative and innovative endeavour. It takes an imaginative leap to envision hypothetical scenarios that contextualize scant remains from the pre-historic past. While inspired by observations, not all hypotheses are immediately falsifiable and/or testable, which some consider to be unscientific (Popper 1998:36). This is a hasty conclusion since additional and/or independent materials or observations unearthed at some later time may well support, weaken or repudiate said hypothesis. A case in point is migration of human and other animal species and climate change, two explanations once widely invoked that later fell into utter disrepute. Advances in DNA analysis and research into climate change on a global scale (Brooke 2014) have reinvigorated these explanations, now respectable again. An alternative to waiting for novel materials/observations in order to substantiate/reject hypotheses is model building.

Recently the Swedish University of Agricultural Sciences (SLU) has implemented an extensive program to map the migration patterns of moose and any variation in their behaviour due to the characteristics of the landscape (Swedish University of Agricultural Sciences n.d.). The latest surveys are based on GPS data captured every hour. The accuracy of this data is superior to that which was available in earlier research, in which pitfalls, settlements and moose migration was first presented (Spång 1997:66). Another addition to technical and scientific developments is the easy-to-use simulation programs for *Agent Based Modelling* (ABM). We realized the benefit of using this tool to simulate how a hunting household during different seasons might use the resources in a landscape. Simulation or model building is gaining increasing adherence in the natural and social sciences as well as in philosophy (Casti 1997; Williamson 2020:114). While ABM has been used by several other disciplines, interest within archaeology has continued to grow only during the last decade (Kowarik 2013; Wurzer et al. 2015; Barceló et al. 2016; Cegielski & Rogers 2016; Romanowska et al. 2021). In this study prehistoric pitfall traps and settlement sites as well as data on present day migration patterns of moose (*Alces alces*) are combined in order to explore the relationship between resource utilization vis à vis settlement and migration patterns of prehistoric hunter-gathers in the interior of northern Sweden.

Background

This study assumes that there was a territorial structure among Neolithic hunter-gatherers in the inland forest areas of northern Sweden as stipulated

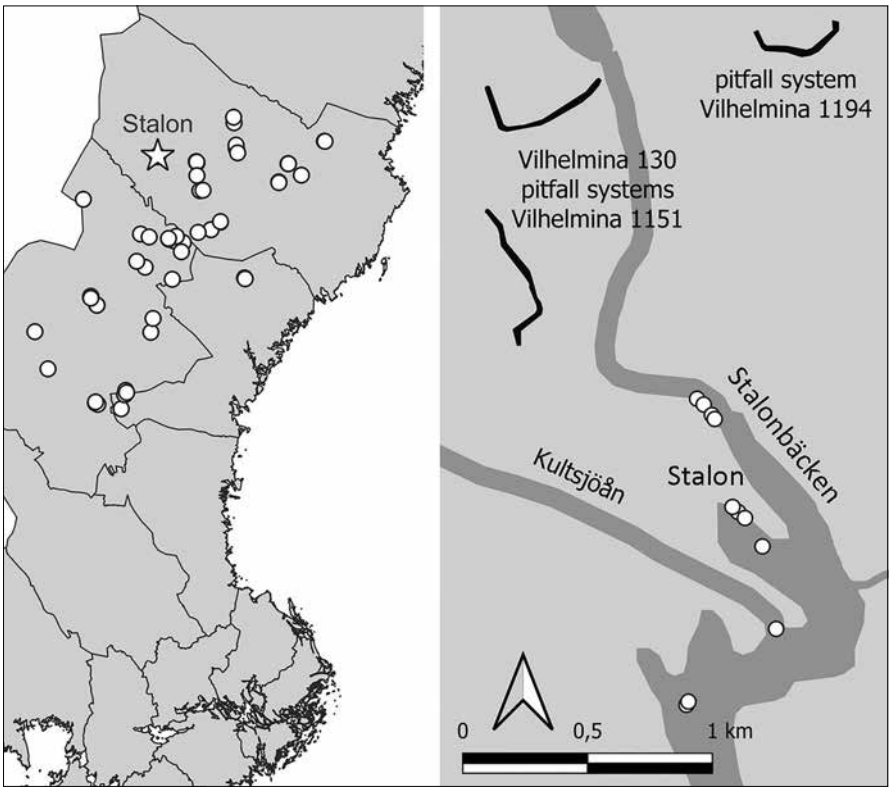

Figure 1. Left side: winter villages in northern Sweden according to Lundberg 1997. Right side: the Stalon winter village. One pitfall from the Raä Vilhelmina 130 system is dated to 4548–3797 BC two sigma, see Table 2.

in a previous study (Spång 1997:224). The thesis put forward then was based on analogies from Canada and Kemi Lappmark. The size and distribution of Sami hunting territories that were later turned into tax lands by the Swedish crown also contributed to the conclusion that a hunting/trapping/fishing economy in a boreal forest needs a territory between 100–700km² (Spång 1997:58). Neolithic winter villages with pit houses were spaced at regular distances from each other (Lundberg 1997:137). These houses are characterized by having the floor recessed a few decimetres below the surface of the ground and surrounded by an embankment consisting of gravel and waste. They are usually referred to as semi-subterranean houses or as pit houses and it is increasingly accepted that they were primarily used during the winter (Loeffler 2005:147). Lundberg mapped about 30 villages and concluded that they represented local bands. The villages were on average 35km apart and each had a territory of about 1000km² (Lundberg 1997:137).

The Stalon winter village

The Västerbotten Museum carried out excavations of the settlement at Stalon during 1979–1980 (Lundberg 1997:58). The winter village at Stalon consists of eleven pit houses. Dates from these excavations show that the round houses belong to an older group established around 4000 BC. Another group consisting of rectangular shaped houses is about 2000 years younger (Figure 1).

The material recovered in and around the pit houses consisted mostly of quartzite debitage and scrapers as well as fragments from a few slate artefacts. Stalon was inhabited both before and after the pit houses were in use. The winter village at Stalon could have simultaneously been home to at least five households between 4500–2500 BC. Here the simulation model is based on the territorial needs of a single household situated along the river Marsån. It is assumed that a household needed a territory of 500km^2 for its subsistence. The territory is assumed to coincide with a watershed which is one way of organizing land use between households, a theory explored earlier (Spång 1997:223) and is examined in more detail here.

Model building: analysing migration patterns and foraging strategies

Model building is a simplification of reality and thus necessarily involves choices. Certain parameters are deemed to be important, others less so. By tinkering with the parameters, connections are perceived, cause and effects discovered. Understanding the model's workings results in knowledge about the real world. In the methodology of model building, old models are replaced by another built on the insights of its predecessor while adding novel parameters (Williamson 2020:123–125). Current computational resources cannot model all aspects of the world, past or present. However, it is possible to model those parameters that are deemed most relevant to the hypothesis under review.

ABM is a general tool for model building where an agent, an individual and/or a specific area are assigned different characteristics. The simulation is then run where agents interact over time depending on their characteristics. This interaction triggers changes in their characteristics and properties as well as changes in the relationships between agents, which is recorded and quantified during the course of the simulation. A common ABM tool is NetLogo which is relatively easy to work with even though it is a programming tool. NetLogo has undoubtedly contributed to the increased interest in ABM in archaeology. The program contains a built-

in manual and an extensive library of sample models. A detailed guide for archaeologists has been published (Romanowska et al. 2021). Thus far, archaeological model building has focused on economic exchange relations and on migration and distribution patterns (Romanowska et al. 2021:71, 148). ABM studies similar to the present work have addressed relationships between hunting, mobility and the location of various other resources in Paraguay (Dean 2000; Janssen & Hill 2016) and Ireland (O'Brien & Bergh 2016). The model designed for this study is available at: https://github.com/lgspang/MooseHunt

PARAMETERS: TERRITORIALITY

It is assumed that waterways and lake systems have influenced the location of Neolithic winter villages and how hunting grounds were distributed among households. Waterways and drainage systems can and do form the basis for how territories are established (Brouwer 2011:128; Selsing 2020:6; Löwenborg 2007). Yet this connection might be too simplistic, other considerations besides geography may be more important (Jochim 2003:325; Lovis & Donahue 2011; Spång 1997:223). The territory of hunter-gatherers is also shaped, for example, by the type, distribution and abundance of predictable resources in the landscape and the extent to which the storage of resources is needed to cope with seasonal fluctuations (Dyson-Hudson & Smith 1978).

PARAMETERS: LOCATION-BOUND PREDICTABLE RESOURCES

An obvious example of a site-bound resource used during prehistoric times are stone quarries. Fishing is also of special importance because it is a rich and predictable resource located at specific places. To some extent the same conditions apply to beaver and moose. Beavers (*Castor fiber*) have specific territories within a lake system while moose (*Alces alces*) have specific migration trails used in the spring and fall. These practicable circumstances facilitate hunting and/or trapping strategies. The placement of pitfall systems shows where such trails are to be found. The investment of labour required to build and maintain a pitfall system inevitably leads to claims of ownership over the site and the game. There are historical documents that reveal property disputes concerning pitfalls (Manker 1960:11) that highlight the importance of these facilities as site-specific resources.

In boreal environments there is a need to store resources for the winter, such as dried meat and firewood. Storage and storehouses require safeguards from both animals and strangers, which in turn creates ownership claims to a place. Territories are maintained through different symbolic systems that outwardly indicate human occupation and activities within

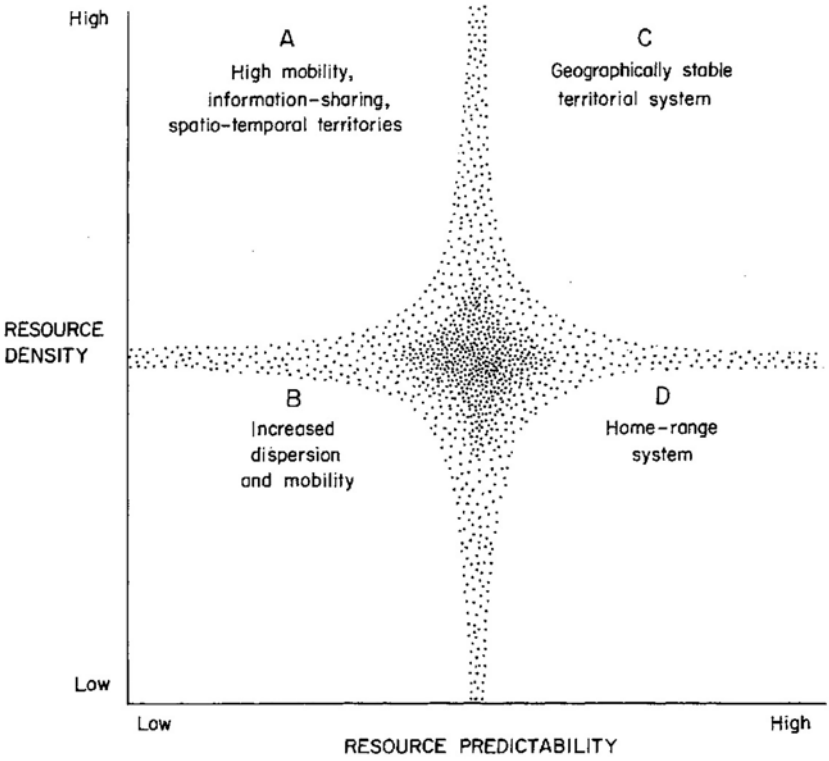

TABLE I. RELATIONSHIP BETWEEN RESOURCE DISTRIBUTION AND FORAGING STRATEGY.

	Resource Distribution	*Economic Defendability*	*Resource Utilization*	*Degree of Nomadism*
A.	Unpredictable and Dense	Low	Info-sharing	High
B.	Unpredictable and Scarce	Low	Dispersion	Very high
C.	Predictable and Dense	High	Territoriality	Low
D.	Predictable and Scarce	Fairly low	Home ranges	Low-medium

Figure 2. The relationship between resource distribution in a landscape and the hunting/trapping strategy employed. From Dyson-Hudson & Smith 1978.

each area (Grøn et al. 2008). Stories about places in the landscape internally strengthen the right to a territory. Religious factors and mental constructs drape the landscape (see the Siberian Khanty in Jordan 2003). Site-bound raw materials can also have an identifying function (Spång & Loeffler 2020). If they are evidence of long distance connections, such as flint, they can also have a status-enhancing effect. Rocks with a special appearance, such as red slate have had a broader meaning within and between groups to mark identity (Lundberg 1997:167; Cummings 2013:119).

In short, the driving force behind territoriality is the need of people to develop a system of coexistence where the community, within a given geo-

Figure 3. Outline of a possible annual cycle for a hunting household 4500–2500 BC based mainly on assumptions from ethnographic sources (Lundberg 1997:144ff).

graphical area, provides exchange, both economically and culturally, and where the relationship between neighbours is constantly renegotiated (Grøn et al. 2008:60).

PARAMETERS: SEASONAL HUNTING GROUNDS

This study investigates the seasonal use of hunting grounds following the seasonal distribution of prey (moose) assuming that the winter households gathered within a common area during the summer and thereafter dispersed to their respective winter villages. The archaeological indicators of winter occupation is the amount of fire-cracked stones and scrapers surrounding the pit houses, as well as the construction of the pit houses which take advantage of the earth's insulating properties. Furthermore, some of the pit houses in Stalon were flooded and uninhabitable during the spring. The amount of beaver bones also indicates seasonality, they are less abundant on winter sites as compared to spring and summer sites (Lundberg 1997:114).

Based on a comparison with the Cree Indians of Alberta, Canada, who subsisted on moose hunting (Lundberg 1997:144), a similar lifestyle is proposed for the prehistoric peoples of Stalon where different activities are linked to different seasons (Figure 3).

Ethnographic evidence shows that the moose was an important prey during autumn and winter when hides, meat, antlers and bones are of the best quality. The winter house needed to be prepared before the snow fell. This

includes repairing the roof and insulation, collecting rocks and firewood and cleaning the floor. Storage pits had to be excavated before the frost sets in. Pitfalls and/or other traps also had to be prepared before the winter while fish needed to be caught and dried before the lakes froze. Winter was probably a quiet time when people could indulge in stories and keep traditions alive. Leather preparation was an important occupation during the winter, as evidenced by the many scrapers. Antler and bone crafts were certainly also important. Moose hunting might have been conducted on a smaller scale, but for the most part people relied on provisions in storage. This was probably in part due to the winter darkness and extremely short days, only three hours of sun in December. On the other hand fur animals are at their best in winter. Neighbours were important if stocks of food and fuel dwindled.

A critical season is the spring ice melt and flood. The pit houses could have been swamped and thus uninhabitable. Today the ice release takes place in the middle of May (Eklund 1999:17) but was much earlier during the Neolithic. Spring is and was the time of the beaver hunt. Their fur is at its best and the beavers are active outside their nests because their winter storage is now completely depleted. Birds could also be caught in the spring (Lundberg 1997:146). During the summer the different village households could have gathered in larger groups by a lake where fish, berries and game provided them with enough food. This gathering could last for two to three months. Before the ice settled, everyone would return to their winter villages. Nowadays the ice settles at the end of November, but somewhat later during Preboreal times when the climate was warmer.

It was certainly important to be on time and on station when the moose passed the pitfalls and/or other traps used to hunt them during their autumn migration. This onset is influenced by snow depth (Singh et al. 2012).

PARAMETERS: RESOURCES

The osteological material from the winter villages is dominated by moose (*Alces alces*). Beaver (*Castor fiber*) bones are also abundant, but not to the same extent as found on other inland settlements in Norrland. A few bones of reindeer (*Rangifer tarandus*), brown bear (*Ursus arctos*), marten (*Martes martes*), fish and birds have also been recorded, but their context is unclear (Lundberg 1997:114).

An adult member of a hunting and trapping household needs 1600–1920kcal/day (Speth & Spielman 1982:13). The carcass weight of a moose varies depending on age and gender. According to the County Administrative Board's moose statistics from 2020 for Västerbotten, an adult bull has a carcass weight of about 200kg, a cow of about 170kg and a calf of about 60kg (Länsstyrelsen n.d.). The carcass weight does not include the

skull, lower legs, hide and intestines, but it does include the remaining parts of the skeleton, which make up about 25 percent of its body weight (Jordbruksverket n.d.). A moose steak prepared in a modern oven provides about 1300kcal/kilo of meat. With a few simple calculations one may conclude that a moose bull can fill the calorie requirement of a five person household for almost three weeks while that of a calf lasts a few days. It is estimated that a moose provided enough food for 30 people during one week among the Beaver Indians of Alberta, Canada (Lundberg 1997:136). This estimate corresponds to a five person household during six weeks.

It should also be noted that much more of the moose was considered edible as compared with today. A meat diet in large quantities also demands a balanced proportion between protein and fat, eating only lean meat can cause the nutritional deficiency known as rabbit starvation (Speth & Spielman 1982:3). A cookbook about traditional food among North American indigenous peoples (Anderson 1973) lists the mule, kidneys, rumen and liver as delicacies. The brain, however, was probably used for hide preparation (Rahme 1991:25). Some parts went to the dogs, which by now were probably members of the prehistoric household (Mannermaa et al. 2014). A lot of moose meat was dried before the winter, while the diet was supplemented with birds, fish and small game. Since the introduction of pots, provided by Europeans, the cooking habits changed among circumpolar indigenous people, favouring boiling (Eidlitz 1969). We can only guess the proportions between fish/fowl and moose, but if half of the calorie intake consisted of moose meat, a household would require about ten adult moose per year.

PARAMETERS: MOOSE MIGRATION AND TRAPS

Moose (*Alces alces*) are partially migratory, which includes different movement strategies and migratory distances within the same population (Singh et al. 2014). For any individual, however, a given strategy is relatively predictable (Bunnefeld et al. 2010). Migratory moose show regular annual migration patterns between their summer and winter ranges, often along the same migration trails, thus making the construction of pitfall traps along these migratory trails a worthy investment, especially within a landscape where the terrain funnels much of the movement. Migration patterns vary with latitude, with longer migration distances and a larger percentage of migrants in northern Sweden compared to the south (Singh et al. 2012; Allen et al. 2016). This variation depends on the different lengths of the growing season, forage accessibility and snow conditions. A warmer climate during Preboreal times in the north is expected to result in migration patterns similar to those currently found in southern Sweden which would suggest shorter migratory distances in the past than those recorded

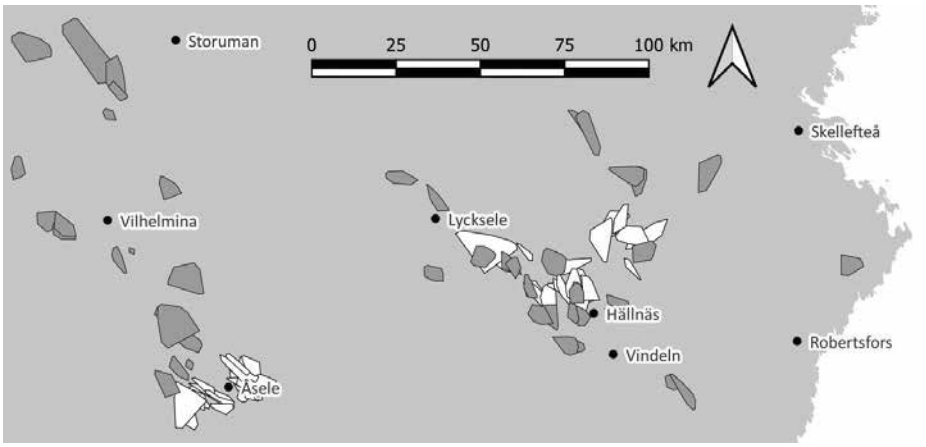

Figure 4. Each polygon is the summer (gray) and winter (white) home range of a single moose. Some home ranges overlap. The data from Åsele is from 2004 while the data from Hällnäs is from 2006. Note the differences between the two areas, where the Åsele moose migrate longer distances due to colder conditions. Data from Ericsson et al. 2004 & 2006.

in the study area today (Allen et al. 2016). Today the annual average temperature in Hällnäs is 1–2 degrees warmer than in Åsele (SMHI n.d.), a circumstance that seems to influence the migration distances between winter and summer ranges. The GPS data on the seasonal migration of moose available from Åsele Lappmark shows that the distance between the winter and summer ranges is over 200km for one bull and 100–120km for the cows (Neumann et al. 2018; Schön et al. 2007:20), see Figure 4 left side. The maximum migration distance between winter and summer ranges in Hällnäs is 83km while the average migration distance is only 19km (Ericsson et al. 2006:4), see Figure 4 right side. In our model we assume an average migration distance of 10–40km.

The bulls usually migrate to their summer ranges in May, just before the leaves sprout while cows migrate just before calving (Neumann et al. 2020; Singh et al. 2014). In contrast, the timing of the autumn migration back to the winter range is often less predictable, varying from year to year, depending on environmental conditions (Singh et al. 2012).

Pitfall systems are commonly located near winter villages. Radiocarbon dates show that pitfalls are occasionally contemporary with the pit houses (Table 1) but pitfalls may have been in use throughout most of prehistory and even later. One of the pitfalls in Stalon has been dated to about 4000 BC and is thus contemporary with the oldest dated pit houses. Radiocarbon dating and their presentation are highly problematic. This is exemplified by two flawed hypothetical scenarios that purport to place them in a prehistoric context. One is based on a fallacious mixing of both un-calibrated

Table 1. Newly calibrated ^{14}C dates 2 sigma (Stuiver et al. 2020) of pitfalls from 21 pitfall systems older than 4000 years within the Åsele Lappmark. Original material/dates from Selinge 2001:181 and Spång 1981:284 & 1997:77).

Lab no.	Raä no.	Sample location	BP	2 sigma BC	Source
Lu 1558	Vilhelmina 235:6	bottom	7280±75	6352–6005	Spång 1981:24
St 7402	Vilhelmina 573:32	wall	6250±100	5467–4963	Spång 1981:24
Lu 1562	Vilhelmina 235:18	embankment	6160±70	5300–4938	Spång 1981:24
St 11681	Fredrika 125:3	embankment	6090±265	5533–4402	Spång 1981:24
St 6335	Åsele 10:1	bottom	5835±95	4932–4465	Spång 1981:24
St 11680	Fredrika 125:3	bottom	5425±135	4525–3968	Spång 1981:24
St 8118	Vilhelmina 130	bottom	5380±170	4548–3797	Spång 1981:24
St 6585	Åsele 16:3	embankment layer 2	5210±95	4313–3795	Selinge 2001:181
St 6613	Åsele 17:21	embankment layer 3	4940±110	3972–3387	Selinge 2001:181
St 6611	Åsele 17:20	embankment layer 3	4855±310	4335–2888	Selinge 2001:181
St 6594	Åsele 16:10	embankment layer 2	4785±210	3982–2934	Selinge 2001:181
Lu 1563	Vilhelmina 235:18	bottom	4700±60	3634–3367	Spång 1981:24
St 11667	Fredrika 79:3	embankment	4680±170	3775–2928	Spång 1981:24
St 6583	Åsele 15:20	embankment layer 3	4650±175	3762–2912	Selinge 2001:181
St 11666	Fredrika 125:1	bottom	4540±75	3514–2944	Spång 1981:24
St 6580	Åsele 15:5	embankment layer 7	4410±245	3695–2458	Selinge 2001:181
St 6597	Åsele 17:11	embankment layer 2	4360±265	3652–2291	Selinge 2001:181
St 6586	Åsele 16:10	embankment layer 1	4145±295	3517–1931	Selinge 2001:181
St 6936	Vilhelmina 235:2	bottom	4020±95	2872–2298	Spång 1981:24
St 6584	Åsele 16:3	embankment layer 1	3930±125	2865–2041	Selinge 2001:181
St 7403	Vilhelmina 573:21	wall	3920±285	3317–1635	Spång 1981:24

and calibrated dates (sigma unspecified) resulting in erroneous conclusions (Larsson et al. 2012). The other is based on a covert sampling method that garbles all attempts to duplicate and verify the conclusions drawn from the sample (Ramqvist 2007:166).

PARAMETERS: HUNTERS AND PREDATORS, COOPERATION OR COMPETITION

Wolves (*Canis lupus*) are effective hunters of large prey as they usually hunt in packs. They typically hunt moose younger than two years of age (80 per cent) and cows older than 11 years. In the summer a wolf pack kills almost one moose a day and in the winter one moose every three days, in total circa 120 moose each year (Sand et al. 2011).

The wolf certainly constituted a major intrusion into the Stone Age hunting economy since both wolves and hunters were dependent on the same prey. Traces of wolves are however unusual in the archaeological record in

Norrland. Of the 59 settlements that were investigated in connection with the hydro-electric development of the Ångermanälven River, bones from wolf were only found on one site (Ekman & Iregren 1984:60). Maybe the wolf was not hunted. Maybe it was considered to have supernatural powers as envisioned by the Dene in Alberta (Moore & Wheelock 1990) and treated in a way that left no traces. Among hunter-gatherers it is also possible that the relationship between humans and wolves was mutually beneficial rather than competitive, a situation which eventually leads to domestication of the latter (Pierotti & Fogg 2017:270).

Bears are omnivores and usually prey on recently calved juvenile moose, only rarely do they kill an adult moose (Swenson et al. 2007). Bears can take over the prey of wolves, but meat is not their main diet. In Scandinavia plants and berries comprise a large part of their food (Swenson et al. 1999; Stenseth et al. 2016). Adult bears kill 7–8 moose calves per year (Sand et al. 2011). Bones from bears are rare on archaeological sites in Norrland even though this environment is natural for them. Within the Ångermanälven river system, bones from bears have been found on 7 of 59 sites (Ekman & Iregren 1984:12). Many bear graves have been found along the coast of northern Norway, as well as in the mountain regions and in the forested interior of northern Sweden. Dated to historical times it is a ritualistic act that clearly belongs to the Sami cultural sphere (Jennbert 2003:142). It is possible that the bear also held a special position during the Stone Age since the oldest unburnt bear bones are 3000 to 5000 years old (Iregren 2023:554). Bears have been a sacred animal for several cultural groups in northern Eurasia. Bears are depicted in the rock-art of the northern Scandinavian dating to the Stone Age (Hellskog 2012). The bear head sculptures from Arnäs and Bodum in Northern Sweden also date to the Stone Age (Baudou & Selinge 1977:91). The wolf however, is seldom, if at all, depicted.

PARAMETERS: THE LANDSCAPE

Pollen analyses from lake sediments in Stalon revealed that the winter pit houses were established after the postglacial thermal maximum when the climate was up to 3.6 degrees warmer than today and the forest included significantly more deciduous trees. From the glacier at Tärna, for example, the remains of trees have recently been recovered from beneath the melting and retreating ice-sheet. This shows that the tree line was up to 700m higher than it is today. Within the present study area, the highest peak, Marsfjället, reaches 1590m.a.s.l. while the tree line is now between 700–800m.a.s.l., which means that during the Subboreal period most of the mountains were covered with forest (Öberg & Kullman 2011; Kullman 2017).

The pit houses are a response to a gradually cooling climate, but it was still slightly warmer than today, since deciduous trees grew in the area.

Table 2. Settings of the simulation.

Hunters	
Onset to spring camp	123 Julian days
Onset to summer camp	153 Julian days
Onset to fall camp (trap location)	300 Julian days
Onset to winter camp	365 Julian days
Speed	0.7km/day
Trap radius	1km
Moose	
Onset to summer range	121 Julian days
Onset to winter range	304 Julian days
Speed	0.2–0.4km/day
Distance between summer and winter range	20–40km
Birth of calves (60% of moose females yrs >2)	50 Julian day
Wolves	
Kill radius (selection of prey)	0.8km
Speed	0.6km/day
Bears	
Active moose kill (only calves <1 yrs)	120–160 Julian days
Speed	0.6km/day
Hibernation	300–120 Julian days

Some lakes had already turned into bogs. According to the pollen analysis, bogs were formed before the Subboreal period, namely before the pit houses were established (Wallin 1986).

Setting up the simulation

In the simulation program NetLogo (Wilensky 1999) we specified conditions during the Neolithic. The model created here focuses on the spatial interaction between predators-hunters-moose. Our intention was to discover when this interaction becomes sustainable based on the migration model proposed for the hunting households in relationship to the migration patterns of the moose accompanied by the assumed presence of predators.

Our simulation emphasizes the importance of setting the daily movement correctly for both the human hunters, the predators and the moose (Table 2). Parameters, such as departure, arrival and speed were adjusted so that hunters would reach their traps when the moose were in the area. For

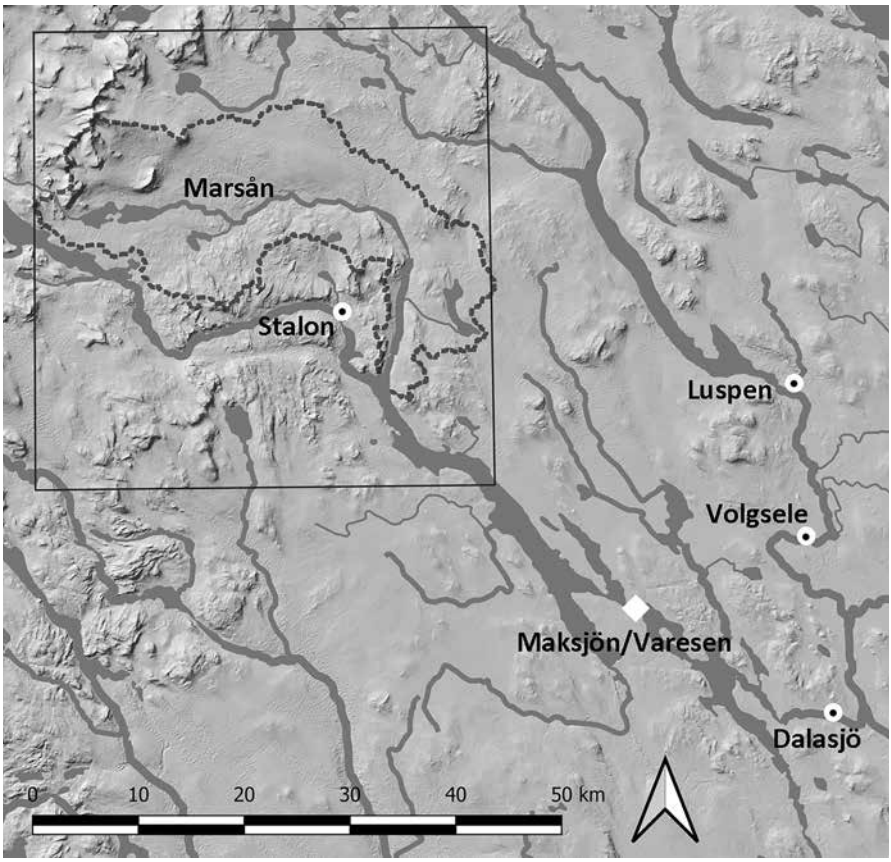

Figure 5. The frame around Stalon is equivalent to the map in figure 6. All winter camps with pit houses are marked with a white dot, their common summer area (Maksjön and Varesen) marked with a white diamond. The Marsån hunting territory, belonging to one household from Stalon, is marked with a dotted line.

example, if the daily movement was set too low, households did not reach their base camp and traps in time. If the movements of the predators were too slow then they did not catch up with their prey. The daily movement of the moose also needed to be set so that most of them reach their summer and winter destinations within a specific time period.

A simulation run in the study area will furnish varying results depending on where traps and base camps are located and where the winter and summer ranges of the moose are situated. After having reached their base camps, households move randomly in the vicinity of the camp. Likewise, moose move randomly within their seasonal home range.

Household base camps were located according to certain principles. The winter base camp includes pit houses while the summer camps are

located at lakes Maksjön and Varesen (Figure 5) which is believed to have been a common summer residence used by several winter villages (Lundberg 1997:138). The spring camps were located along the river Marsån, where beaver trapping is believed to have been most lucrative. The pitfalls are located near the winter range of the moose, taking into account that transport by boat/sledge to the winter village would be possible. The winter range was placed close to the fall camps while the summer ranges were initially placed randomly (Figure 5).

GEOGRAPHICAL PARAMETERS

Using real terrain data and archaeological documentation within the area under study, we simulated the Neolithic environmental conditions as closely as possible. Terrain properties are created using digital elevation maps (DEM) with waterways and lakes. In this model we assume that all land has equal properties and is not affected, for example, by overgrazing or forest fires.

Rivers and lakes are obstacles for the migration of animals, but only to a certain extent. Both wolves and moose swim long distances, whereas in the winter the ice facilitates movement. Rivers and lakes are impossible to cross during some weeks when ice formation and break-up occurs, but these factors are excluded in the model.

ANNUAL CYCLE OF THE HOUSEHOLD

We divided the household annual cycle into four seasons, winter, spring, summer and autumn with each season having one base camp. We specified the day of the year when households move to a new seasonal encampment, the arrival at the summer camp is 1 June. During our simulation, we adjusted distances travelled in a day so that the households would reach their base camps in time to intercept the moose. Households have probably travelled according to certain preferences, for example via lakes and rivers or by land, topography permitting. In the model households move in a straight line between seasonal camps.

MOOSE MOVEMENT AND REGROWTH

We controlled moose migration through several parameters. Two variables control the direction; the destination parameter and a variable that drives the moose towards valleys. The start of the migration towards the summer areas was set to 1st April and back towards the winter areas on the 1st November. The map frame sets the limit for the distance between winter and summer areas to a maximum of 60km (Figure 5).

In the spring cows give birth to one or two calves (Neumann et al. 2020). The calves inherit migration trails from the cow. In our simulation,

we simplified moose fertility which decreases after ten years (Sand 1997; Ericsson et al. 2001) by assuming that 60 percent of all cows older than 2 years give birth to a calf (Sand 2007). The quota is based on the County Administrative Board's statistics from this area between 2009–2019 that show a fertility rate of 0.6 calves per cow (Länsstyrelsen n.d.).

Home range size varies individually according to GPS documented movement, about 2700ha in Hällnäs and 1300ha in Nordmaling (Ericsson et al. 2006; Neumann et al. 2018). Here, each moose is assigned a home range covering on average 2000ha for both summer and winter.

EFFICIENCY OF THE TRAPS

Ethnographic sources show that trapping moose in a pitfall is one of many possible hunting methods. Snares and self-triggering spears have also been employed as well as hunting by boat at fords and pursuit hunting through heavy snow on skies (Spång 1997:55). In this model we do not distinguish between pitfalls or other methods used to hunt or trap moose but we assume that the trap is only active when the household is in place.

A radius was created around each trap. Only when the household and moose are simultaneously within this radius does the trap become functional and moose is caught. The trap should not be too far from the winter village, where the prey is to be stored. Several factors determine the difficulty of transporting the prey, such as snow and ice conditions, as well as topography, none of which is specified in this model.

Unlike the predators, the household does not select calves. Calves were probably not attractive from a nutritional point of view, but they do provide the best hides (Rahme 1991:39). In the model, however, only moose older than one year are killed, a parameter chosen because it simplifies keeping track of nutritional needs, which is ten moose per year for each household.

The moose density in Sweden is very high relative to other countries globally (Jensen et al. 2020). This is in part caused by extensive forestry that generates large areas of young successional forest and in part by selective hunting practices that cull the low reproductive members of the moose population, were calves are shot before the female (Lavsund et al. 2003). Thus moose density today likely differs from Stone Age conditions. Today the population is estimated to be 230–360 thousand in the summer when the calves are born (Jagareförbundet n.d.). With 28 million hectares of forest in Sweden (Skogen n.d.) there is an average of about one moose per km^2 of forest. Today, during the annual moose hunt from autumn to winter, between 80,000–90,000 moose are killed, equivalent to 29 per cent of the population. The moose population is less dense within Åsele Lappmark where in 2019 a total of 2200 moose were killed in a hunting area of 14,700km^2 (Länsstyrelsen n.d.). This corresponds to about 0.15 moose per km^2 and a

density before the hunting season of 0.45 moose per km². Stalon, the area under study, is 1849km² in size. If moose density in the past was equivalent to that of today, the study area would have supported about 700 moose.

WOLVES AS PREDATORS

A pack of wolves normally consists of a family of about six with a territory of about 900–1200km² (Sand et al. 2007:27). In our model, the size of the wolf pack does not increase and the pack only hunts moose calves younger than two years and moose cows older than 11 years (Sand et al. 2007:33). To survive, wolves require a large number of moose, but wolves and humans could coexist if the moose population was large enough, to be exact, over 0.5 moose per km². Sand et al. (2007) have calculated different scenarios concerning culling rates and concluded that a density of 0.5 moose per km² together with a wolf pack with a territory of 1000km² would entail that both wolves and human hunters would be able to meet their needs without endangering the regeneration of the moose population. However, if the territory of the wolf is less than 1000km² then the moose population risks extinction. The predation rate of wolves is regulated by two variables, mobility and radius. Mobility controls the speed at which the wolf pack moves towards the prey and the radius indicates the distance to the prey. When a wolf targets a prey that meet the criteria (calf <2 years and cow >11 years) it is followed and killed. The radius is adjusted so that the wolf pack kills approximately 100 moose per year.

Results of the simulation

Eight different scenarios were simulated, based on the parameters described above but with varying moose density, number of predators and traps (Figure 6). A period of ten years was simulated during which the different outcomes are compared (Table 3).

The speed of the moose was set so that most of them reached their summer range during the spring. The human hunters/household needed to travel 700m/day to reach their destinations on time. The number and efficiency of the traps was set so that each household harvested ca 10 moose/year. The speed and radius of the wolves was set so that each wolf pack would harvest circa 100 moose each year. A bear only kills juveniles during spring and its speed and radius was the same as the wolves. The result of the bear's harvest was rather unpredictable, but their impact on the population was minimal.

Our simulation suggests that when the moose population falls below 0.6 moose per km² while both predators and hunters kill their share of the

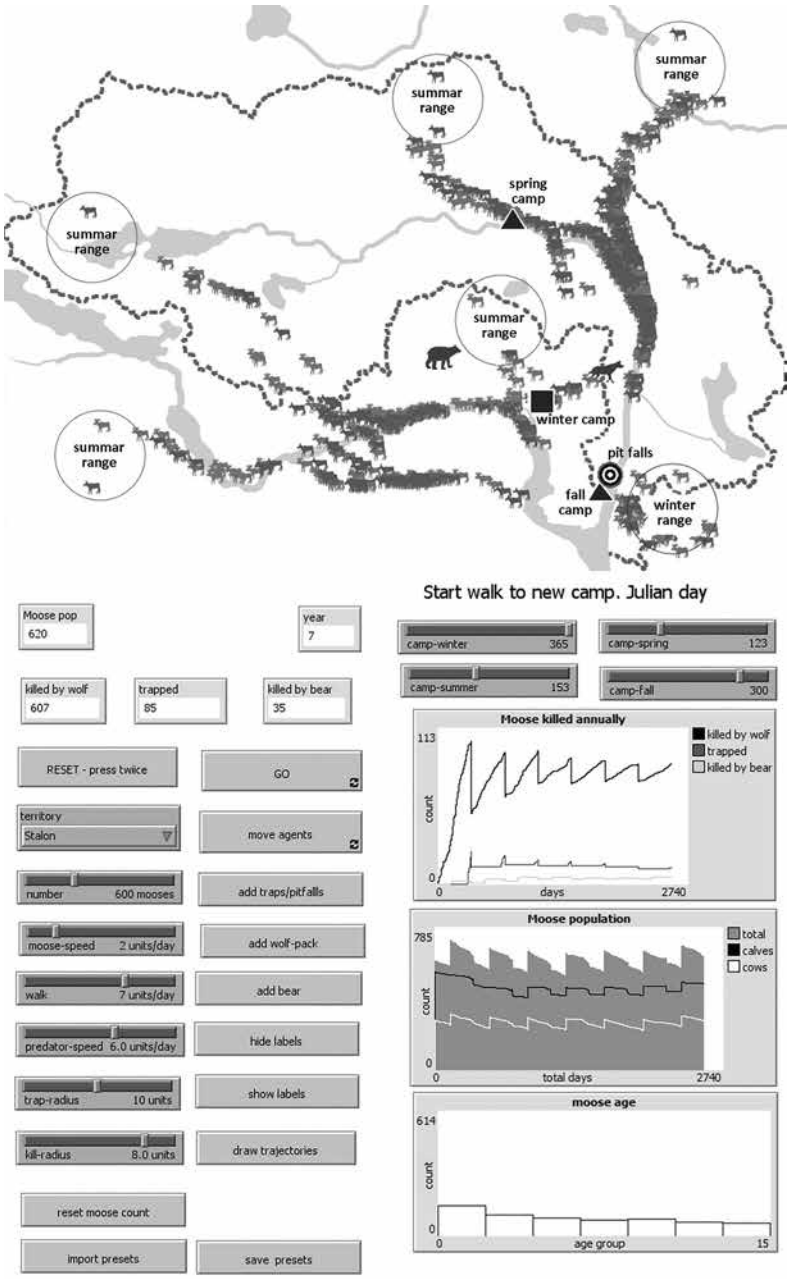

Figure 6. Snapshot of the simulation model running according to scenario 2 (Table 3). The hunting territory, Marsån, belonging to one household from Stalon is marked with a dotted line. The moose migrate between five summer ranges and one common winter range. The household has its fall camp near the moose's winter range, where pitfalls are placed (marked with a target symbol). The summer camp is located at Maksjön-Varesen outside the map. One unit equals 100m.

Table 3. Variations in the densities of the moose population as a result of different hypothetical scenarios based on the settings for departure, speed, trap-radius et cetera, as shown in Table 2.

Scenario	Initial moose population	Moose mortality rate and population level after 10 years				
		old age	wolf	bear	trapped	remaining
1	600 (0,38 moose/km²)	333	0 (no wolfs)	61	209	3959
2	600 (0,38 moose/km²)	217	900	40	109	861
3	600 (0,38 moose/km²)	101	778*	22	66	217
4	600 (0,38 moose/km²)	227	868	101	86	1303
5	1000 (0,6 moose/km²)	359	1858*	40	131	1262
6	1000 (0,6 moose/km²)	175	887	28	333	513
7	1000 (0,6 moose/km²)	218	905	106**	105	689
8	1000 (0,6 moose/km²)	258	1026	65	722	947

*two wolf packs *two bears

moose population, then the moose population will decrease every year until completely depleted. This is consistent with the data reported by Sand et al. (2007). The results from simulating eight different scenarios are presented in Table 3.

Row 1. With no wolves and only one bear in the area the moose population grows over six times its original size, even if the human household traps twice as much as it needs.

Row 2. With one wolf pack in the area the moose population still grows.

Row 3. Two wolf packs in the area cause a sharp decline in the moose population after six years, since all juveniles are killed.

Row. 4. In this scenario predators and hunters meet their needs while the moose population more than doubles.

Row 5. If the moose population is initially set to 1000, two wolf packs and one household can all meet their needs while the moose population grows slightly.

Row 6. In this scenario the household extends its hunting range and traps three times more moose than previously. The wolves meet their needs, but the moose population drops to half of the initial population after ten years.

Row 7. Bears have minor impact on the system. Two bears and one wolf pack in the area cause a drop in moose population after ten years, but afterwards the population starts to grow again.

Row 8. This scenario is rather stable albeit the hunters are active with three traps at different places. By focusing on moose all year round and following the moose migration, they achieve the needs of seven households. One wolf pack and one bear are also present. This simulation was run to analyse the possibility of hunting for trade.

Summary

After running a number of alternative sets, we noticed that if a household fully utilizes its territory, one consequence will be a relatively longer walk to the local gathering at the summer meeting place. Thus the question is whether the utilization of the entire territory required participation of all members of the household. It is most likely that households moved between two base camps, the Stalon winter village in autumn-winter-spring and the Maksjön-Varesen area in summer. The full extent of the household territory was probably only used in the autumn and spring by individuals or task-groups, that is to say, for hunting birds, beavers and quarrying. Moose hunting, however, required the entire household to be gathered at the fall camp.

Moose cows pass on their migration route to their offspring. In our model, we assume that moose follow their traditional migration trails generation after generation as any given moose is quite consistent in its movement strategy (Bunnefeld et al. 2010). However, if a majority of traps had only been placed in the summer range of, for example, the simulation in Table 3 row 8, then the moose population of that particular group will decrease. We assume that this was obvious to the households and that the traps had to be built at several alternatives places in order to increase hunting success as well as to spread hunting pressure across the area. It is possible that the territory was used all year round for moose hunting and that the summer gathering took place for a short time at a marketplace, as was the case during historic times, where any surplus could be traded. This scenario is plausible in following periods after 2000 BC.

However, moose were probably caught in the summer during the time before 2000 BC as well. Two of the pitfalls at Varesen (Raä Vilhelmina 235, see Table 1) are contemporary with the winter villages but since there are no pit houses at Varesen we assume that the drying of moose meat and the processing of hides was also carried out during the summer.

Logistics regarding winter storage in collaboration with all households within a winter village would seem to be important. The prey could be slaughtered at the kill-site, but since almost the whole carcass was used, its weight did not decrease. Thus in one form or another the entire carcass had to be transported to the winter village and distributed among the different households where the skin was stretched for processing while the meat was cut into pieces and dried. In some places the prey could be moved by boat, but otherwise some form of sledge was probably necessary for transportation.

Conclusion and beyond

This study was intended to evaluate the models presented in previous research (Lundberg 1997) regarding winter and summer residence among hunter-gatherers during the Neolithic in Lapland. The intention was also to see how moose migration patterns interacted with the proposed migration between summer and winter settlements for a single household and if it was possible for wolves and bears to live in harmony with this economy. When the SLU mapped moose migration patterns and the predatory rate of wolves and bears, the opportunity to go deeper into this issue was made possible. In addition, a simulation tool was available that could process and animate migration patterns and how they evolved depending on geophysical conditions.

We applied a simple model that is limited to a few factors in the ecosystem; terrain, moose, wolves, bears and one household. We have not considered the occurrence of beavers, vegetation, poultry or fish, all of which would have been equally important for human subsistence. Neither has the availability of raw materials for tools, clothing and building been taken into account.

The social need for local meeting places for larger gatherings of people is a topic in archaeology (Käck 2009:7; Whallon et al. 2011). Lakes Maksjön and Varesen have been designated as an area that could have supported a local gathering of inhabitants from several winter villages during the summer (Lundberg 1997:141). There was probably also a need for more extensive networks reaching beyond these local meetings. Exactly how much larger these networks might have been is still under discussion (Käck 2009:154). In the model outlined here, social networks beyond the winter-summer settlements are ignored.

We cannot go back in time. But we can hypothetically model those parameters that would have been of great concern for prehistoric peoples and thereafter test the model. Testing models has the added advantage that others can duplicate and thus confirm the validity of the model and the suitability of the materials/variables/parameters used in its creation.

The results obtained here lend credence to previously proposed archaeological models concerning human migration, seasonality, subsistence strategies, size of territories and their geographic determinants (Lundberg 1997; Spång 1997). But like most hypothetical models, its creation and testing has required a considerable amount of speculation and simplification. An ecosystem with human occupants is enormously complex and grasping all parameters requires more than can be achieved in an overview such as this. Perhaps the most valuable result from this project has been that insight. It is easy to suggest different migration models based on the sparse

facts archaeologists have access to, but how much of an ecosystem can we expect to reconstruct?

Agent Based Modelling is a powerful tool and it has a wider potential than this example shows. Perhaps a more extensive simulation, involving more parameters, would lead to better predictability. Extending the model could involve attributing soil variables to the terrain, so that when moose graze an area it needs time to recover thus addressing the risk of over browsing. It would also be interesting to calculate the number of beaver that could be harvested within a territory and what effects a declining beaver population would have on the environment. Forest fires fundamentally change both the environmental preconditions and productivity of an area, which in turn affects species composition and resource distribution (Brown et al. 2018; DeMars et al. 2019; De Jaeger et al. 2017a; De Jaeger et al. 2017b; Neumann et al. 2023: Fredriksson et al. 2024). Forest fires in Norrland have occurred frequently during history and prehistory (Spång 1997:63), some perhaps deliberately set by hunters as a form of wildlife management, an aspect which would also be interesting to include in a model.

Our simulation reveals the complexity of hunters' dependence on an ecosystem where some resources are predictable and stationary while others are on the move according to certain annual patterns. The impact of competing predators disrupts the equilibrium of the system, but this can also be monitored in a simulation. First and foremost we found that the simulation reveals the importance of specifying which parameters are predictable and which are random and/or unpredictable. When these and other factors are also accounted for, then Agent Based Modelling will facilitate an ever increasing range of insights.

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Groundbreakers

Human Remains and Radiocarbon Dates from the First Burials in Churchyards on Gotland

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This paper presents osteological analyses and radiocarbon dates from human remains found in early churchyards on the Baltic island of Gotland. Graves from the first phases of burial have been discovered beside churches on Gotland on many occasions since the late nineteenth century, usually during preparations for new interments. Previous work has focused on the artefacts found with many of them, which suggest that the early churchyard dead were buried in costume closely resembling that worn in the last phases of the traditional grave fields. These finds have been a key source for research into the chronology and process of the Christianization of Gotland during the late Viking Age and early medieval period. Neglected, however, are the human remains which were sometimes recovered alongside the artefacts, but until now escaped research attention. Here we present analyses of the remains of 26 individuals recovered from Garda churchyard, with smaller numbers from Stånga, Havdhem and Fardhem. The results contribute osteological characterization of the early adopters of churchyard burial, along with new absolute dates for the establishment and use of the new Christian burial sites, and demonstrate that the practice of furnished burial was maintained in churchyards for an extended period.

Keywords: Christianization, bioarchaeology, osteology, Viking Age, Middle Ages, churchyard finds, radiocarbon, reservoir effects, early churches

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Introduction

Artefacts thought to belong to the first phase of burial in churchyards on Gotland have been recorded on numerous occasions since the late nineteenth century. Over the decades 'churchyard finds' (Sw. *kyrkogårdsfynd*) have become a well-recognized category in the island's archaeological record (Thunmark-Nylén 1995:161; Westholm 1926). The artefacts, mainly dress accessories, show that many of those who were first to be placed beside churches went to their graves in full costume, in a manner better known from traditional grave fields elsewhere in the landscape (Thunmark-Nylén 1989, 1991, 1995; Trotzig 1969; Westholm 1926). In Scandinavia, furnished graves in churchyards are almost unique to Gotland and have been linked to influence from eastern European missions (Rundkvist 2003:75–83; Staecker 1997a, 1997b, 2001). The artefacts from the churchyards have been a key archaeological source for discussing the chronology and process of the island's conversion to Christianity, especially the timing of the establishment of the first churches and the shift of burial to these new sites.

The bodily remains of the early adopters of churchyard burials have, however, been missing from the archaeological discussion. Although skeletal parts are mentioned alongside artefacts in many of the records of find incidents, it seems to have been assumed that these were not retrieved or stored. As this paper will demonstrate, this is far from the case: several boxes of skeletal material labelled as deriving from churchyard finds are housed in the Gotland Museum store in Visby and more have been accessioned by the Swedish History Museum in Stockholm. Until recently these would have represented an unpromising archaeological resource, as their contextual information is limited and the remains of each individual incomplete. However, the range of biomolecular analyses now regularly carried out on archaeological skeletal material greatly increases the information to be gained from even fragmentary and poorly documented remains, so that this collection is now an important source. Moreover, there is potential to link some of the skeletal material to specific find events through documentation, and much of it shows metal staining which associates it with the artefacts, providing indications of how objects were worn in the grave.

In this paper we bring forward this previously unstudied archaeological resource: the newly (re)discovered bodies of the first generations of Gotlanders buried beside churches. The aim is to broaden discussion of the Christianization of Gotland by characterizing and dating the human skeletal remains. In particular, we investigate the timing of the introduction of churchyard burial and ask how long furnished burial lasted in ecclesiastical settings.

First, we present an overview of the background of the churchyard finds and current knowledge of the chronology and process of the establishment of early churches on Gotland, with a focus on how the artefact finds have contributed to questions about the shift of burial location. Then we present the first osteological characterization of the early adopters of churchyard burial, in terms of their age, sex and health status, along with indications of activity patterns in life and costume worn in death. In total, 26 individuals from the churchyard at Garda are analysed, together with three from Stånga, two from Fardhem and one from Havdhem. Next, radiocarbon results from 31 individuals are set out, providing new information on the timing of the shift of funerary practice to churchyards and how long artefacts continued to be placed with the dead. In the closing section we discuss what is now known about the nature of the first churchyard burials and place the new dates against the wider historical and archaeological picture of the chronology and development of churchyard burial on Gotland.

History of discovery and interpretation

Most of the churchyard finds came to light through the digging of graves in the late nineteenth to mid-twentieth centuries. During the first phases of burial around churches, interments seem to have fully encircled early wooden churches (Staecker 1997a:67–70, 1997b:207–209, 2001:198–201). The zones in active use then contracted, leading to a hiatus in burial in the traditionally less desirable northern side of churchyards (Staecker 1997a:78, 1997b:217, 2001:248; Thunmark-Nylén 1995:161–162, 2006:608). This meant that when more space was once again needed from the late nineteenth century, gravediggers frequently encountered remains from the earliest phases, usually on the north sides of the churches.

The distributions of the artefacts around the churches indicate that the north sides were reserved for the burial of women, since the finds are overwhelmingly female-linked artefacts such as brooches, beads, pendants and armlets, as well as small personal items that were attached to the dress such as knives, combs and keys (figure 1). Male-linked finds are scarce, mainly comprising belt fittings and penannular brooches (Thunmark-Nylén 1989, 1995; Trotzig 1969:23–24), which is presumed to suggest that male burials were placed in the southern parts of the churchyards. These areas did not see the same gap in use, so that early graves south of the churches would have been thoroughly disturbed by centuries of subsequent interments. Thus the first Gotlandic churchyards seem to have been spatially segregated by gender, a division of space that is also known from early church sites in other

Figure 1. Female grave assemblage from Garda churchyard, SHM 12281, including characteristic animal-head brooches. Photo B98:39 from the photography collection in Antikvarisk-topografiska arkivet, Stockholm (SE/ATA/ARK3_2-19/K1E).

Nordic regions (figure 2) (Mejsholm 2017; Staecker 1997a, 1997b, 2001; Thunmark-Nyhlén 1989:214, 1995).

The informal nature of most discoveries means that records are generally limited. Naturally, gravediggers were untrained in archaeological observation as well as under time pressure to prepare the ground for funerals. The many archived letters concerning the fates of retrieved artefacts show that objects were sometimes retained in private hands (e.g. ATA 5548/48, 4864/64). It is also likely that retrieval was biased to the most distinctive and ornamented objects, while local circumstances dictated how many finds came to official attention. Yet as early as 1903, the first targeted excavation was carried out by schoolmaster Hans Hansson in the churchyard at Stånga, resulting in descriptions and a plan detailing four burials of one child and three adults (figure 3) (report in ATA from 1908; SHM 13436).

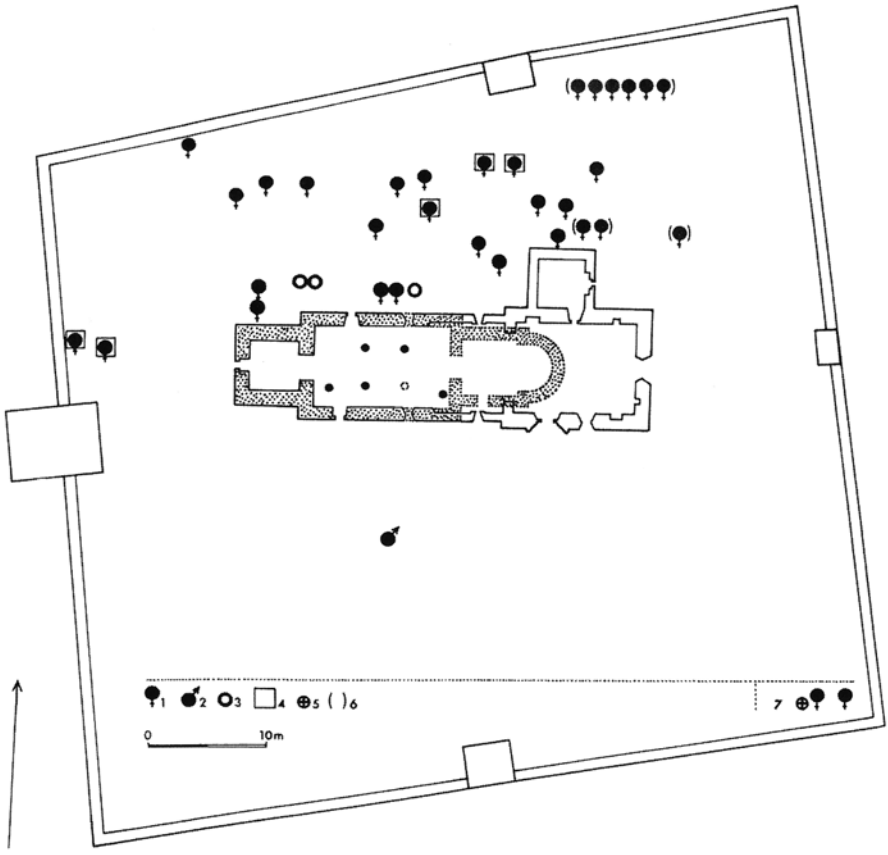

Figure 2. Plan of Garda church with distribution of registered churchyard finds. The post holes of the excavated wooden church and the foundations of the Romanesque church are marked. 1. Furnished female grave. 2. Furnished male grave. 3. Non-furnished grave. 4. Coffin. 5. Cross pendant. 6. Unknown location. Plan from Staecker 2001:200, Abb 7.

Two of these graves had dress accessories and the rest were without, a point which has tended to be obscured by the weight given to the artefacts: as in the last phases of the old grave fields, by no means all the early burials in the churchyards were furnished (see also distribution plans in Staecker 1997a, 1997b, 2001).

By 1926 sufficient artefacts had been recovered from a growing number of churchyards for Alfred Westholm to characterize their types and argue that they belonged to a transitional period between paganism and Christianity. Then where archaeologists established good working relationships with those responsible for churchyards, notably at Garda through the efforts of Greta Arwidsson in the mid-twentieth century, large numbers of finds entered museum collections, often with quite precise details of their

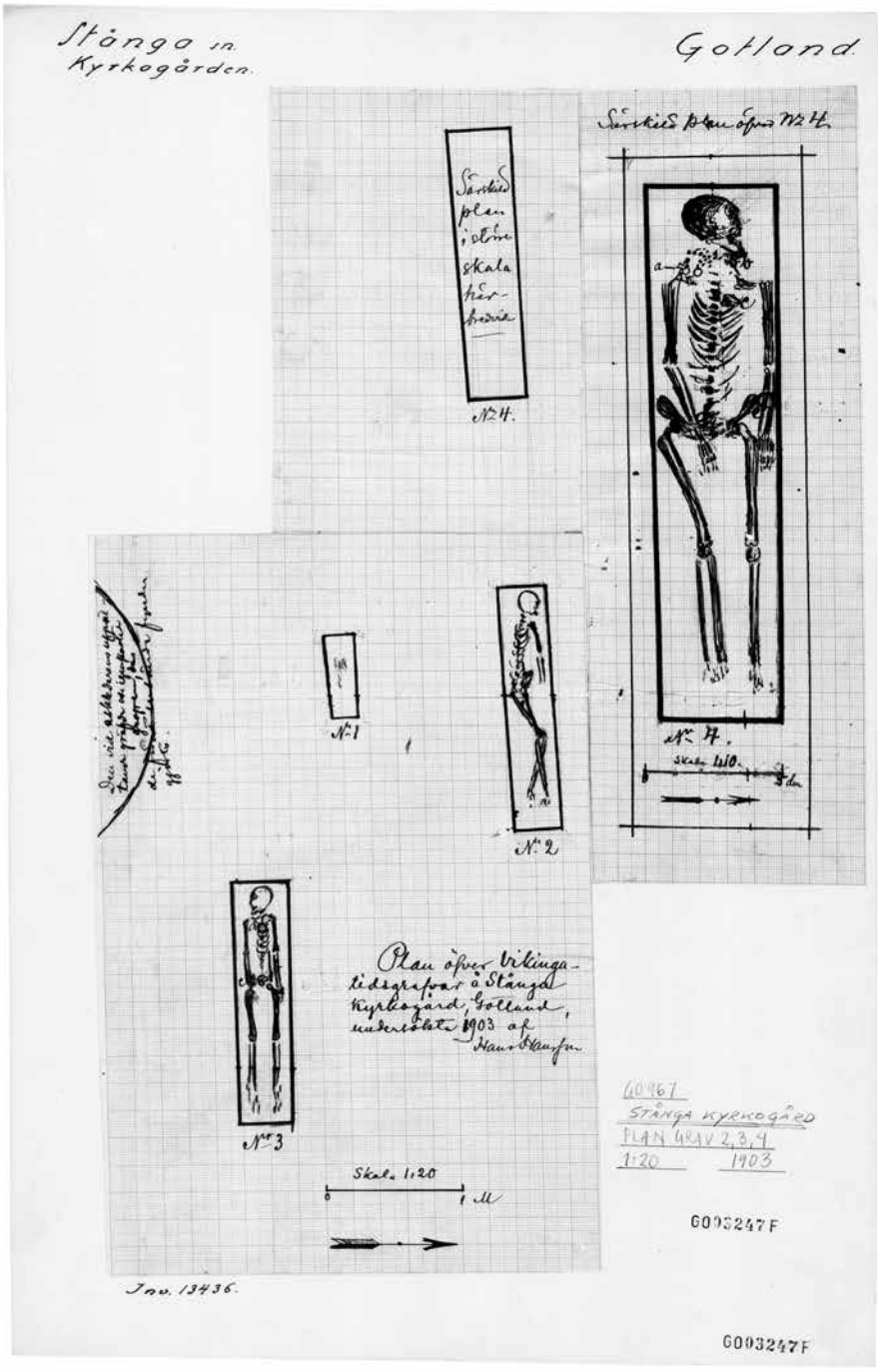

Figure 3. Hans Hanssons's plan from the 1903 excavation in the churchyard at Stånga showing four early graves. Drawing G 3247F from the map and drawing collection in Antikvarisk-topografiska arkivet, Stockholm (SE/ATA/ARK3_2-19/J1).

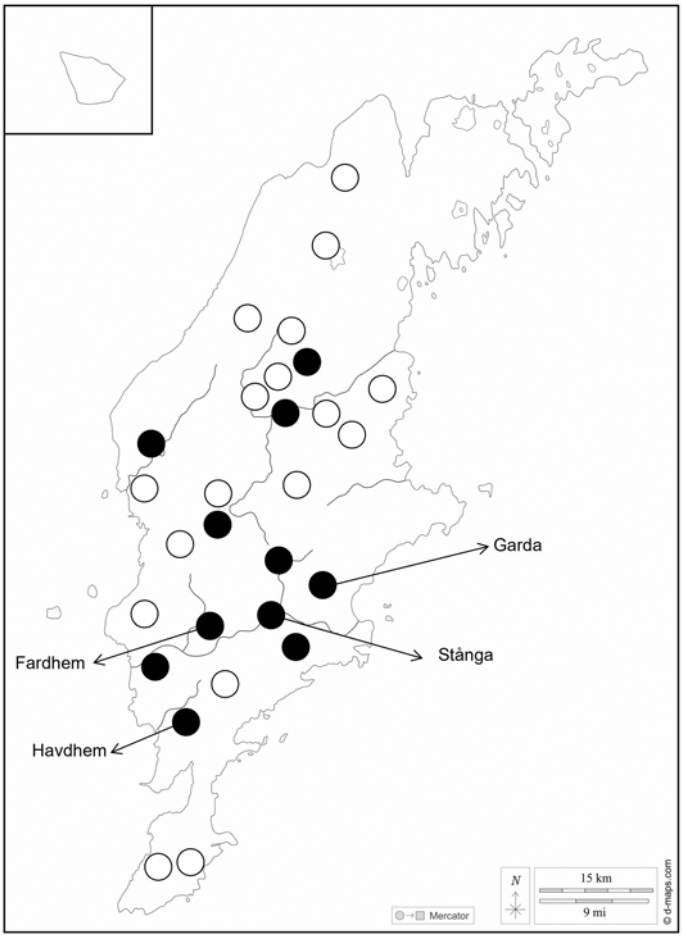

Figure 4. Distribution map of churchyard finds with sites mentioned in the text marked. Black dots: sites with recorded or highly probable churchyard finds. Unfilled dots: sites with indications of churchyard finds. Adapted from Thunmark-Nylén 1995:161, Fig. 1.

locations and associations with skeletal remains and grave structures (e.g. ATA 2858/56). Rescue excavations were sometimes conducted at sites of known interest (e.g. ATA 1949/51; Thunmark-Nylén 2000:214–221). By the 1990s artefacts had been discovered in the vicinity of 28 of Gotland's more than 90 medieval churches (figure 4) (Kyhlberg 1991:166 fig. 26; updated by Thunmark-Nylén 1995:161 fig. 1; for source critical discussion and critique of the number of listed sites see Rundkvist 2003:78; Staecker 1997b:205–206, 2001:236–238).

It was recognized early on that the same types of dress ornaments and small items found in churchyards are also present in graves in traditional burial grounds, implying contemporaneity. At the same time researchers

have stressed that there are general differences between churchyard burials and those in non-ecclesiastical settings. From churchyards there are no reports of the weapons, vessels or animal remains which occur in cemeteries in other locations. Burial grounds elsewhere in the landscape were gender-mixed, with inhumation graves mainly oriented north–south, and during the Viking Age they included varying numbers of cremation graves (Thunmark-Nyhlén 1989, 1995, 2006:608–610; Trotzig 1969; Westholm 1926), even if it is ever more apparent that customs shifted during their later phases (e.g. Toplak 2023). The alignment of the churchyard inhumations is west–east, and interments in wooden containers seem to have been common (Thunmark-Nyhlén 1989:214, 2006:608–610; Westholm 1926). In combination with these variances in customs, the evident temporal overlap has meant that the artefacts recovered from churchyards have become central to discussions on the Christianization of Gotland, and especially how different mortuary practices related to each other during the time of transition.

Churchyard finds and the Christianization of Gotland

At the broadest level, the late Viking Age in Scandinavia saw falls in the use of cremation, grave goods and then the old grave fields, along with the establishment of an early ecclesiastical landscape. Over time, death, burial and the commemoration of the dead would come to be regulated by Christian norms and centralized to church sites, a marked contraction from the more dispersed and diverse commemorative landscape of the preceding centuries. However, the transformations were not uniform, but comprised a number of processes in different regions, with varied histories, tempos and local trajectories (Andrén 2013; see also e.g. Svanberg 2003:147–150; Ljungkvist 2015; Norstein 2024). Gotland in particular stands out in various ways, including both the furnished churchyard burials and late use of traditional grave fields. The shift to new ecclesiastical sites on the island embodied a break with centuries of tradition, since use of some old grave fields stretches back to the Pre-Roman Iron Age or even Bronze Age (see Thunmark-Nylén 2006:596). Elsewhere in Scandinavia, a sense of continuity with the past was at times maintained by the placing of churches at existing burial places (Andrén 2013), but on Gotland the churches are instead mainly on new sites close to major farms (Andrén 2009; see also Trotzig 1969:24).

Despite recognition of varying experiences of change across Scandinavia, the overriding explanatory model remains that of a top-down conversion, driven by royal and elite interests and imposed on populations (e.g. Berend 2007; Sundqvist 2024). Recent work, however, has shown that

regional variation was closely linked to variances in power structures (Gelting 2020; Ljung 2016, 2019; Nordeide 2011). The top-down model helps to explain regions with fast and thorough changes in mortuary customs, notably in southern Scandinavia, where newly established churchyards quickly became the only spaces for burial and commemoration (Ljung 2016, 2019). But it does not account for the processes of change in other areas, notably in Gotland and also the Lake Mälaren region of mainland Sweden, where a greater diversity of ways of caring for and remembering the dead is seen, and the Christianization period was more protracted. There, many examples can be found of old grave fields, churchyards and new sites elsewhere in the landscape being used in parallel (Ljung 2016:148–171, 243–246, 2020).

Written sources imply that the Gotlanders paid tribute to the Svea king (Andrén 2021:37–42; see also Blomkvist 2008), but that royal dominion on Gotland was weak. The king owned no estates and had no juridical power on the island in the medieval period, nor did he visit it during the traditional *Eriksgata* itinerary (Lindkvist 1983). This dearth of royal power, as well as the absence of an aristocracy with large-scale landowning (Andrén 2009:53–54; Carlsson, D. 2015), mean that the supposed drivers of religious change are missing on the island. The islanders became Christian all the same, but the chronology and control of this process are debated.

Although missionary activities directed towards the North are known from written sources from the eighth century onwards, there is little indisputable archaeological evidence of Christian cult in Scandinavia prior to the second half of the tenth century (Gelting 2007:77–78, 2020; Ljung in press). On Gotland, the oldest archaeologically-dated cross pendant was deposited circa 990, whereas the youngest Thor's hammer derives from a silver hoard dated to around 1080, a passage of time which is thought broadly to capture the period of religious change (Andrén 2011:148, 2021:43). Where more detailed discussions of the timing of the Christianization process have been attempted, the churchyard finds and their relationship to continued use of ancient burial grounds have stood at the centre. Lena Thunmark-Nylén (1989, 1991, 1995, 1995–2006) in particular carried out extensive work on their typochronology, as well as on the compositions of the grave assemblages, reaching the conclusion that the depositions represent an extended period. She argued, based on the direct correspondence of artefacts found in churchyard burials and in traditional grave fields, for a long period of temporal overlap with use of both old and new sites. This, she suggested, may have continued until sometime around the end of the twelfth century, with possibly even later use of some grave fields. Further, she proposed that this parallel use of different mortuary settings represented contemporaneous pagan and Christian communities coexisting for a considerable period of time. Most subsequent researchers have been critical towards Thumark-

Nylén's late dating of the contemporaneous use of churchyards and ancient burial grounds, instead arguing that both the use of old sites and furnished burial in churchyards ceased altogether during the beginning of the twelfth century (e.g. Carlsson, A. 1983, 1988, 1990; Kyhlberg 1991:169–172; Rundkvist 2003:75–83, 86; Staecker 2001:238–241, 1997a:67–71).

While the end-dates of both burial elsewhere in the landscape and the use of costumed burial in churchyards are contested, there has been a consensus that churchyard burial started in the early eleventh century (Kyhlberg 1991:165–169; Rundqvist 2003:86; Staecker 1997a:63–71, 1997b:203, 208; Thunmark-Nylén 1980, 1989:223–226, 1995:163). Even with the more cautious earlier dating of the end of burial at older sites, this opens for a century of contemporary use of churchyards and traditional burial grounds.

This long period of diversity in burial practices is interpreted as an outcome of Gotland's decentralized social structure (Staecker 1997a, 1997b, 2001), where the decision to convert to Christianity was made at many different times by smaller units, possibly at local thing assemblies (Trotzig 1969) or reflecting estates or groups of farms (Andrén 2009:46; Rundkvist 2003:82–83). For example, Anders Andrén (2009:53) argues that the first churches on the island were built as private initiatives on major farms and suggests that the ancient burial grounds continued to be used by settlement units lacking early churches. Anders Carlsson (1988:101, 1990) on the other hand recognized no contemporaneity between churchyards and ancient cemeteries on a parish level; he saw them as excluding each other, and suggested that older burial grounds were abandoned when a churchyard was established (see also Liljeholm 1999). It is not, however, possible to verify such a model based on the available archaeological data, and as noted by Jörn Staecker (2001:236–243) there seems to be a certain overlap between early churchyards and late grave fields on a local level (see also Rundkvist 2003:78–80). Further, it is recognized that late Viking Age burials with 'Christian elements' are found in many of the traditional cemeteries, often distributed in between older graves, underlining that the background to different burial locations did not lie in a direct chronological replacement of older (pagan) cemeteries and new (Christian) churchyards (Toplak 2022:100).

Dating churchyard burials

Turning to the details of the chronological discussions, the dating – of the establishment of churches on Gotland in general and of the churchyard finds in particular – has been primarily based on written sources, dendrochronology, coin finds and artefact typologies. For the historical record,

Hans Nielssøn Strelow's chronicle of Gotland, *Cronica Guthilandorum*, completed in 1633, gives exact dates for the foundation of the churches on the island. According to Strelow, the first churches were built as a consequence of Olaf (later Saint Olaf) Haraldsson's missionary visit to the island in 1029, an event also related in the Guta Saga (GS chap. 3). Strelow's chronicle dates nearly 40 churches to the eleventh century (see Thunmark-Nylén 1980:30, Tab. 1), and several archaeologists have stressed the correspondence between the years given by Strelow and the archaeological record; many of the sites with churchyard finds are among those with early dates in the chronicle, suggesting a level of authenticity (Kyhlberg 1991:165–169; Rundkvist 2003:81–82; Staecker 1997a:67, 2001; Thunmark-Nylén 1991:180–182, 1995:163). On the other hand, some of the churches with early churchyard finds have a late foundation date in the chronicle (after 1160) (Carlsson, A. 1990:6–7), and the reliability of Strelow's information is heavily debated (Carlsson, A. 1990; Kyhlberg 1991; Staecker 1997a:66–67, 2001:195; Thunmark-Nylén 1980, 1989, 1991, 1995; Wase 1995).

Direct archaeological evidence for the first churches is limited, but the remains of three early wooden churches – Eke, Hemse and Sproge – have been dated by dendrochronology, showing that the timbers were felled in the periods 1096–1101, 1107–1112 and after 1149 respectively (Bråthen 1995:83–85, 1998; Bartholin 1998). The complications of dating the remains of these structures are illustrated at St Olofsholm, a harbour site in northern Gotland, where initial radiocarbon dates from posts probably belonging to a wooden church produced dates in the tenth century, despite the building's foundation wall overlying a burial unlikely to have been made before the second quarter of the eleventh century at the earliest. There it appears that wood from early in the tree growth was sampled, and the structure is suggested instead to date from the mid-eleventh century. It was perhaps placed in connection with burials of men killed in battle, possibly related to the historically recorded visit of Olaf Haraldsson (Carlsson, D. 2018; Gerber et al. 2023).

None of those four above-mentioned sites have yielded churchyard finds. At Garda, from where many of the recorded churchyard finds and the bulk of the osteological material discussed in this paper derive, a beam felled soon after 1065 has been discovered in the nave of the early twelfth century Romanesque stone church, suggesting it was reused from an older building (Bråthen 1995:68–72, 88, 1998; Bartholin 1998). It may have come from the preceding wooden church, of which postholes were found in the late 1960s during excavations beneath the flooring of the Romanesque nave (see figure 2). Radiocarbon results from contexts beneath the flooring seem also to indicate dating to approximately the eleventh century (Trotzig 1970; see also Staecker 1997a:67–67, 1997b:207, 2001:199).

Looking at coin finds from early churchyard burials, the *terminus post quem* range is from circa 997 to 1111–1125 (Thunmark-Nyén 1995:184, 189–193). Very few are datable to the twelfth century and none later than its first quarter. This range is seen as indicative of furnished churchyard burial dating to the eleventh and early twelfth centuries (Carlsson, A. 1990:10–11; Staecker 1997a:69–71, 1997b:207–208). However, Thunmark-Nylén (1991:169–171, 1995:184) argued that the apparent twelfth-century fall is a product of coin circulation patterns, and that old coins were still regularly deposited in the twelfth century (for critique see Carlsson, A. 1990:10–11). Coin finds from both Garda and Stånga have evidence of added suspension loops, demonstrating that they were worn as pendants (Audy 2018:176–178, 288, 291). One set from Stånga (SHM 13436b) included coins of diverse origins, one dating to circa 997–1003, and another to 1082–1106 (Audy 2018:134, 291); three of the coins were at least around a century old when entering the graves.

The chief artefacts for the typochronological dating of late furnished burials on Gotland are animal-head and penannular brooches (see figure 1). Animal-head brooches found in churchyards are above all the latest types: 6, 7 and 8 (Carlsson, A. 1983:49–53, 72–74; Thunmark-Nyén 1995:169). Most common are 7:7–9, which in Carlsson's (1983:72–74) dating can be placed circa 1000–1100 (his period D). Penannular brooches found in churchyard contexts with few exceptions belong to types FAC:S (with faceted/cubooctahedric terminals) and RUL:SM (with rolled terminals), which are also frequent in Carlsson's period D (Carlsson, A. 1988:18–19, 73–80; Thunmark-Nylén 1995:70). Occasionally a later type belonging to period E (circa 1100–1150), FAC:S with rhomboid cross-section, also appears (Carlsson, A. 1988:73–77). Thunmark-Nylén (1991:163–169, 1995:169, 182) argues that the absolute dates of periods D and E should be pushed forward in time. It should be noted that Carlsson focuses on the production period and Thunmark-Nylén on the time of deposition of the objects, albeit this does not fully explain the disagreement. Thunmark-Nylén stresses that late animal-head brooches as well as penannular brooches occur in the same graves as double-sided combs cut-in-one, or of composite type, which in medieval urban contexts are found primarily in layers dated to the twelfth and thirteenth centuries respectively, even if earlier specimens exist. In Lund double-sided combs cut-in-one occur in the eleventh century (Persson 1976), which Thunmark-Nyhlén also notes, and in Sigtuna from the second half of the century (Ljung & Wikström 2008:77; see also Ljungkvist 2015). Carlsson (1990:8–9) disputes the late dating suggested by Thunmark-Nylén and is critical towards the analogy with mainland urban sites, arguing that the Gotlandic double-sided combs could have been produced locally in the eleventh century.

To sum up, a central line of disagreement concerns how long churchyard burials continued to be costumed and furnished, and the same archaeological material has given rise to different interpretations of whether the custom stopped at the beginning of the twelfth century or continued through to its end. Further, despite lively debate on the former point, most researchers have accepted that churchyard burial began in the early eleventh century with much less discussion. In fact, as Staecker (2001:238–241) points out, it is difficult to define when churches were founded based on the current state of knowledge. With the aim of moving beyond this state of impasse, we now turn to the skeletal remains of the early adopters themselves.

The buried population

The skeletal remains discovered together with artefacts since the late nineteenth century have not previously been drawn on for research purposes; it seems not to have been recognized that in many cases they were also collected or stored. More generally, osteological work on Gotlandic material of this period is limited: of the more than thousand excavated graves from the Viking Age, only a small proportion had until recently been the subject of detailed osteological analysis (Thedéen 2019:97; Thunmark-Nylén 1989:214), even if the rate is now increasing. The recent rediscovery of significant human bone collections from Gotland's early churchyards therefore offered a unique opportunity to characterize the physical remains of those first chosen for burial at ecclesiastical sites, the overall findings from which are presented here (full details in supplementary material: table 1).

Contextual information for the stored human bones is limited, but there is evidence from the storage itself that can help associate specific find events with artefacts and skeletal remains. The individuals from Garda kept in the Gotland Museum facility were still unwashed in their original newspaper wrappings, some stamped with the names of their local subscribers, providing a close date of their finding and the parish in which they were found (figure 5). The skeletal remains held at the Swedish History Museum store – those from Stånga, Havdhem and Fardhem churchyards, as well as some from Garda – were repacked more recently, but sometimes old labels with contextual information were retained inside the new bags. As will be discussed below, metal staining, distributed mostly in areas of the chest and arms, provides additional detail to connect the human remains with the better-studied artefacts.

The osteological analysis was constrained by several factors. The skeletal remains were not, for example, all packaged in a way which fully reflected how the individuals had been buried: some boxes contained several skele-

Figure 5. Newspaper stamped with the name of Anton Johansson, Bjärges, Garda, dated from 14 January 1950. This newspaper was used to wrap Garda 12. Photograph: Astrid A. Noterman and reproduced with permission of the Gotland Museum.

tons mixed together, while others had mostly limbs packed together without indication of which grave they came from. At both storage facilities the bones thus had to be reassociated prior to the analysis, so the current study is based on the minimum number of identifiable individuals, each only partially represented. The reassociation of skeletal parts was carried out following the second order association method based on matching bilateral bone pairs in terms of similar appearance, size, robustness, maturation stage and joint congruity set out by Henri Duday (1987), Villena i Mota (2015) and Partiot et al. (2020), although lack of clear association markers meant skulls could not always be linked to postcranial remains. Twenty-six individuals from Garda, three from Stånga, two from Fardhem and one from Havdhem were identified and analysed (supplementary material: table 1). The majority of individuals (72 per cent) are present as less than half of a complete skeleton; only three (Garda 16 and 20, Havdhem 1) show completeness of more than 75 per cent.

The osteological assessment focused on biological characterization, traces of activity during life and evidence of funerary costume. The Probabilistic Sex Diagnosis (DSP) was used to determine the sex of the adults (Bruzek 2002; Murail et al. 2005), complemented by secondary sex estimation method for poorly preserved individuals (White et al. 2012). Age-

at-death was estimated based on biological growth and maturation indices for subadults (AlQahtani et al. 2010; Fazekas & Kosa 1978; Schaefer et al. 2009; Sellier 1993; Ubelaker 1978), late fusion of secondary ossification points for young adults, and observation of the iliac sacro-pelvic surface and signs of degeneration for adults over 30 (Adserias-Garriga & Wilson-Taylor 2019; Schmitt 2005). The principal sources for description and diagnosis of pathological conditions were Ortner (2003) and Waldron (2008). Nonmetric skeletal traits and anatomical variants were recorded according to White et al. (2012), Voisin (2012) and Verna et al. (2013). The methods set out by Smith (1984), Molnar (2011) and Perrin et al. (2019) were used to record, describe and classify dental wear.

The results showed that the studied population was made up of 78 per cent adult individuals, at least 75 per cent of whom were over 35 years old at death, plus a relatively small proportion of subadults. Due to the incompleteness of many skeletons, sex could be determined for only 44 per cent of the adult individuals. Among these there is an over-representation of women (93 per cent), in line with the gender segregation noted by previous work on artefact finds, which suggested the inhumation of women on the north side of churches, where the overwhelming majority of discoveries have been made. However, at least one individual from Stånga was identified as male. One grave with male-linked artefacts has previously been recorded south of the church at Garda and two in the western part of Stånga churchyard (Thunmark-Nylén 2000:215, 624). Ancient DNA extraction and analysis is currently being carried out for individuals from Garda and if successful will provide chromosomal sex, including for subadults and those individuals whose skeletons were too incomplete for osteological sexing. The number of subadults recovered was fairly low, but nonetheless enough to show that all age categories could be included in the early churchyards. The six juvenile individuals from Garda were aged between birth and 8 years old, while the skeletal material from Stånga also contained the remains of an infant of circa 40 weeks of gestation.

A general assessment of the health status of these early adopters of churchyard burial was carried out, although should be taken with caution given the fragmentary condition of most individuals. Degenerative disease was the most common pathology, particularly at Garda with 34 per cent of individuals affected by spinal arthritis and osteoarthritis. *Cribra orbitalia* – pitting on the superior wall of the orbit –is another frequent pathology (16 per cent of individuals) and seems to have affected all adult age categories, while arthritis is mainly visible in middle-aged and older people. The factor responsible for *cribra orbitalia* is the subject of much debate; specialists do not fully agree on its cause, but no longer systematically associate it with anaemia (Waldron 2008:136–137; Walper et al. 2004). The overall rather

low rate and extent of degenerative pathologies does not seem to be linked to age at death, since all age categories are present and the population was on average of fairly advanced age, but rather to relatively good health status among the buried population.

Evidence of trauma is also limited, with two individuals definitely and one potentially showing old fractures. An old fracture of a right rib was found on a middle-aged woman at Garda, which was the only pathology recorded on this well preserved and unusually complete skeleton. Another woman from Garda churchyard may have evidence of a head injury; this older individual also has a number of degenerative changes and complete loss of teeth. The Stånga male stands out with a reduced clavicle fracture and a probable fracture of the neck of the left femur with pathological consequences for the spine, pelvis and lower limbs.

The population shows a low rate of dental disease, but extensive signs of use of teeth as tools and some possible indications of deliberate tooth-filing. Among the individuals whose bone preservation was sufficient to make observations of the dental region and excluding those with extensive tooth loss (two cases), no less than 78 per cent of the individuals at Garda show significant tooth wear. Two main categories of dental modifications are recorded at Garda: extensive wear of the first molar or the front teeth which appears to be the result of a habitual activity in life; and teeth which bear signs which may indicate deliberate filing for visual effect. Regarding the wear patterns which are likely to have resulted from tooth use, modification of the first molar is the most common, sometimes also associated with modification of the incisors and/or canines. This usually takes the form of extreme wear of both upper and lower first molars, especially the occlusal surfaces (figure 6). Despite this significant dental wear, tartar deposits are moderate and caries almost non-existent. The similarities in the patterns between the individuals suggest that the wear bears witness to a shared activity of some kind, perhaps related to craftworking. This is particularly interesting in relation to the question of who these early adopters were in social terms, and will require further investigation, including against ethnographic parallels. In addition, the young woman buried at Havdhem churchyard also displays dental wear resulting from a habitual activity in life, but of a different pattern. Lastly, a number of individuals, up to four, present with horizontal lines on the labial surfaces of readily visible upper front teeth, and these appear to fall among the variety of wear patterns previously noted in Viking Age individuals from a number of sites and interpreted as deliberate filing (see Arcini 2005, 2028; Kjellström 2014; Loe et al. 2014:63, 212–213; Radon 2019; Toplak & Kerk 2023) (figure 7). These again will require further investigation to fully understand the processes which could result in such marks.

Figure 6. Detail of the worn first molars on the mandible from the female adult in grave 9 from Garda. Photograph: Astrid A. Noterman and reproduced with permission of the Gotland Museum.

A total of five individuals show one or more nonmetric variations, all located on the skull: three cases of metopic suture, two cases of wormian bones and one case of foramen tympanicum, also known as foramen of Huschke. Also known as epigenetic variants or discrete traits, these are minor variants of the human skeleton which may reflect heredity or environmental influences (Verna et al. 2013:9; White et al. 2012:476–477). All the affected individuals are adults, one female, three probably female and one of undetermined sex.

Evidence of metal staining, likely caused by copper-alloy objects (Buikstra & Ubelaker 1994:96; Dupras & Schultz 2013:327–328; Morris 1981), was found on a total of fourteen individuals (figure 8). This number is a minimum since many skeletons are so incomplete: around half of the Garda skeletons were represented by only cranial elements or a few other skeletal parts, and most of the individuals from Fardhem and Stånga exhibited poor preservation of the upper part of the body where this staining is mostly found.

The distribution of stains on the skeletal remains is indicative of objects being worn mainly on the upper chest, shoulders or around the wrists. This

Figure 7. Detail of apparently modified teeth from Garda (top left), Slite (top right) and Vibble (bottom). Photographs: Astrid A. Noterman, Johnny Karlsson (SHM) and Lisa Hartzell (SHM). Reproduced with permission of the Gotland Museum and Historiska museet/SHM (CC BY 4.0).

is consistent with the funerary practices of the late Viking Age on the island, characterized by the burial of many of the female dead with brooches, pendants and bracelets. Staining was additionally observed in the area of the head in four individuals; as discussed below, the radiocarbon results indicate some of them died rather later.

A final aim of the osteological assessment was to devise a sampling strategy for biomolecular analyses of the skeletal material, first to maximize

Figure 8. Metal staining on the first left rib and the left clavicle of Garda 3 and on the left temporal bone of Garda 6. Photographs: Astrid A. Noterman and reproduced with permission of the Gotland Museum.

efficiency in destructive sampling of the relatively scarce resource offered by these bone collections, and second to make sure that the anticipated results are grounded in osteological understanding of the population. Further biomolecular analyses are underway, but the initial step was to obtain radiocarbon dates for all the identifiable individuals, with the exception of the fragile remains of the perinate from Stånga. Following the recommendations of the literature (e.g. Eriksson & Lidén 2013; Kontopoulos et

al. 2022; Parfitt 2002), the skeletal elements selected for this purpose were primarily the femur, the mandible and the petrous bone. For the poorly preserved and least complete individuals, the selection prioritised long bones.

Radiocarbon dates from the buried population

Radiocarbon results were obtained from 31 of the 32 osteologically identified individuals (figure 9; raw data in supplementary material: table 2). All samples were processed at the 14Chrono Centre for Climate, the Environment and Chronology at Queen's University Belfast, using collagen extraction methods outlined in Brown et al. (1988), Bronk Ramsey et al. (2004) and Brock et al. (2010). Stable carbon and nitrogen isotopic compositions were also determined for all the samples. These will be published separately with discussion of dietary variability in this phase of Gotland's past, but the $\delta^{13}C$ results are included here since they informed the recalibration of the radiocarbon dates.

Given that the isotopic values suggested a strong contribution of marine protein to diet, it was necessary to correct the radiocarbon dates for marine reservoir effects. Because ^{14}C does not enter aquatic food chains at the same rate as it enters terrestrial food chains, marine organisms can produce radiocarbon ages older than their actual age. On average, this difference is 400 years, but there can be significant variation across marine systems (Ascough et al. 2005). If marine organisms are consumed by humans, then this will affect their radiocarbon results in proportion to the amount of marine protein in their diet (e.g. Dury et al. 2018; Jarman et al. 2018).

The contribution of marine protein (fm) in the diets of the individuals analysed here was calculated using a linear interpolation method laid out by Jarman et al. (2018). The $\delta^{13}C$ values relate to both marine consumption and the balance of C_3 and C_4 plants in the diet. Given that there are no C_4 plants native to northern Europe, any variation in $\delta^{13}C$ should relate solely to marine consumption (Kosiba et al. 2007:401; Strand et al. 2022). More complex modelling using $\delta^{15}N$ was not employed here, as nitrogen values can also be influenced by dietary pathways such as breastfeeding and weaning, although some studies have also shown that $\delta^{13}C$ could be affected by this (e.g. Fuller et al. 2006; Richards et al. 2002) and there was a number of juveniles in the sample. The following formula was applied:

$$fm = (\delta^{13}Cn - \delta^{13}Cterr)/(\delta^{13}Cmar - \delta^{13}Cterr)$$

Values for a fully terrestrial diet ($\delta^{13}Cterr$) and fully marine diet ($\delta^{13}Cmar$) were obtained from faunal data from Gotland. A value of -21.0‰ was used for a fully terrestrial diet, based on the least enriched value obtained

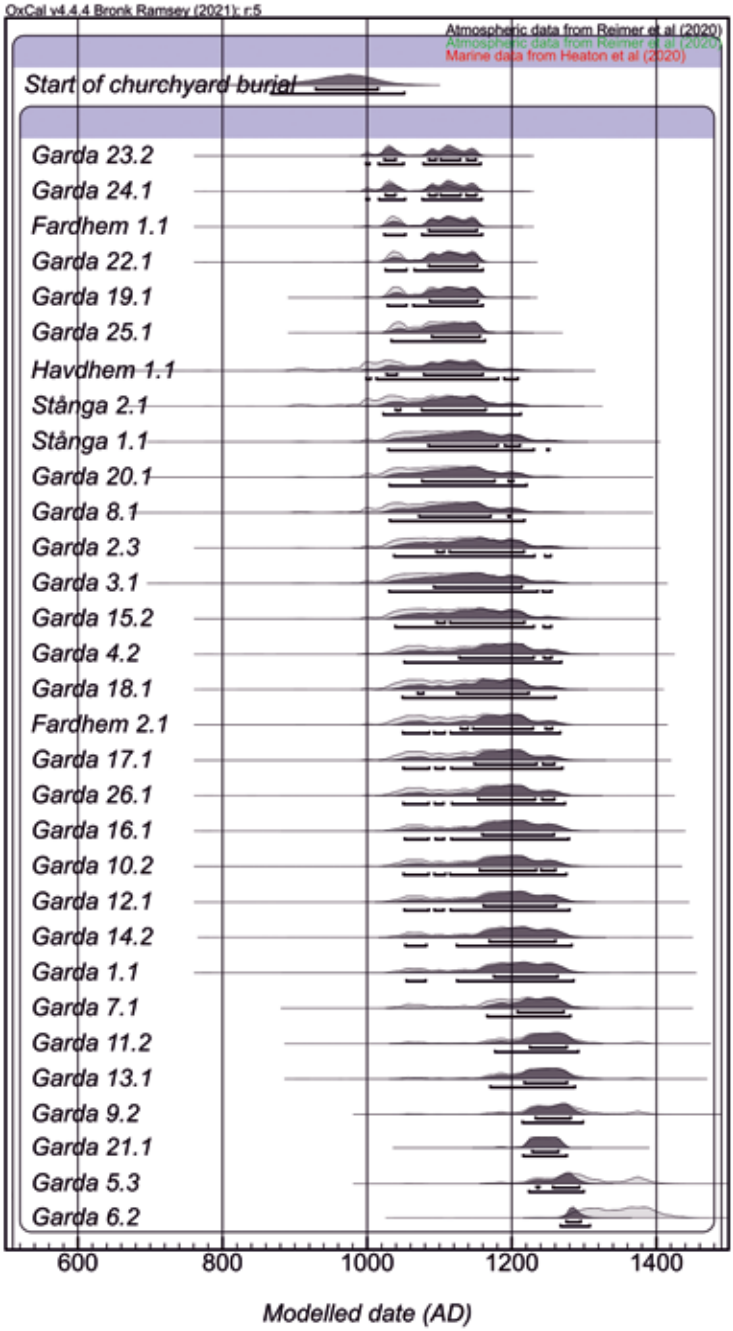

Figure 9. Recalibrated radiocarbon results from individuals buried in the churchyards at Stånga, Fardhem, Havdhem, and Garda. The light grey distributions represent the radiocarbon dates after adjustment for diet, but before Bayesian modelling. The dark grey distributions represent the dates after Bayesian modelling (highest posterior density).

from the contemporaneous site of Ridanäs, and is comparable to that used in other studies (Cook et al. 2015; Jarman et al. 2018; Kosiba et al. 2007; Strand et al. 2022). A value of -11.9‰ was used for a fully marine diet, based on the average $\delta^{13}C$ value from the Neolithic site of Västerbjers (Eriksson 2004). The only fish sampled from Ridanäs returned a lower value than this: -16‰. However, despite not being contemporaneous, the average from Västerbjers, based on more samples, was preferred. The marine end point for the Baltic Sea is likely to be distinct, due to its relatively enclosed nature, and the input of freshwater rivers (Lidén & Nelson 1994:14).

Following the calculation of the proportion of marine protein in the diet, a custom calibration curve was created in Oxcal v. 4.4, by mixing Intcal20 (Reimer et al. 2020) and Marine20 (Heaton et al. 2020) in the necessary proportions for each individual, using a standardized error of ±10 per cent (Cook et al. 2015). This reduces the precision of the radiocarbon dates, but better reflects the uncertainty involved in dietary modelling.

Determining the local marine offsets (ΔR) is more complex. The Baltic Sea has highly variable reservoir effects, ranging from about 300±50 in the Danish straits, to approximately 110±50 in the Bothnian Sea in the north, with coastal values much higher due to the input of freshwater systems, as high as 1456±51, on the eastern coast of Sweden (Lougheed et al. 2013). Because of this variability, it is likely that people living on Gotland were consuming marine resources with a mixture of reservoirs, and indeed potentially freshwater fish from Gotland itself. The effect of calibrating with different ΔR values was tested, using three different values from the area around Gotland determined in Lougheed et al.'s study, and was determined to make little difference. The results based on the median ΔR value are presented here (figure 9) and the other results are available in the supplementary material.

The samples processed had varying levels of marine protein in their diet, ranging from 1 per cent to 18 per cent. Anything less than 5 per cent was calibrated using the terrestrial curve only, as any marine effects were so slight that accounting for them introduced an unnecessary level of uncertainty. Although 5 per cent is not a large contribution, it can have a large effect on radiocarbon dates if it causes a potential date range to intersect with a plateau in the calibration curve. In this period, there are notable plateaus from circa 1050 to 1160, and from circa 1300 to 1400. These plateaus mean that the date ranges produced after marine recalibration are quite broad.

Nevertheless, the results show that all the individuals from Stånga, Fardhem and Havdhem were buried at some point in the eleventh or twelfth centuries. The larger number of individuals from the cemetery at Garda derive from burials over a more extended period of time. Just under half date to the eleventh to twelfth centuries, with a further nine dating broadly

from the eleventh to thirteenth centuries. The remainder date to the thirteenth century, with one final grave from its end or perhaps even the fourteenth century.

To refine the dates further, a Bayesian chronological model was created which modelled the results from Garda as a single phase in which it was assumed that use of the site for burial started at zero and rose linearly over time. This suggested that there was a 68.3 per cent probability that churchyard burial on Gotland had begun by 1017, and a 95.4 per cent probability that it had begun by 1055 (figure 9).

Discussion

The results contribute substantial new data to what is known about the early phases of churchyard burial on Gotland. In the first place, although the radiocarbon date ranges are wide, they give the strongest indications so far of the likely period during which funerary ritual began to move to church sites. As discussed above, the establishment of churches on the island has been believed on the basis of historical texts to date from about AD 1030 onwards, although this point has received less research attention than other aspects of this phase of Christianisation. Meanwhile the earliest dendrochronological date which may be associated with an early church is from the mid-eleventh century (Bartholin 1998; Bråthen 1995:68–72, 83–85, 88, 1998).

The new radiocarbon dates presented here are compatible with this picture. In particular, the start of the probability ranges would not support a substantially earlier date for the establishment of churchyards. A relatively small number of sampled individuals could possibly date from the first half of the eleventh century, with growing numbers and probability from the middle of that century onwards. The numbers of individuals recovered from the sites other than Garda are too small for comparisons between the churchyards to carry much weight, but it may be noted that the remains from Havdhem and Stånga have rather earlier probability distributions than many of the Garda individuals.

It is likely that the new church sites attracted burial from their first phases, since there is no marked delay between estimates of church establishment and the potential date ranges for the earliest graves. Here evidence collated by Staecker from the churchyard at Garda is significant: the spatial distribution of animal-head and penannular brooch finds there showed no chronological pattern (Staecker 1997a:67–70, 1997b:207–209, 2001:198–201). Instead of successive growth of the burial areas, Staecker proposed that the whole of the large churchyard came into use from the foundation of

the church. Similarly the circumstance that burials are segregated according to sex is taken as evidence that they were established in relation to a church (Staecker 1997a, 1997b, 2001; Thunmark-Nylén 1995:161–162). Bringing the archaeology and the new dates together, it appears that churchyards and the disposal and commemoration of the dead within them were integral to the establishment of Gotland's churches as new ritual foci from the start.

Turning to the question of who was buried in the early churchyards, one of the major demographic patterns seen widely in the late Viking Age and often attributed to growing Christian influence is the increased representation of the whole population, including children, in the burial record (Mejsholm 2009). Previously only a proportion of the dead was buried in ways which leave archaeological traces (Price 2020:869). A general tendency of Late Iron Age cemeteries in Scandinavia is a lack of children, and especially newborns. By contrast, late Viking Age burial grounds, like the early churchyards, often include children in more representative proportions (Mejsholm 2009:141–153; Toplak 2018:73–78, 2023:135–139), demonstrating the emergence of new social attitudes towards sub-adults during the time of conversion.

Although children are somewhat under-represented in the population from the early churchyards presented here, this is likely affected by limited and biased bone retrieval, and the full age range appears, from perinatal infants upwards. Meanwhile, despite the general tendency to increased representation, in the large Havor cemetery, less than 3 per cent of the excavated late Viking Age burials belonged to sub-adults, and infants and young children seem to be missing altogether (Toplak 2023:134–135). Havor was returned to after a phase of desertion in the early eleventh century, and burials continued for about 150 years, thus contemporaneously with the use of the churchyard in Garda. New analysis of the late grave assemblages from Havor suggests striking similarities with the churchyard finds, not least through the lack of overtly pagan elements in the burials as well as the find of a cross pendant, suggesting that the site may have been used by Christian communities (Toplak 2022, 2023). Therefore, it is interesting to note that attitudes to the burials of children seem to have differed between these two contemporaneous mortuary settings.

That female burials made up a significant number of the first churchyard graves on Gotland is without doubt; the osteological analyses presented here as well as the gendered artefact assemblages support this conclusion. However, the male proportion is unknown, since finds from the male-linked southern halves of the churchyards are few. The adults among the identified skeletal individuals are a relatively mature population, although too much should not be made of this pattern. The mature profile might suggest, for example, that those placed in churchyards, especially those with decorative

objects, enjoyed relatively high status connected to quality and length of life, or it could simply reflect a tendency for older women to be buried with the types of distinctive artefact which led to their recognition and retrieval.

Since this is the first study of human remains from locations which became Gotland's parish churches, direct parallels are absent. However, the radiocarbon results place the earliest individuals presented here as approximately contemporaneous with five burials associated with the wooden 'prayer house' at St Olofsholm in Hellvi parish (Carlsson, D. 2018; Greber et al. 2023). Comparison of the osteological findings tends to underline the special nature of that site, at which two or possibly three adult men had died from devastating battle injuries. As the foundation wall of the first church building overlays one grave, the suggestion there is that the burials were at least part of the motivation for its placing.

A closer parallel may be provided by the skeletal remains of some 43 individuals recovered from a site interpreted as an early Christian graveyard connected to the major early harbour at Fröjel on Gotland's west coast (Carlsson, D. 1999). Nearby are extensive burial grounds starting perhaps as early as the seventh century and in use through the eleventh century (Arcini 2018; Peschel et al. 2017), but this group is dated by artefact finds to the early eleventh century, possibly even as early as AD 1000. Due to the west-east orientation of almost all the burials, many of which were in narrow wooden coffins, and the exclusive presence of women and children, this is argued to represent the north side of an early churchyard predating the establishment of the twelfth-century church on an elevation about 150 m away. As at Garda, all age ranges are seen, including some individuals of advanced age, but the extent of pathological changes due to activity and illness observable in the skeletal material appears greater here. For the future, comparison of the stable isotope results indicative of diet should give further indications of where the early adopters of churchyard burial stand in relation to other Gotlandic populations.

The results of the present study also contribute new material to the more extensively debated question of how long furnished churchyard burial continued on Gotland. As discussed above, Thunmark-Nylén in particular has argued for prolonged use of this custom on the basis of the artefact chronologies, but also its prevalence. She observes, for example, that with around 30 known female interments at Garda, there are simply too many to represent only a short period in a time of small communities (Thunmark-Nylén 1995:163). Further, her thorough examination showed that many object types usually labelled as 'late Viking Age' in grave finds, hoards and as stray finds in fact have a medieval dating, and indicate that furnished burials continued at least to the turn of the century around 1200 (Thunmark-Nylén 1991).

The radiocarbon results in combination with the evidence of metal staining on many of the skeletons support this interpretation and indeed go further. Some individuals with definitively late radiocarbon dates, such as Garda 11 (UBA-51199) – a child who almost certainly died after 1150 and most likely in the thirteenth century – show signs of having been buried with artefacts, in this case through copper-alloy marks on the right clavicle and ribs. The extent of the stains makes the possibility of metal shroud fasteners unlikely; on Garda 3, for example, multiple connected bones are affected. Several individuals with probability ranges right through the twelfth century, such as Garda 2, have staining on similar areas of the upper body, indicative of funerary costume including brooches fastened to clothing (figure 8, tables 1 & 2). The furnished ritual was thus evidently not exclusive to the first generation of churchyard burials.

Four individuals show copper-alloy staining to the head, and two of these, female adult Garda 6 (UBA-51194) and child Garda 10 (UBA-51198), gave radiocarbon results in the late twelfth and thirteenth centuries, with no additional evidence of metal marks. These may be indications of a change in corpse presentation in the later phases. The wearing of an artefact linked to the hairstyle seems a possible hypothesis; S-shaped temple rings have been found in Stånga churchyard (Thunmark-Nylén 1995:178, 185). The other two individuals, Garda 17 (UBA-52651) and Fardhem 1 (UBA-52664), both adults of undetermined sex giving earlier dates, were each buried with a copper-alloy object in contact with or close to their mouth. One of these individuals was incomplete and poorly preserved, while the other showed average bone preservation and additional traces of metal stains on the left shoulder and upper limb.

Conclusion

This paper has aimed to raise the research gaze from the artefacts found in early churchyard burials on Gotland to the population represented and their customs. The new radiocarbon dates presented here point towards the mid-eleventh century as the start of a growth phase for churchyard burial. However the bulk of our results, especially among the higher number of samples from Garda churchyard, show a later concentration of probability centring on the twelfth century, with some individuals possibly dating as late as 1400. The dated skeletal remains in combination with the metal staining evidence support arguments for a prolonged period, probably through the twelfth century, during which costumed burial was used for some of the dead placed in churchyards.

The finding of a long chronology for furnished churchyard burials may not be as contentious as it once was, if placed in an updated explanatory model for understanding the conversion period. Late Viking Age mortuary practices on Gotland have mainly been discussed within a dichotomy of pagan versus Christian, as represented by two sets of distinct rituals, with the focus on defining the shift between the two religious modes. However, as outlined above, grave fields elsewhere in the landscape which were in use into and beyond the late Viking Age show considerable changes in terms of ritual expression in their later phases; they do not represent a static form of old ways. Nor does extended parallel use of multiple burial places need to map directly onto divisions in religious belief. This is reflected in the wider picture from elsewhere in Europe, notably England and northern France, where the last decades have seen recognition that the Christianization of mortuary customs is marked by a phase of innovation and creativity, rather than a direct leap from one well-established norm to another (e.g. Geake 1997; Hamerow et al. 2024; Zadora-Rio 2003). Similarly on Gotland, it is now evident that complexity in mortuary practices in this phase goes far beyond parallel use of early churchyards and traditional cemeteries. The Viking Age saw not only continued use of the communal burial grounds, sometimes with hundreds of graves, which had been established in the Bronze Age or Early Iron Age, but also an intensive phase of reuse of ancient sites that had previously been abandoned, as in the case of Havor (Thunmark-Nylén 2006:595–596; Toplak 2022, 2023). At the same time there was considerable establishment of new burial grounds without churches, often located in the coastal zone (Carlsson & Bokor 2018; Thunmark-Nylén 2006:595–596; Widerström 2007).

Moreover, new excavations and interpretations have recently brought further nuance to the complexity of the mortuary changes of the time. At Havor, a key element of the late Viking Age burial ritual was the regular reuse of older graves for new interments, which involved a variety of interactions with the human remains from the primary burials (Toplak 2022, 2023:144–147, 274–283). Likewise at Sundre by the southernmost tip of Gotland, a woman with an animal-head brooch in a style which dates after 1050 and perhaps into the twelfth century, was recently discovered in an ancient stone cist, exemplifying another form of late interaction with older graves (Widerström et al. 2019). Meanwhile, at Gudings slott, an Iron Age fortified enclosure in southern Gotland, east-west oriented inhumation graves in coffins were added as late as the thirteenth century to occasional burials made throughout the Viking Age, of which two or three seem to have been revisited and emptied of skeletal parts (Carlsson & Bokor 2018). Thus for a considerable period of time the archaeological record testifies to creative adaptation of rituals and use of the landscape and past monu-

ments, none of which can readily be placed in a simple pagan-Christian dichotomy. Instead, the picture is of active selection and composition of places and rites by a population navigating radical change.

Although the shift to churchyards involved a major change in the location of burial on Gotland, as well as in many aspects of the forms of graves and funerary rituals, it was thus not necessarily a complete rupture either with the past or with those who continued to use the old burial places. The presentation of the corpses themselves in the churchyard funerals, as either fully dressed or presumably otherwise wrapped individuals, mirrored the customs still in use at sites elsewhere in the landscape. Here we have drawn attention to evidence for extended, if occasional, parallel use of non-churchyard sites alongside the newly established churchyards. Where work on the churchyard finds previously focused on contrasting practices between two categories of sites and defining them in terms of pagan versus Christian, the long period of contemporaneity for which we argue instead opens for research on how funerary practices in a variety of old and new locations mirror or link to each other, along with which individuals were commemorated in different spatial settings.

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In Sheep's Clothing?

Humans and Other-Than-Humans in Iron Age Cremation Assemblages in North Spånga, Sweden

Fredrik Fahlander

This study investigates the potentially generative roles of animals in the cremation ritual through an in-depth study of an excavated Late Iron Age (*c.* 400–1050 BCE) grave-field in North Spånga, Sweden. The animal remains in this burial ground are generally of two categories: one comprises parts from several body regions, and one entails mainly fragments of the skull and lower extremities. Although there are general distinctions between animals of the first category (dogs, horses and cats) and of the second category (sheep/goat, pigs, fowl), they are not exclusive and do not reflect a dualist view of companions versus beasts of burden or food. Moreover, the latter category is here interpreted as the remains of skinned animals with head, toe and ankle bones still attached. As such, depending on how they were arranged on the pyre, they may have worked to deflect malevolent forces during the transformative part of the cremation. The collection and deposition of the cremated bones of both animals and humans, sometimes with additional unburned bone, suggests that they were considered as generative materialities in the grave, conceivably to shelter or aid the dead post-cremation.

Keywords: animal-human relations, burial archaeology, burial practices, multispecies archaeology

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Introduction

The role of animals in the Iron Age cremation rituals has been thoroughly discussed in previous research. Animals have variously been understood as personal possessions, guardians, symbols of rebirth, psychopomps, status objects, mnemonics, offerings/sacrifices, remnants of funeral meals or as food for the afterlife (e.g. Biuw 1992:289; Brück 2004:324; Fahlander 2014; Groot 2008:188; Nordberg 2003:240–244; Sigvallius 1994; Sten 2013:223; Williams 2001; Hållans Stenholm et al. 2023:92). These interpretations all have merits but tend to rely on analogies, textual sources and a generalized view of animals in terms of species. As such, animals are more or less viewed as interchangeable objects rather than as diverse beings with different affordances, properties, qualities, faculties and agencies. Considering that animal bones make up a large part of Iron Age burial assemblages, and the extra effort they pose in terms of the increased size of the pyre, there is curiously little discussion about why animals are part of the burial ritual in the first place (see for example Cerezo-Román et al. 2017; Kuijt et al. 2014; Thompson 2015; Williams & Lippok 2024). In contrast to other grave goods, such as weapons, pearls and costume fittings, the animal remains in Iron Age burials do not exhibit strong relations to the sex, age or status of the buried humans (Arcini & Magnell 2022:686; Sigvallius 1994:134). There are, however, interesting patterns in the forms and conditions in which animals are employed in the burial ritual. Some are put on the pyre as articulated bodies; others seem to be chopped into pieces or only part of the animal is cremated. The remaining bones of both categories were seemingly selected together with the human remains when moving material from the pyre to the grave (Sigvallius 1994; Williams 2005:33).

To deepen our understanding of the roles of different animals in Iron Age burial rituals it might be useful to allow the animals, and their bones, a more generative role rather than viewing them as symbolic and passive tokens for a species. In recent years, the field of human-animal studies has emphasized the active role of animals in their interactions with humans (Argent 2010; Hill 2013; Kirksey 2015; Oma 2018; Poole 2015). Emphasis is placed on how the affordances, behaviours, agencies, and needs of animals mutually form individual relations with humans and each other. Such relations (not necessarily relationships) are situational and vary between species as well as between individual beings according to e.g. age, sex, breed etc. (Law & Mol 2008; Poole 2015:863). Although the animals' particular properties and agencies are hard to determine from cremated remains, it is worth adopting a more symmetrical view of their roles in burials.

This issue also relates to a contemporary discussion of burials as composite contraptions, assembled to *do* something rather than merely represent or

symbolize individual status as memorials (Crellin 2017; Fahlander 2020b; 2024; Fowler 2013). This perspective emphasizes the physical properties, qualities and generative abilities of the materialities in the graves from an ontological point of view. Particular and intrinsic aspects of the interments (form, matter, colour, etc.) may thus be as important as the category of the item (a knife, pearl, femur of a pig, etc.). For example, does the tooth of a cow in a grave represent cattle or was it more important that the grave should contain the tooth of an animal? Such distinctions may prove important, as in some ontologies parts of animals can retain some of the qualities and abilities they had in life, even after the animal's death. The head, for example, being the seat of the major sensory organs, may be attributed with awareness after death, even performing the same functions (smelling, hearing, eating, viewing, etc.) as if it were alive (Hill 2011:409, 216). Thus, it is important to consider not only what certain animal species do but also the abilities and functions of different body parts (Fahlander 2020b:564; Lindström 2024:156–162). Although such aspects are difficult to discern archaeologically, a study of the configuration and type of bones that are deposited in the graves can be informative. Thus, after a brief background discussion, I will evaluate the benefits of such an approach in a case study of a typical Iron Age burial ground in North Spånga in central-eastern Sweden, paying close attention to animal remains in the composition of the cremation assemblages.

Background: animals in Iron Age burials

In central-eastern Sweden, the practice of cremating animals (e.g. sheep/goat, cattle, horse or pig) together with humans began in the Late Bronze Age (Hyenstrand 1968:189; Nylén 1958; Röst 2016:215–219). After being scarce in the pre-roman period, the amount and diversity of animal bones in graves increased substantially during the Late Roman and migration periods (*c.* 200–550 CE). During this period, complete bodies of certain animals also began to be placed on the pyre. This tradition culminated in the Vendel and Viking periods (550–1100 CE), with animal bones found in large quantities in cremation graves (Hållans Stenholm et al. 2023:90; Jennbert 2002:109, 2011; Nordberg 2003:239; Sigvallius 1994:133). Indeed, some Late Iron Age cremation burials contain more animal than human bone and a few even lack human bones altogether (Bond 1996:78; Sigvallius 1994:62). During this period, animals are also present in inhumation burials such as the boat-graves in Vendel and Valsgärde and the chamber graves at Birka (Gräslund 1980; Gräslund & Ljungkvist 2011). The practice of including animal remains in burials almost entirely ceased during

the period of Christianization, when inhumation in wooden cists became dominant (Artelius 2010; Hedeager 2004). The only remaining burial practice involving animal remains in this period involved the occasional placing of animal teeth in or on top of coffins (Fahlander 2018:58; Gilchrist 2019:141; Palmqvist 2021).

The majority of animal remains found in Iron Age cremation graves are bones from sheep/goats, horses, dogs, poultry and pigs. In the later part of the Iron Age, other species (for instance cats, birds, lynx, bears, rodents and fish) are also found in varying quantities (Flood & Hed Jacobsson 2018:50; Jennbert 2004a:194; Sigvallius 1994:109–113). Wild animals are less common, although there can be remains of birds of prey, fish, squirrels and occasional phalanxes of lynx and bear, the latter of which are often interpreted as remains of pelts (Lindholm & Ljungqvist 2016; cf. Mansrud 2023). The prevalence of farm animals has led to suggestions that the animals were put on the pyre to facilitate the creation of a new farm in the afterlife (Seiler & Sjölin 2022:149). However, comparisons between animal bones in settlements and burials show that the composition of animals in graves does not correspond to the stock of animals on contemporary farms (Iregren 1997; Magnell et al. 2017:220). Cattle, for example, which are common in farm refuse, are seldom found in cremation graves (Magnell et al. 2017:216). As Häggström (2011:237) points out, however, it is unlikely that all Iron Age farmsteads had the same type of animals available for burial.

It is also evident that not all species are treated the same way on the cremation pyres. Horses, dogs and to some extent cats, stand out because they seem to have been cremated as complete bodies (Nordberg 2003:240). Cattle, sheep and pigs, however, were normally cremated as parts (legs, feet and heads) and only rarely put on the pyre as complete bodies. This pattern is corroborated by in situ (*bustum*) cremation burials, where the grave was built directly over the pyre, which show a similar differentiation between the species cremated as complete bodies or as parts (Seiler & Sjölin 2022:145).

The Old Norse cosmythology is often employed to explain the roles of animals in Iron Age burial rituals. For example, dogs are commonly associated with *Garm* who in Völúspa and Grimnismál are guarding the gates of Hel (Gräslund 2004; Seiler & Sjölin 2022:147) and horses are associated with Sleipner on which Odin rides to Hel in the Edda (Loumand 2006; Seiler & Sjölin 2022:147). Cocks, and by association hens, are seen as symbols of rebirth and argued to wake the dead on the other side (Gräslund 1980:54; Nordberg 2003:266). However, the few burials described in these texts do not make such associations. They are more prosaic and only mention the occasional horse and dog accompanying their owner on the pyre (Lorentz 2020). Ibn Fadlan's account of a chiefly burial among the Rús in the Volga

Delta in 721 CE does not acknowledge any ownership of animals, but simply notes that a dog, a horse, two cows, a cock and a hen were killed and cut up before they were thrown onboard the boat to be burned (Montogomery 2014:249). Other contemporary accounts are curiously silent about animals. The Beowulf poem, for instance, which is supposed to narrate events from the period when animals were most frequent in burials, mentions no animals in relation to Beowulf's cremation (see Heaney 2000:211–213).

Another common theme in archaeological interpretations is that animals and humans were cremated together to merge after death (Jennbert 2004a:205; see also Fahlander 2020b; Ratican 2020:214). Hedeager (2004:222) has pointed out that the hybrid character of animals in Iron Age art resembles the way in which fragments of humans and animals are amalgamated in the cremation urns (see also Jennbert 2004a:199). Indeed, the development of the Nordic animal style coincides with the period in which animal bones increased in the cremation burials (Kristoffersen 2010; Morphy 1989:2). However appealing the idea of a hybrid ontology may seem, it does not fit well with the multitude of different species in the graves as human-animal hybridisation normally only concerns the merging of two bodies. Moreover, the animal style, accounts of shapeshifting and animal-themed personal names of the Iron Age mainly involve wild animals. In contrast, the vast majority of the animals in the cremations are domesticated farm animals.

A problem in drawing inspiration from other materials and sources is that human-animal relations are generally situational and contextual. It is unlikely that these relations remained constant across myth, ideology, on the farm or in death. That animals were already part of the cremation rituals during the late Bronze Age also speaks against relying on the Old Norse sources. Moreover, the Late Bronze and Iron Age cremations of northern Europe are an anomaly compared to other known cremation traditions that very rarely include animals (Davies 2005). Thus, a study of the roles of animals in Iron Age cremation rituals demands a formal (archaeological) rather than an informed (ethnographical/historical) approach. In such a study, it is important to note that Iron Age views of animals most likely differed from contemporary understandings in terms of classification (species) and dualist conceptions (wild/tame, human/animal, etc).

To understand the roles and functions of different animals in death rituals, we thus need to consider other types of categorisations in terms of affordances, behaviours, agencies and needs of different animals in an Iron Age context (see Hill 2018; Law & Mol 2008; Nordahl 2024; Oma 2018). This potential alterity inevitably turns the study into an ontological inquiry. A tangible starting point to the examination of such aspects is to analyse the different forms and conditions in which the animals are put

on the pyre and deposited in the graves; for example, whether the animals are cremated as whole bodies or only in parts and what bones are transferred to the graves. In order to evaluate the benefits of such an approach, I will examine the distribution and composition of animal remains in the cremation assemblages of a previously excavated Iron Age burial ground in North Spånga, *c.* 10 km northwest of the Swedish capital of Stockholm (Biuw 1992; Sigvallius 1994).

Humans and other-than-humans in Iron Age Spånga cremations

The excavations in North Spånga, carried out between 1964 and 1976, exposed 558 graves of which 488 were cremations spanning from the early to the late Iron Age (*c.* 500 BCE–1050 CE). The chosen grave field, labelled 157A, is situated on a small outcrop and covers about 100 cremations and two inhumation graves from the Migration period to the Viking Age (*c.* 400–1050 CE). The graves are generally round mounds or stone settings of various forms and sizes (Figures 1 and 2). Anita Biuw (1992), who took part in the excavations, distinguishes between Early Iron Age and Late Iron Age graves, but contrary to the standard division of the Iron Age, she considers the Migration period as part of the Early Iron Age. Judging from the 15 C-14 determinations from the site (which are made from charcoal) all graves but one are from the Late Iron Age (400–1015 CE). Thus, the temporal division is mainly between the Migration period (early) and the Vendel and Viking Ages (later). The early graves cluster in the middle and to the north of the outcrop (Figure 1) and judging from the type of the graves, contents and one of the C-14 determinations, the burials seem to have begun in the middle of the outcrop and thereafter progressed to the southeast and northeast. The burial items are typical for the late Iron Age and region and include pearls, rivets, nails, ceramics, gaming pieces, fragments of costume fittings, whetstones, slag, bone combs, nutshells, etc. (Biuw 1992:214–225). Of particular note are the amulet rings (*Sw.* torshammarringar), which were deposited in 18 graves. The purpose of the rings is widely debated but they are generally considered as magical, most likely protective devices (Andersson 2005:62–66; Harrysson 2023).

The osteological material from the Spånga graves was analysed by Berit Sigvallius and is presented in her thesis *Funeral Pyres: Iron Age cremations in North Spånga* (1994), as well as in a series of unpublished reports under her previous surname Vilkans. Both texts are products of their time and their perspectives and conclusions need to be critically scrutinized. For example, in her thesis, Sigvallius merges all nine separate burial grounds

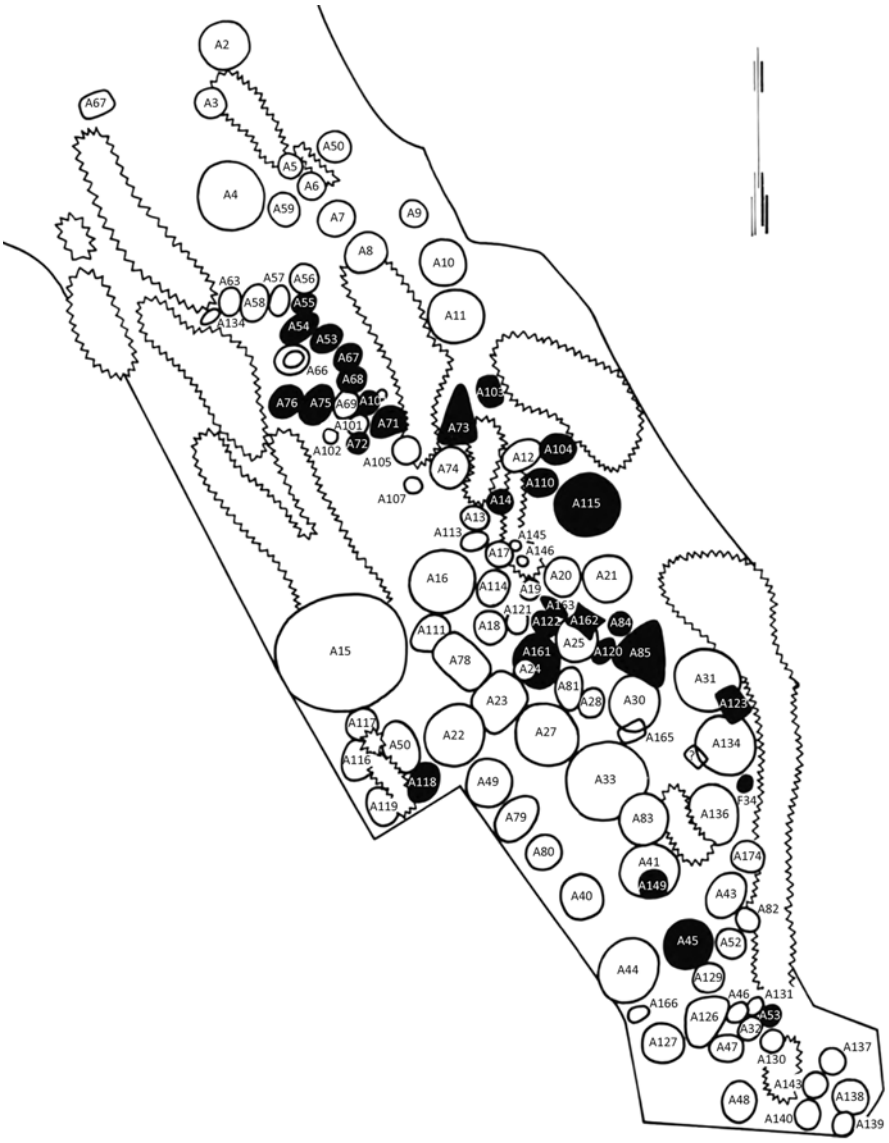

Figure 1. Map of grave field 157A (modified from Biuw 1992:82) with grave numbers added from the unpublished grave plan (ATA). The graves in black are considered earliest (i.e. from the Migration period). Areas encircled with pointed lines indicate areas with bedrock.

from different periods into one account that mainly focuses on statistical analyses of how animal bones, in terms of species, correlate to the age and sex of the buried humans. Moreover, because the material only supports a handful of osteological sex determinations, Sigvallius (1994:198–202) resorted to use the burial interments as sex indicators (Svenfelt 2009:93).

Figure 2. Photo of the south-eastern part of the burial ground 157A (modified from Biuw 1992:69).

According to this gendering principle, the 'males' tend to have more animals than the 'females' of each species, except in regard to dogs which are equal in numbers. Moreover, she concluded that horses are more often found with men and that the young adult graves (18–44 years) had more animals than other age groups (Sigvallius 1994:133). The latter correlation is not surprising since the majority of the determined human bones consist of adults. Because of the above-mentioned objections, Sigvallius' conclusions concerning humans and animals in North Spånga rest on a rather weak foundation. Fortunately, the unpublished osteological reports contain sufficiently detailed information on the individual bones to allow discussion of the distribution of animal remains in different graves, as well as the type of bones and their condition (cremated or unburned). The following is thus a restructured and reanalysed account of the burial ground 157A, mainly based on the osteological reports (Vilkans n.d.).

The grave field 157A contains just over 100 graves. The original map contains more features (113 pc) than the 108 graves reported by Sigvallius (1994) and the 102 considered by Biuw (1992:76–77, 214–224). These

inconsistencies may be due to the different ways in which the data can be interpreted, with some graves containing more than one cremation deposit, but they do not significantly alter the larger picture. The graves are not considered in situ cremations, rather mounds and cairns were constructed over elements from the pyre which were deposited in layers with or without ceramic vessels. Thus, the remains in the graves do not necessarily mirror the composition of the pyre. Moreover, a general problem of osteological analyses of cremation assemblages is that they might give a misleading impression of absolute numbers of individuals and the presence or absence of certain species in the graves. The proportion of determined bones in 157A is 15.2%, a reasonably high number, but it still means that some graves may include additional species and other types of bones than what have been recognised osteologically. These, and other taphonomical issues, are a good reason to focus on indications and trends in the material rather than absolute numbers. The osteologically determined material consists mainly of remains of humans and domestic animals such as dogs, horses, cats, cattle, sheep/goats, birds (mainly poultry and geese) and pigs. There is no evidence of wild animals including foxes, rabbits, snakes, elk, deer, rats, etc., and only a few claws from bears and lynx. Cats did not exist in Sweden until about 200 CE and began to appear more frequently in settlement sites and graves in the Mälaren region from the 6th century onwards (Sigvallius 1994:134; Toplak 2019:230). The manner of deposition, in pots or the surrounding cremation layer, does not reveal any structured pattern in terms of the animal and human bones. In 26 of the burials at 157A, bones were placed in a ceramic vessel, normally sited in a layer of cremation debris. There are no significant differences between bones that are placed in a pot versus the surrounding cremation layer. They contain the same species, possibly from the same individuals, and there are no more human than animal bones in the pots.

The humans

Judging from the unpublished osteological report of 157A (Vilkans n.d.), the grave field 157A comprises 114 buried humans. There are 16 graves without identified human bones and seven graves that contain more than one human (nos. 7, 14, 16, 18, 40, 43, 166). Five additional graves are considered double burials (nos. 13, 16, 18, 21, 33). An approximate age span has been determined for 85 individuals, with the majority (72 pc) being adults in the span of 18–64 years. Four individuals are considered pre-pubertal (0–7) and the additional nine determined individuals are placed in overlapping age spans (e.g. 4–14, 10–24, >60). Unfortunately, only 19 individuals have

Table 1. The age and sex of the human individuals in the graves of 157A. The numbers followed by a question mark refer to individuals whose sex is less conclusive and odd and overlapping age-spans are excluded (from Vilkans n.d.).

Age group	Individuals	Male/male?	Female/female?
0–7	4	-	-
18–44	27	1+5?	1+3?
18–64	5	1?	-
35–64	20	2+4?	1+1?
Adult	20	-	-

been assigned sex by osteology (13 males and 6 females), of which only five are conclusive (Table 1). This rate of the osteological sex and age determinations of 157A is fairly representative of all the excavated Spånga burials.

The animals

In total, there are animal remains in 65 of the 102 graves analysed by Sigvallius/Vilkans. Dogs are the most common species, followed by horses, sheep/goats, birds, pigs, cats and cattle (Table 2). Wild animals such as bears and lynx are only present in the form of the third phalanx and are interpreted by Sigvallius as remains of pelts (although the phalanxes could have been placed in the graves as individual objects). Plotting the distribution of the different species on the grave field plan do not reveal any significant spatial patterns. Most species are distributed fairly evenly, except for six of the eight cats that are found in a series of physically linked graves at the centre of the burial ground (A16, 22, 23, 50, 78 and 111). (see Figure 3). There are some differences between the early (Migration period) and the later (Vendel and Viking Age) graves. In the earlier period there are proportionally fewer graves with animal remains (41%) when compared with the latter (55%). The high frequency of animal bone in the graves attributed to the Early Iron Age is mainly due to Biuw's characterization of the Migration period as part of the Early Iron Age. For comparison, in an adjacent grave field (no 156), all but one of the graves categorised to the Early Iron Age with animal remains are dated to the Migration period (Biuw 1992:53). There are nonetheless a few chronological differences at 157A. The majority of dogs, for example, are with four exceptions (A34, 45, 103, 149) found in the graves of the later period. This is also the case for the horses, which are only found in three of the same early-period graves as the dogs (A34, 45, 149). These four graves are all clustered in the southern part of the outcrop, which may indicate that they in fact are later than the other early graves at the top of the outcrop. Birds are only found in two early graves (A34, 71) and pigs

Table 2. The animals in the graves of 157A. In addition, there are also four instances with phalanxes from bears and two from lynx. The bracketed numbers are unburned animal bones added to some of the graves (data from Vilkans n.d.).

Species	No of graves
Dog	58
Sheep/goat	36 (3)
Horse	33
Bird	24 (3)
Pig	14 (1)
Cat	8
Cattle	5 (1)

only in one (A73). Remains of sheep/goats are, however, evenly distributed over time and space. They are found in similar proportions between the early (28%) and late (26%) periods. In general, the distribution of animal remains at 157A is fairly representative of the other grave fields in North Spånga, the only significant divergence being theremains of fewer cattle (4.9%) compared to the average (8.6%) (Sigvallius 1994:71).

As already mentioned, correlating different species with the age or sex of the human individuals in the graves is difficult in this case. The thirteen possible males have all been cremated with typical species (dog, horse, sheep/goat, pig, cat, bird and cattle) in different combinations, while the six females have been cremated with dog, horse, pig, sheep/goat and bird, but no cat or cattle remains (which are rare at 157A). A similar lack of patterning in the deposition of animal remains is also evident when examining the age of the humans. The graves of young individuals under the age of 18 can include dogs, horses, cats, sheep/goats and birds. There are also three cases where young individuals, between 4–24 years old, buried in the same grave as an adult had been cremated with all the typical animals except for cattle. The few subadult individual (0–7) single burials, however, only contain the remains of horses and sheep/goats.

The remaining 37 graves without identified animal remains do not differ substantially from those containing animal bones. They too are evenly distributed throughout the outcrop, with a small concentration in the south. A common factor for these graves is the overall small number of bones; the humans in many of them are not age or sex determined which suggests that the lack of animals is, at least partly, due to taphonomy. It should nonetheless be noted that the superstructures of some of these graves are fairly large (A49, 66, 74, 85, 134, 136), which shows that a high number of animals on the pyre is not necessarily an indication of high status (as judged by the size of the grave).

Parts and wholes

On the whole, the Spånga cremations follow the general differentiation between species in Late Iron Age graves, with horses and dogs standing out as the most common animals in the graves to be cremated as complete bodies (Sigvallius 1994:109). The distinction between complete and partial bodies is determined by the types of bones that are found in the graves. In her thesis, Sigvallius (1994:110) differs between 'complete bodies', 'probably complete bodies' and 'uncertain'. However, employing this definition, humans are more often partial in relation to dogs. In the unpublished report, a complete body is instead defined as showing 'fragments from all body regions' (Vilkans n.d.). In this study, a complete body is defined by the identification of at least one fragment each of: the skull, spine/ribs/pelvis and extremities (parts of lower leg/foot). This correlates well with many species that are only present as fragments of skull and lower extremities. There are nonetheless several inconclusive cases such as grave 157A:33 that contained a scapula and extremities of a cat. This suggests a complete body even though it would not pass the criteria.

At 157A, 43 graves out of the total 84 graves with cremated material include the remains of at least one complete animal (Table 3). Dogs are most common, either as a single complete body or combined with a complete horse, sheep/goat, pig, cat or bird. Only three graves (A53, 113, 149) included bones from complete bodies (sheep, pig and horse) without a dog. Horses, the second most common animal to be cremated as a complete body, are found in 20 graves and always together with at least one other complete animal. Significantly, cattle never occur as a complete body in any grave in any of the nine burial grounds in North Spånga. Among animals cremated as complete bodies, a combination of dog and horse is most common (17 pcs). The number of complete animals in the 43 graves varies from one to five different species. Grave (A16) stands out, with five complete bodies (dog, horse, cat, sheep and bird) and grave A11 has four complete animals (dog, horse, cat and pig). An additional nine graves contain three complete animals, while twelve graves have two complete bodies. In the 15 cases where there is only one complete animal, it is with one exception always a dog. It should also be noted that one cat is found in a double burial containing two dogs, while the combination of cat and dog is found in four single burials. This may cast some doubt on the proposed idea of these animals as personal companions or pets.

The graves containing animal remains from complete bodies have no general relation to the sex and age of the buried humans. Of the 43 graves with at least one complete animal, the sex of the humans is undetermined, apart from one possible male and three females. Dogs cremated as complete bodies

Table 3. Remains of the animals cremated as complete bodies at 157A (data from Vilkans n.d.).

Species	Complete	Total no.	Share of total
Dog	41	58	71%
Horse	20	33	61%
Sheep/Goat	9	35	25%
Pig	6	14	43%
Cat	5	8	62%
Bird	2	26	13%
Cattle	0	5	0%

are present in graves of all sexes and ages, and horses are found in six of the nine male and two of three female graves. Remains from complete dogs and horses are only found together with adult individuals (ages 18–64), although one of the four double graves containing a young individual included two horses, which may indicate one horse for each human. Remains of complete sheep/goats are only found together with adult individuals. The sex of the humans in these graves is mainly undetermined, with the exception of one possible male and one female individual. Sigvallius (1994:114) notes that most sheep/goats cremated as complete bodies are in the Viking Age graves. Complete pigs are found together with adults of undetermined sex, apart from one from a grave with one male. Bones of cats are deposited in one double burial (one young person and one adult), and with one adult, but otherwise with individuals of undetermined age and sex. In summary, there are no consistent patterns of who (in terms of age, sex or status) is to be cremated with complete animal bodies of any particular species.

The partial bodies of animals such as pigs, sheep and cattle are generally interpreted as symbolic food offerings for the dead because they are rarely represented by the meaty parts of these animals (Vilkans n.d:3). As a general hypothesis, this is difficult to either prove or disprove, but it is significant that these bones were placed in the grave. At 157A, the bones of partial animals show the same degree of burning as the complete bodies that were placed on the pyre; hence, we can assume that both were put on the pyre at the start of the cremation process. It should also be noted that humans are sometimes only represented in the graves by remains from the head and feet. In fact, in the Spånga cremation graves, the remains of dogs are more often 'complete' than humans (1994:109, 116). That being said, the majority of farm animals like cattle, pigs, sheep/goats are mainly represented by pieces of the skull and lower extremities in the graves. This pattern is quite persistent and suggests that these body parts had particular significance in the burial ritual.

Remains of partial animals are found in 30 graves at 157A. The majority of the buried humans in these graves are adults, of which five are potentially male and one female. Sheep/goat dominate the partial animals in the graves (19 of 30); eight are found in graves of the early period and eleven in the later. They are evenly dispersed on the outcrop, with no particular structural relations to the sex of the buried human. Partial pigs are found in eight instances, with equal proportions as skull and teeth fragments or as parts of the lower extremities. They are only present with adult (ages 18–64) humans, of which four are potentially male graves (of the total six instances). When the entire Spånga material is considered, pigs are equally found in male and female graves, with only minor fluctuations over time (Sigvallius 1994:74). Pigs are mainly found in the late period graves, with the exception of one in an early grave (the large triangular grave A78), and are concentrated in the middle of the outcrop. Partial pigs and sheep/goats are buried together in three instances, while the teeth and toe bones of cattle are found in three graves (in addition to one with unburned teeth). The remains of partial birds normally consist of front and back extremities. As in the case of complete bodies, there are no consistent patterns of who (in terms of age, sex or status) is to be cremated with partial animal bodies of any particular type of bones or species. It is nonetheless interesting that the form and state of the animals is not as strict between species as is usually acknowledged. In one sense, the partial animals are more interesting than the complete ones with regard to the ways that they have been manipulated or curated before being placed on the pyre. The categorization of these animals as 'partial' deposits may also be misleading, as indicated by the consistent pattern of only heads and lower extremities being identified. I will elaborate on these aspects in the discussion.

Unburned additions to the grave

About 56 graves of all the nine Spånga burial sites (11%) contain unburned bone (Sigvallius 1994:128–132). At 157A, slightly less, that is seven of the 102 graves (7%), include unburned bones, mainly teeth from cattle, horses and pigs but also a couple of hens and two cases with human bone (Table 4). These additions have been found in the cremation layer, in a burial pot or in the filling of the superstructure. There is no obvious differentiation between the sex or age of the buried human in relation to unburnt additions. They are found in three potentially male burials and one female. The buried humans in these graves are all adults, except for one teenager (17–18 years of age) in the double grave (A16). The other interments in these graves include fragments of common grave materials, such as iron rivets and nails,

Table 4. Unburned additions to the graves including amulet rings (data from Vilkans n.d.; Biuw 1992).

Grave no	Unburnt additions
A15	One hen, one amulet ring
A16	Two hens (one with the legs cut off) and one fragment of a sheep/goat tooth. One amulet ring
A22	7 fragments of pig teeth and 2 fragments of sheep teeth. One amulet ring
A30	2 sheep/goat teeth, fragments of a femur and pelvic bone of a horse
A44	47g human bone from an adult individual of unknown sex. One amulet ring
A119	Cattle tooth and one amulet ring
A166	43g unburned bone of which 38g human

glass beads, combs, ceramics, slag, etc. At 157A, unburned bones are found in both mounds and stone settings, but only in graves dated to the Viking Age (Table 4). Partly because of this, they are only distributed in the southern half of the outcrop. It is striking that the two graves with unburned hens (A15 and A16), and two with unburned human bone (A44 and A166) are situated close to each other as pairs (Figure 1). This is an intriguing relation but could, of course, also arise from their construction close together in time.

It is worth noting that there is only one case (A16) that has both unburned and cremated animal remains of the same species (sheep/goat). Otherwise, the species that are added in unburned conditions are generally not the same as in the cremated animals in the graves. This may indicate that some graves needed to be 'supplemented' with animal bones of a specific type or species. It is probably not coincidental that the additions mainly comprise teeth. Unburned teeth probably had a special purpose in burials, since the tradition of depositing them continued into the early Christian period of inhumation burials. As indicated in the introduction, it is therefore not necessarily the species that was important; instead there may have been a concern with what a particular type of bone was thought to achieve. In addition, it is probably significant that all but two of these seven graves with unburned bones also include amulet rings (Table 4). Since amulet rings only are added to 11 additional graves (Biuw 1992:214–225), this is a strong indication that the unburned bones were also intentionally added to the graves to *do* something.

Discussion

As in other Iron Age burial grounds in central-eastern Sweden, there are few patterns in the composition of species in the graves at 157A in North Spånga. The few reliable sex and age determinations of human individuals

at the site make it untenable to draw any conclusions about the degree to which certain animals are related to or associated with particular categories of humans. This holds true even when considering Sigvallius' gender estimations based on the grave goods. The only exception, on the basis of Sigvallius' assessment, are horse remains, which are more than twice as common in male compared to female gendered graves (1994:161–165). It is not, however, evident if this is an actual correspondence or if it results from a stereotyped view of gender. The relationship between the number of animals and the size and position of the graves on the outcrop is also unclear. Thus, more animals in a grave do not indicate higher status burials – at least not in rural burial grounds like 157A (but see Bratt 2008:76). The distribution of the different species in the graves across the outcrop is fairly even, with no major differences between older and younger graves or between small and large graves. Only two species stand out in this respect: the cluster of cats in the middle of the burial ground and the lack of cattle bones in the graves.

At 157A, six of the total eight graves containing cats alongside human remains are clustered in the middle of the outcrop (Figure 3). The physical closeness of five of these graves (nos. A22, 23, 78, 111 and 16) might suggest that these graves have something in common that 'needed' cats on the pyre and in the grave. There is, however, nothing out of the ordinary in these graves. Their superstructures are either a mound or a low cairn. The humans are all adults, one male and one female as well as two possible males, while the other four are undetermined. The cats are accompanied by a typical set of other animals: all six graves include remains of dogs and horses and, in addition, five have sheep/goats, three include birds and one of them a pig. Two of the graves (A16 and A30) contained unburned teeth of sheep/goats and bones from fowl and horses. Thus, the cats do not seem to have replaced any other animal in the burial ritual. The artefacts in these graves are also typical for the period (Viking Age), although amulet rings were found in four of the eight graves with cats. The clustering and position at the middle of the outcrop suggest that the presence of cats might be linked to chronology, indicating a shorter period of use. The question then, is why cats ceased to be considered appropriate for the pyre and the grave. There could be several reasons for this: perhaps they did not fulfil their function in death or there was a change in cat-human relations during this period. The ontological status of cats and the nature of their relations with humans during the Iron Age were manifold (Poole 2015; Toplak 2019). Cats have a range of abilities and qualities that may or may not have made them suitable for the cremation ritual. They are well known for their great hearing and night vision and are curious, playful, great hunters, patient and seemingly 'lazy' beings. In terms of human-animal relations, there is evidence

Figure 3. The southern half of 157A with the graves containing cremated bones of cats (orange). Modified from (Biuw 1992:82).

of exploitative attitudes to cats in terms of skinning, but also admiration for their skills as mousers, as well as affectionate relationships based on the names of cats (Poole 2015). It is difficult from the cremated material to establish any of these behaviours, faculties or intrinsic properties that can explain their scarcity in the burials at 157A. Perhaps the most conceivable reason for the lack of cats in the cremation ritual may lie in their lifestyle which places them in-between domesticated and wild beings. As such, cats were probably not primarily held as pets on the farms. Some of them might occasionally socialise with humans, but they were more likely to live parallel lives, hunting small prey around the farm. In that sense, cats are more akin to wild animals when compared to other farm animals, and might hence have been regarded as less suitable for the cremation ritual after a brief 'trial period'.

When it comes to the lack of cattle bones, there are only a few foot fragments and one unburned tooth in a total of three graves. At North Spånga, cattle were apparently not deemed necessary or suitable on the pyre and in the grave. The few finds are not likely to be an issue of taphonomy, as the in situ cremation graves show a similar lack of cattle bones (Magnell 2017; Seijler & Sjölin 2022). This is unlikely a matter of food preference, as cattle were regularly slaughtered and eaten at Iron Age farms (Magnell et al. 2017:211). It can be argued that cattle were omitted because of eco-

nomic reasons, as they were an important source of leather, but that would not explain why so few heads or meaty parts did not make it to the pyre. Nor is it a matter of status, as the three graves with cattle remains at 157A are quite small (A13, 119) or mid-sized (A2) and since bones of cattle are common as Iron Age household refuse and in other ritual contexts it is unlikely to be a question of a taboo (Magnell 2017:105).

The absence of cattle in the burials cannot be explained by the faculties and agencies of their species, in comparison to other animals on the farm. Cows and bulls may not be as intelligent as pigs, horses and dogs, but they can recognize individual humans and form social bonds (Young 2018). Cows, just like sheep, provide secondary products such as milk and hides. They eat grass, like sheep, and have horns like goats. Full-grown cattle are large animals, arguably too large for the pyre, but size is not likely to be the main issue, since a calf is no bigger than a sheep and smaller than a horse. The list can be continued, but there is no evident faculty, relation or agency of cattle that can explain their scarcity in the burial ritual. Regardless, something that the lack of cattle bones suggests, given their abundance in slaughter deposits, is that partial animals were not primarily put on the pyre as food for the afterlife or leftovers from funeral feasts. Moreover, the lack of cattle, and the few cats, also shows that distinctions between appropriate species on the pyre were not necessarily only made between wild and domestic animals, beasts of burden and meat and dairy producers; instead other aspects of the animals were considered when arranging a cremation ritual.

The arrangement and condition of the cremated animals

A tangible aspect of the cremation ritual concerns the forms and conditions in which animals are put on the pyre. For example, it is evident that some animals are much more frequently cremated as complete bodies at 157A. Dogs and horses also stand out in this respect when compared with other species. It must, nonetheless, be emphasised that, although their total numbers are low, a fair number of cats, pigs and sheep/goats are also cremated as complete bodies (Table 3). The complete pigs are most likely full grown; Vilkans/Sigvallius generally note when a specific animal is of a young age. It may thus be a mistake to reduce pigs and sheep/goats to meat, dairy and wool producers, in contrast to dogs, cats and horses as companions and beasts of burden. Sheep/goats stand out, as only 25% were cremated as complete bodies despite being as common as horses in the graves (61%). These numbers and proportions fit well with other contemporary burial sites of

the period, although there is some regional variability (e.g. Seiler & Sjölin 2022; Magnell et al. 2017:214).

Was it a privilege for an animal to be cremated as a complete body? Does it signify a special status or even personhood? Or were they mere possessions or personal beings tied to the deceased that could not be inherited? The latter might be true for horses, especially those used for warfare and hunting, which tend to be connected to one single human (Argent 2010:161). Dogs also tend to form personal bonds with particular individuals, although it is questionable that more than half of the population, children, adults and elderly, owned a personal dog in the same way as in modern Western societies. On an Iron Age farm, dogs were more likely to move freely about the farm or be kept in a common kennel rather than as personal pets. It must also be emphasised that other animals, including wild ones, can form strong bonds with humans (Birke & Hockenhull 2012). In Spånga, there is a fair share of pigs cremated as complete bodies (6 out of 14). From an economic point of view, pigs differ from sheep as they grow quicker but do not offer secondary products (Oma 2018:98). Their intelligence and sociality are, however, on par with dogs and they can form close and personal bonds with individual humans (Marino & Colvin 2015; Marino & Merskin 2019). Should we expect some people to have such close bonds with individual pigs that they were to join them on the pyre when they die? Probably not. After all, there are cases with up to five complete animal bodies in some graves, which suggests that being cremated as a complete body was not primarily about emotional bonds. Moreover, the disarticulated distribution of complete animals in many bustum graves does not correspond to an animal lying in a supine position by the human body (see Seiler & Sjölin 2022:144). It rather suggests that smaller animals like dogs, cats, pigs, sheep/goats were cut up (as in Ibn Fadlan's account) or put on the pyre hung by their heads on posts (as in other ritual contexts, see Jochelson 1905:91–95; Figure 5b). Thus, taken all together, to be cremated as a complete body seems not to be wholly concerned with according the animal greater respect; after all, these animals were killed during the rituals.

Another way of looking at this distinction is to consider the long-term inclusion of animals in cremation burials. During the first millennium BCE, cremated body parts of goats/sheep, cattle and pigs in the graves only occasionally included dogs and horses (Häggström 2022:92–93). The concept of cremating complete animal bodies thus coincides with the rapid increase of dogs and horses in the graves during the transition to the Late Iron Age. It is probably significant that when these animals were added to the pyres it was generally as complete bodies from the beginning. This development indicates changes in human relations to dogs, cats and horses (and maybe pigs) during the transition between the Early and Late Iron Age. The rea-

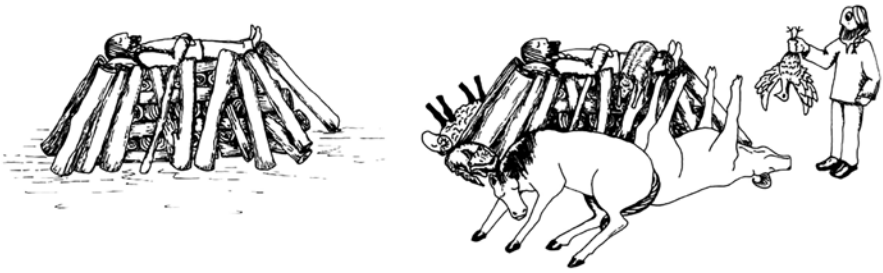

Figure 4. Illustration of a common envisioning of an Anglo-Saxon cremation (left) and what it may have looked like taking into consideration the remaining animal bone (right). (Reproduced with permission from Bond 1996:80).

sons for such a change may have been due to alterations in faith, perceptions of the afterlife, social turbulence or smaller changes in farm life and the organisation of the longhouses that led to altered encounters with animals (see Oma 2018). It might even have been due to the animals themselves. For example, a new breed of dogs adapted for different uses could have affected the relationship to the species per se (see e.g. Iregren 1994; Magnell et al. 2024). Even the introduction of poultry and cats during this period could hypothetically have had unintended consequences for human-animal relations. The introduction of cremating complete animals also entails physical and practical aspects in terms of building a larger pyre to successfully cremate multiple bodies (Bond 1996:79; Prata & Sjöling 2017, Figure 4). The short- and long-term causes for this change in burial practice are most likely complex but reveal a conscious change in the cremation practices during the transition between the Early and Late Iron Age.

The proposition that partial animals were put on the pyre as food offerings and leftovers from funeral meals seems rather weak, considering the lack of cattle bones in the graves. It is also somewhat contrary to the evidence for proportionally large numbers of sheep/goat remains in the graves. The cremated goats/sheep are, like the pigs, not young individuals and are hence more likely to have been producers of milk and wool rather than of meat (Ericson et al. 1988; Jennbert 2004b). Regardless, the very term 'partial' or 'incomplete' concerning these animals may be misleading. As already mentioned, there is a pattern in the type of bones (mainly fragments of the skull and lower extremities) that are deposited from partial animals in the graves. It has been suggested that these bones represent the remains of bedding pelts (Äijä 1993:68; Bennett 1987:117). However, pelts of sheep or pigs rarely have the head, toe and ankle bones still attached. Instead, this combination of bones indicates a different kind of arrangement. One scenario that better fits with the type of bones in the graves, is that the animals were skinned with the head and lower extremities still attached. As such, they

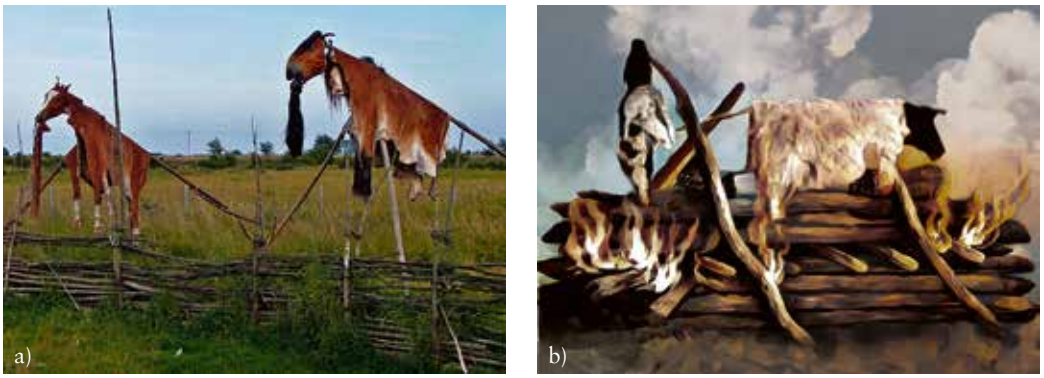

Figure 5. Left (a): Reconstruction of skinned horses raised on poles with head and lower extremities still attached (from Olofsson & Josefsson 2007:33). Right (b): A tentative illustration of a cremation pyre with a human, a dog mounted on a pole and a sheep skin with head and lower extremities still attached. Image compiled by the author.

may have been draped or hung on a post over the grave, in a similar manner to the way in which horses were set in relation to wetlands (Hagberg 1967; Klindt-Jensen 1957:86–88, 248; see Montgomery 2014:209, Figure 5a). Indeed, animal hides mounted on stakes on the pyre may be a conceivable explanation for the type of bones of sheep/goats and pigs found in the Iron Age graves. Raised in this way, the lower extremities would work as weights to keep the hide in place and even animate the hides as the hooves dangled in the wind. Arranging animals like this on the pyre would have been a spectacular visual prop that would not have gone unnoticed during the cremation ritual (Figure 5b). From a ritual point of view, a potential reason for such an arrangement might have been to animate the animals, making them seem alive. In this arrangement, the hides potentially acted as deflectors, attracting any malicious spirits to attack them, rather than the dead human, during the transformation phase of the cremation (see Houlbrook 2013:107).

Another, or complementary, function for such hides, if draped or raised to a tent-like structure over the human body, could have been to cremate the human body within a 'shell' of an emptied animal (see Davies 2005:82). If the dead were wrapped or set 'within' an animal while being cremated it might be fair to speak of hybridization and merging with that particular animal. Either way, it begs the question why it was mainly sheep/goats that might have been arranged this way on the pyre? In her book *Sheep People*, Oma (2018:141–142) argues that people and sheep had a special relation in the Bronze Age since humans wore clothes made from wool. Indeed, in some ontologies, dressing up in the hides of an animal is a way to become the animal itself (Descola 2013:80). It is, however, not a very likely scenario

in this case, as the wool was refined into fabrics, thus losing its immediate relation to the sheep. Therefore, being cremated under a sheepskin probably did not mean that humans were to 'become sheep' in death. However, Oma also emphasises how humans, sheep and dogs can form a special matrix of relations during herding, where dogs are trained by humans to pen or divide a flock of sheep (Oma 2018:116). In this context, dogs become an extension of human agency, although they are capable of performing their duties autonomously. The presence of dogs and sheep as the two most common animals on the pyres at 157A may be related to their relations and agencies in life. For example, if animals were assumed to retain some of their faculties in death, an assemblage of sheep, humans and dogs on the pyre might utilize the dogs' abilities to control the sheep (as deflector) and secure a successful cremation process while the dead human is incapacitated. This implies that arrangement and condition (complete or partial) of animal remains corresponds, to some extent, to different functions, qualities and faculties of the animals rather than to the type of species in general.

The lack of wild animals in the graves of 157A adds to this general interpretation. If formulated in terms of sociality and control, it might be easier to understand why they were omitted. Wild animals are not devoid of human relations. Some are likely to be named and even accorded personhood. However, relations to wild animals tend to be either generalized according to species or only concern individuals in a particular situation (Willerslev 2007). This might also be true for some farm animals, but the farm environment tends to lead to repeated encounters and closer relations between humans and animals to a higher degree. This distinction can be articulated in terms of familiarity and control. In a cremation ritual where a human body undergoes a potentially vulnerable transformation process, it might be desirable to avoid including animals that may not behave appropriately. Thus, farm animals that are nourished and trained over time were more likely to be selected for the pyre because they had proven themselves to be friendly and dependable. A distinction based on sociality and control, instead of dual categories such as wild and tame, could also clarify why semi-wild cats and certain wild animals at other Iron Age burial grounds were sometimes put on the pyre.

The efficacies of animal bones

That remains of the animal bones from the cremation were collected and placed with human remains in the graves indicates that the functions of animals were not restricted to the cremation process. Experiments have showed that it is relatively easy to spot most bones from a cremation pyre Henriksen

2019), Despite that, not all bones found their way to the graves since there is an overrepresentation of parts of femurs, humeri, ribs and skulls. Thus, there seems to be a selection process at play (Jennbert 2004a:192). Some bones were also curated, cleaned from soot, broken or crushed before deposition (Bennet 1987:13; Kaliff 1992:103; Sigvallius 1994:32, but see Harvig et al. 2012). But why was it important that cremated animal bones were added to the graves? And can we really make direct associations between species and their transformed remains after the cremation? To be fair, there are no actual bodies in the Iron Age cremation burials, only a haphazard assemblage of bits of bones. The apparent lack of differentiation between bones of different species (human and non-human) rather suggests blurred boundaries, with the remaining bones in their new fragmented and transformed state becoming something distinct or new (Fahlander 2018). Thus, from a less anthropocentric perspective, the Iron Age cremations could be considered to be multispecies assemblages, that is, not exclusively human burials in the traditional sense. Indeed, the amount of animal bones in the burials outnumbers the human ones (which, in some graves, are lacking altogether) and, as previously indicated, humans are not the only species cremated as complete bodies. However, as appealing as such a notion may seem, the majority of the grave goods are artefacts with close ties to human dress or practices. Humans also occupy a central position in the contemporary inhumation graves, and written sources are quite firm on the identification of humans as the focus of burial activity. Thus, the vast majority of graves from the Iron Age must be considered as features that primarily follow the death of a human individual, thus justifying a traditional distinction between humans and animals as different categories of being.

That being said, one possibility is that the animals were thought to have persistent agentic influence after their death through their bones (Hill 2018). In this case, they could have continued to fulfil the roles assigned to them on the pyre after deposition in the grave. It is also conceivable that animal bones were believed to possess certain magical efficacy. This is supported by evidence of animal bones being deposited in relation to load-bearing structures, at external wall lines and entrances of longhouses. The role of animal remains in this context is generally understood to create apotropaic devices that protected the house and its inhabitants (Carlie 2004:107, 109). Such generative abilities of animal bone also plays a more direct role in Iron Age material culture. Terje Gansum, for example, has suggested that animal bone (and perhaps human bone) was used while forging swords in the Late Iron Age (2004:51; see also Hedeager 2011:143). The carbon in the bones is coupled with the iron to form steel. This practice provides the opportunity to choose specific bones of specific individuals with particular qualities (e.g. robust, aggressive, quick, agile, etc.) to become part of the weapon.

We should also consider the addition of unburned bones and teeth to some of the graves. We can only speculate on the function of animal teeth in a grave, since there is little in their materiality and form that stands out, except for a certain resilience when compared to other bones. The correlation between the amulet rings and instances of unburned bones suggests that they both were deposited in the graves for a reason – to *do* something (Fahlander 2014, 2020a, 2020b; see also Crellin 2017). If animal bones and other deposited materials were considered generative, they might work to protect the living from the deceased, to assist them in the afterlife, or to provide the deceased with appropriate paraphernalia to allow the dead a continued existence in some form after death. Considering that animals have been part of the cremation practices since the Bronze Age, and thus throughout several ideological, social and cultural developments, their attributed efficacies are likely to have been less about religion and cosmology and more about the ontology and realities of death and dead bodies.

Summary and conclusions

This paper has aimed to discuss the roles of animals in Iron Age cremation rituals from a symmetrical perspective that acknowledges the importance of individual faculties, properties and agencies. This has been explored through a study of a late Iron Age burial ground (157A) in North Spånga, Sweden, with a special focus on the form and conditions in which different animals were put on the pyre and what type of bones were subsequently deposited in the graves. From a general point of view, the common species (dog, horse, sheep/goat and pig) are evenly distributed, with no significant correlations with burials of different types, sizes or locations. Moreover, there are no significant relations between different species, or number of animals, with the sex, age or status of the buried humans. This is significant, as it sets aside animal bones from most other grave interments that have stronger associations with the buried humans' social persona. The study also challenges the common interpretation that partial animal remains represent food offerings, highlighting the consistent pattern of skull and lower extremity fragments of the non-complete animals (e.g. sheep/goats and pigs). This suggests that they were put on the pyre as hides with the head and lower extremities attached rather than as cut up meat. The collection and deposition of cremated animal bones in the graves, alongside unburned bones and teeth, further suggests that animal remains were believed to possess persistent agencies and efficacies that extended beyond the cremation event.

From a long-term perspective, the practice of cremating certain species (predominately dogs and horses) as complete bodies around 400 CE com-

prises a substantial shift in the cremation ritual. This distinction between species was, however, not simply about separating "companions" (horses, dogs and cats) from producers of meat, milk and wool (sheep/goats, pigs and fowl). Over time, a fair number of pigs and sheep/goats were also cremated as complete bodies. One reason for this flexibility is argued to lie in both individual faculties and the multiple status of many animals. That is, they could simultaneously belong to more than one category (companions, producers of meat, milk and wool, pets, beasts of burden, etc.). In general, familiarity with individual animals and their personalities and experiences seems to have been pivotal to their participation in the cremation ritual. For example, wild animals were apparently not regarded as appropriate for the pyre. Considering the sensitive transformative process of cremation, it is not surprising that only animals that had proven themselves dependable and predictable (i.e. well-known farm animals) were chosen. This argument is corroborated by the small number of cats on the pyres, whose lifestyle as half-wild and less predictable made them less appropriate for burials. Thus, the main criteria for choosing animals for the pyre was less about the type of species and more about how well they were considered able to perform their roles in the cremation ritual.

In conclusion, the study of the cremated animals at 157A shows that animals were indeed important contributors to the Late Iron Age cremation ritual beyond being passive offerings, status objects or personal possessions. The choice of animals and the different conditions in which they were added to the pyre depended on a mixture of species-specific properties, affordances and abilities, as well as their behaviour and relations to humans in life. Dogs, for example, may have been added because of their abilities to perform actions, such as herding, independently of human supervision. To facilitate a more precise discussion of the roles of animals in the past there is a need for greater attention to variation within species (e.g. age, size, sex, colour of coat, origins/place of birth, etc.) through osteology, isotope- and genetic analyses of the animal bones, in a manner similar to the analyses carried out on human bones. Such efforts would not only significantly add to our specific understandings of human-animal relations but also to the changing ontologies and social life of past societies in general.

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THEME

Beyond Representations

Animating Figurative Imagery in Archaeology

Tobias Lindström[1] & Erik Solfeldt[2]

This special section of Current Swedish Archaeology explores the relationship between figuration, animacy, and abstract imagery within the archaeology and ethnography of figurines. Departing from traditional representationalist approaches that have long been the *modi operandi* in the study of figurative imagery, as well as in the archaeology of figurines, the papers adopt ontological, new animist, and new materialist perspectives, viewing figurines not as mere depictions but as active entities affecting their makers, users and environments. They discuss non-representational theoretical approaches in relation to archaeological materials from middle Neolithic Fennoscandia, Neolithic and Iron Age Britain and Ireland, and ethnographic approaches focused on the recent past and present of Indigenous groups in Northwestern Siberia. Together the contributions seek to highlight the complexity of figurine research and the need for interdisciplinary methodologies and innovative treatments to properly reanimate both research and the figurines themselves.

Keywords: figurines, imagery, non-representational, relational archaeology, theory and method

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The starting point for the section was a workshop called *Figurines in Transformation: The Emergence of Figurative Imagery at the Edges of Europe*, held at the Department of Archaeology and Classical Studies at Stockholm University in 2023. Drawing on research carried out in Sweden, Finland, and Great Britain, it brought together early career researchers and established scholars working on figurines across Scandinavia and northern Eurasia. A couple of key questions emerged from the workshop: what does figuration imply about a society's relationship with their environment, does it imply a sense of animacy? How does this imagery relate to abstract imagery and mark making that appears alongside figuration? Does figuration emerge from abstract imagery, or do figurative images and abstract images emerge simultaneously?

Such questions, along with calls to move beyond representational approaches, are not new (see for example edited volumes by Back Danielsson et al. 2012; Back Danielsson & Jones 2020). In the last decade, researchers have started to recognise that a rigid separation between subject and object can be problematic in relation to figurines. Indeed, figurines are often not only depictions of certain beings. Instead, they are treated, or effectively function, as beings in themselves (e.g. Freedberg 1989; Mitchell 2005). This, of course, has implications for how we are to understand and approach them. Figurative images are not simply carriers of meaning. Rather, figurines and depictions are material entities with capacities to affect the contexts in which they are involved.

The papers in this section address these concerns in several ways. In their paper 'Rethinking Representation and Animation: A Visual Ethnoarchaeology of Material Spirits in Northwestern Siberia', Erik Solfeldt and Anna Naglaya are combining a new animist theoretical framework with Indigenous knowledge of Siberian figurines, often referred to as 'idols', to discuss the Western biased representational interpretations of the figurines made and used the by the hunter-gatherers of the Stone Ages. They draw on the visual ethnography of northwestern Siberia, involving early artwork, as well as photo and video material that engages with various kinds of Siberian figurines in their ontological contexts. Based on this, they argue that to understand the role of figurines, made and used by both past and present hunter-gatherers and hunter-herders, we need to look at the complexity of animistic ontologies rather than explaining their role as representational art based on a Western view of reality. The figurines of northwestern Siberia are animated, they are subject-entities with souls that are equal to the souls of humans and animals. The figurines are together with gods, spirits, ancestors, humans and animals caught up in ecological material and immaterial relations that constitute reality and affects the tasks done within this reality. Based on this visual ethnoarchaeological study it is argued that the

figurines of the Stone Ages, made and used by hunter-gatherers, are caught up in similar complex ontological relations.

In the paper 'Eyeing the Beholder: Anthropomorphic Clay Figurines and Reciprocal Gazing', Tobias Lindström focuses on the physical attributes and visual capacities of the anthropomorphic figurines found on late middle Neolithic Pitted Ware culture (*c.* 2900–2300 BC) sites in Sweden and Åland. Acknowledging that figurines are often considered to be alive or animated, he contends that their physical attributes had an impact on how they were used and perceived. Certain attributes afforded or encouraged certain engagements between the figurines and the humans who made, held, and gazed upon them, while others served to complicate them. He further suggests an understanding of the Pitted ware culture anthropomorphs as 'interactable' beings who could be persuaded or coerced into aiding people in various tasks.

Both Solfeldt and Naglaya's paper and Lindström's paper stresses that these evocative creations were involved in the day-to-day lives of humans – deconstructing the Western dualism between the figurines being either sacred or profane.

In 'Making Faces: Facial Imagery and the Non-Representational in Later Prehistoric Europe', Helen Chittock and Andrew Meirion Jones criticize the tendency in archaeology to follow the art-historical interpretational process of converting non-representational imagery into representational images, trying to decipher and decode them to attribute meaning. Based on case studies from the British and Irish Neolithic and the European Iron Ages, they emphasize the relation between pattern and images of faces and bodies. They argue that imagery is to be viewed as 'in the making'. This offers a way to understand the emergence of representational imagery without taking representation and symbolism for granted or as starting points in archaeological reasoning. The faces and bodies that emerge from the non-representational serve as focal points for affective potentials within the prehistoric human-imagery relations.

Taking these papers into consideration, along with the other workshop presentations, the discussant, Fredrik Fahlander, identified a shift from figurines as representations and symbols of ideology and mythology towards a focus on the figurines' materials, their making, properties and ways of affecting human life-ways. In relation to this, as an emergent collective of figurine scholars, we argue that the archaeology of figurines has since long left post-processualism and is now deeply engaged in the new paradigm, or theoretical trend (see Harris & Cipolla 2017), of a relational and ontological based archaeology with materials and materiality in focus – a trend that indeed exists alongside the so-called third scientific aDNA revolution in archaeology (Kristiansen 2014). Only the future can tell how this shift

will influence future research, but it is safe to say that figurines studies in archaeology is at the forefront of archaeological theory, providing insights that have the potential to contribute to other disciples such as anthropology, ethnology, history of religion, art history, and art, craft and design studies.

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Rethinking Representation and Animation

A Visual Ethnoarchaeology of Material Spirits in Northwestern Siberia

Erik Solfeldt[1] & Anna Naglaya[2]

Archaeological interpretations of prehistoric humanoid figurines, made and used by the hunter-gatherers of the Stone Ages, have traditionally relied on Western concepts of hylomorphism and iconology. Consequently, these figurines are depicted as finished and static objects of art, often separated from their archaeological contexts. Analysis of these figurines has been focused on identifying what they represent, rather than considering what they do or how people used them. This paper draws on new animism and Indigenous knowledge, combined with visual ethnographic analysis to create a visual ethnoarchaeology of northwestern Siberian humanoid figurines, here viewed as material spirits, within their animistic contexts. We argue that archaeologists' interpretative focus on representation should be abandoned in favour of attending to animation and the material and immaterial ecological relations these figurines shared with their prehistoric makers.

Keywords: figurines, 'idols', animism, hylomorphism, iconology, ethnoarchaeology, visual ethnography, visual anthropology, material culture studies

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Introduction

Prehistoric humanoid figurines, made and used by hunter-gatherers, hold a special place among the archaeological materials from the Palaeolithic, Mesolithic, and sub-Neolithic. Humanoid figurines are first known from the beginning of the Upper Palaeolithic (Conard 2009; Farbstein 2017; Pettitt 2017) and continue to be made and used throughout the world by hunter-gatherers and hunter-herders up until the present-day (Golovnev & Osherenko 1999:114; Haakanson Jr & Jordan 2011:172–174; Ivanov 1970; Willerslev 2007:129). Contemporary or recent past humanoid figurines, often termed 'idols' in the ethnographic literature, and the figurines made and used by prehistoric hunter-gatherers are viewed very differently in the academic literature. The former are viewed in their religious contexts as products of animism, shamanism and totemism, and are interpreted as being household gods, deities, ancestors, or totems (Bolinder 1927:3–4; Castrén 1853:197; Czaplicka 1914:200; Donner 1922:130–134; Jordan 2003; Vallikivi 2011; Willerslev 2007:129), while the latter are viewed as 'portable art', representing everything from fertility gods to toys (Farbstein 2017; Iršėnas 2007; Jonuks 2021; Pettitt 2017; Rice 1981; Ucko 1962; see also Lindström 2024:27 and references therein). Additionally, in popular scientific contexts prehistoric figurines, especially those deriving from Stone Age Europe, are frequently presented, together with cave art, as evidence for the origins of art.

In both cases, but especially in archaeological discussions, it is argued that the figurines and 'idols' represent something beyond themselves that can be deciphered (see Mitchell 1986:8). Examples of this include Palaeolithic Venus figurines as representations of fertility and womanhood (Berenguer 1973:51) and 'idols' as presentations of false gods or the idolisation of false gods (see Vallikivi 2024:132–133). This representationalist perspective is the result of Western notions of hylomorphism and iconology.

Hylomorphism derives from the works of Aristotle (Ingold 2013:20; see also Simondon 2020). It describes the process of making artefacts which, according to Aristotle, begins with an idea of form in the mind of the maker. This idea is then imposed on raw material – a lump of clay becomes a ceramic vessel, a bundle of reeds is plaited into a basket, and so on. The active mind of the maker (culture) leads and the passive raw material (nature) must follow (Ingold 2013:20–24).

The related concept of iconology is often used in combination with hylomorphism. Iconology '[…] is the branch of the history of art which concerns itself with the subject matter or meaning of works of art […]' (Panofsky 1972:3). Archaeologists Ing-Marie Back Danielsson, Fredrik Fahlander and Ylva Sjöstrand (2012) have critiqued archaeologists' tendency to default to

iconology and the iconographic method when analysing visual materials. They argue that:

> […] iconological approaches in archaeology are generally concerned with questions of identifying what the image is supposed to represent, and in the second stage, to interpret how such an image may fit into a cultural cosmology or ideology. (Back Danielsson et al. 2012:2)

Iconology and iconography are an extension of hylomorphism, in which the forms and visuals hold a meaning, representation, or symbolism that the maker wishes to communicate to the observer (cf. Panofsky 1972:7–15). Images are viewed as signs representing something beyond their making and as forms which can be deciphered (Mitchell 1986:8–9). An artefact and its visual elements are then reduced to a representation of an idea in the mind of the maker (c.f. Ingold 2013:20–21).

Is it then reasonable to view both the figurines, made and used by hunter-gatherers in prehistory, and the contemporary or recent past 'idols', made and used by hunter-herders, as presentations of something beyond themselves, when such interpretations separate them from their own ontological contexts and force them into an explanation grounded in Western representationalist thought? This is not to say that figurines cannot be representational in their making and use but images, in this case figurines, are multiple; they can be and do more than what they might or might not represent (Back-Danielsson & Jones 2020:2). The questions then follow, what do these 'idols' represent, if they represent something? And what do they do within their own ontological context? And how can the answers to these questions regarding the 'idols' assist in the reasoning and theoretical discussion of the humanoid figurines made and used by prehistoric hunter-gatherers?

In this paper, we aim to answer the questions stated above by studying northwestern Siberian humanoid figurines ('idols'), that is *material spirits* and *ancestral images*, in their own animistic ontological contexts. This is done in order to *understand* the material spirits rather than *explaining* them based on a Western representationalist perspective. This case study is followed by a critical discussion, regarding the representational interpretations commonly employed by Stone Age archaeologists studying the prehistoric figurines made and used by the hunter-gatherers of the Upper Palaeolithic, Mesolithic and sub-Neolithic (Farbstein 2017; Iršėnas 2007; Jonuks 2021; Mcdermott 1996; Meskell 2017; e.g. Nuñéz 1986). It is not our aim to offer a specific interpretation of the prehistoric figurines but rather to discuss the theoretical premises and preconceptions of the representational interpretations and argue that animistic ontological premises are the most likely point of departure when dealing with the figurines made by prehistoric hunter-gatherers.

A visual ethnoarchaeology

In 1983 Lewis R. Binford predicted that future archaeologists would make use of the visual ethnographic materials, i.e. drawings, photographs and video (Pink 2021:6), that ethnographers have produced since the beginning of the 1900s. Binford, asked 'How can we take such pictures and convert them into usable archaeological information?' (Binford 1988:26).

In the cases where material spirits are present within the visual ethnographic materials, so too are their contexts. It is this aspect of visual ethnographic materials that makes them of significance to archaeologists (Binford 1988:26). The material spirits are not separated from their contexts as they are in the archaeological record (in terms of the taphonomic factors affecting their preservation) or in museum collections. Recent studies by visual ethnographers and anthropologists have drawn on non-representational theoretical approaches (see Ingold 2011b; Stafford 2006) to reconceptualise visual ethnography. These approaches involve a shift away from visual research methods being viewed as recording methods which produce ethnographic data, towards an understanding of the visual as cultural experience, ways of knowing and things to learn from (Pink 2021:6, 31). To analyse the visual, then, becomes a practise of theorising how and why the visual was made, and what can be learned from the ethnographic contexts and the things they portray.

The material analysed in this study is formed of visual ethnographic materials from northwestern Siberia (*c.* 1600s–present). The study focuses on the tundra Nenets and how they relate to their material spirits (N. *Khekhe*/*Syadei*). Visual materials and ethnographic literature of neighbouring peoples, such as forest Nenets, Enets (tundra and forest), Nganasan (western and eastern), Selkup (northern and southern), and Kets is also considered. Drawing on Matthew Desmond's (2014) concept of *relational ethnography*, which emphasizes the study of '[…] fields rather than places, boundaries rather than bounded groups, processes rather than processed peoples, and cultural conflict rather than group culture' (Desmond 2014:574), the focus is on these Indigenous hunter-herders and their relations with each other, as well as their contact with the colonising governments and Christian missionaries.

The visual material consists of illustrations and photographs from northwestern Siberia, in combination with a short, 3-minute video (*Sharing a meal with the ancestors in Gyda tundra*, unpublished), containing footage of a Nenets herder feeding his family *Khekhe* (ancestral images) within his chum (Nenets conical tent, N. *Mya*).

The analogies drawn between the ethnographic recent past/present and the archaeological distant past, that is the prehistoric hunter-gatherers of

the Palaeolithic, Mesolithic, and sub-Neolithic, are not meant to be directly analogical. Instead, they serve as a means to think beyond the confines of Western thought, which in this case rest upon a representational bias (see Günther 2022:29 for a similar analogical reasoning). By drawing on new animist theory, Indigenous knowledge, and the results from the visual ethnographic analysis presented below, analogies are made between the present and the past in order to create premises through which animist perspectives might take part in theoretical discussions relating to the interpretation of prehistoric figurines. Since prehistoric hunter-gatherers made their living based on hunting, fishing, and gathering, it is more likely that they perceived their environments and their non-human co-inhabitants (material and immaterial) in a manner similar to the animists of northwestern Siberia, rather than aligning with Western, modern perceptions of reality. Thus, the ethnographic analogies made in this paper should be regarded as deconstructive and relational analogies:deconstructive in terms of criticising Western representationalism as being universal in both time and space, and relational in terms of building arguments based on environmental and subsistence similarities (Wylie 1985).

Approaching the animism(s) of northwestern Siberia

The Nenets, Enets, Nganasan, Selkup, and Kets are all Indigenous to northwestern Siberia. The tundra Nenets live in an area that stretches from the Ural Mountains in the west, along the northern Siberian coast to the Gydan tundra east of the gulf of Ob (Nikolaeva 2014:1–2). The lands of the Taymyr peninsula further east are the herding grounds of the tundra Enets and the Nganasan (Eidlitz Kuoljok 1993:22–23). To the south, in the taiga zone along the rivers of Ob, Nadym, Pur, and Taz, and their tributaries, live the forest Nenets and Selkup (Maloney 2016:117; Sammallahti 1974:12). Along the rivers of Yenisei and its tributaries are the lands of the forest Enets and the Kets (Eidlitz Kuoljok 1993:22; Vajda 2016:298).

Reindeer herding (large-scale since the beginning of the nineteenth century), fishing and hunting are the main subsistence of the tundra peoples (Eidlitz Kuoljok 1993:51–52; Golovnev & Osherenko 1999:7; Istomin 2011:237). Before the nineteenth century the tundra peoples were fishers and sea mammal and wild reindeer hunters (Golovnev 1992). In the taiga zone hunting, fishing and gathering are still of great importance, often in combination with small scale reindeer herding (Eidlitz Kuoljok 1993:47–50; Vajda 2016:298). All of the communities discussed here are nomads, or semi-nomads, and, since the domestication of the wild reindeer, they

have used reindeer and sleighs for transportation and migration to varying degrees. The reindeers are also used for food, clothing, tent canvases, craft materials, and ritual offerings (Jordan 2016a).

Indigenous oral history and ethnographic accounts establish the peoples of northwestern Siberian as animists who are spiritually guided by shamans. Their animism(s) centre on the animation, that is the subjectification and life-giving, of the non-human. Spirits and beings of various kind, as shall be seen below, affect hunting, fishing and herding practises and determine the fate of all individuals (Haakanson & Jordan 2011:164; Maloney 2016; Vallikivi 2024:33). It is important to note that the people of northwestern Siberia have, over the last two centuries, practised syncretic mixes between animism(s) and other religions as a result of contact with missionaries (c.f. Eidlitz Kuoljok 1993:76–85; Haakanson Jr & Jordan 2011:164; Maloney 2016:119; Toulouze et al. 2022; Vajda 2016:299–307; Vallikivi 2024). These different syncretisms are mostly mixes between animism(s) and Christianity (Russian Orthodoxy and Evangelicalism), which have been affected by Tsar Russian, Soviet and contemporary Russian politics, as well as secular reasoning, global capitalism and neoliberalism (Forsyth 1992:155; Vallikivi 2011, 2009, 2024). While many consider themselves fully converted to the new religions, or new ideologies, animistic practises are still present in this region (see Toulouze et al. 2022; Vallikivi 2024). It should also be added that syncretic mixes between different kinds of animism(s) exist as a result of cultural encounters through prehistoric and historic times (see Chernetsov & Moszynska 1974; Forsyth 1992). While ontological and cultural similarities exist across this region, differences in animism and animation can still be found (Vajda 2010:126). Therefore, these animistic syncretisms need to be pluralised – *animisms* and *syncretisms* – rather than being described as a unified animism or a syncretism of two binary positions.

Social anthropologist Tim Ingold defines animism as 'A complex network of reciprocal interdependence, based on the give and take of substance, care and vital force […] [that] extends throughout cosmos, linking human, animal and all other forms of life' (Ingold 2011a:133).

Compared to the first theory of animism proposed by anthropologist Edward B. Tylor in 1869, '[…] the doctrine of all men who believe in active spiritual beings […]' (Tylor 1869:566), Ingold's definition can be considered a contribution to the so-called 'Anthropologists' revisitation [of animism]' (Harvey 2017:20), or new animism. Whereas Tylor's focus lies on explaining animism as a cognitive undeveloped, or failed, epistemology (Bird-David 1999), Ingold's focus, shared by others contributing to the revisitation, such as Bird-David (1999), Descola (2014), Viveiros de Castro (1998), Willerslev (2007) and Pedersen (2001), instead views animisms as relational perceptions of reality, or as ontologies which differ from the

Western, structuralist and dualistic, modern thought and perception of reality. From this perspective, what the Western researcher believes and argues, on scientific basis, to be true or not true is of no importance. The importance lies in the acknowledgement of other ways of perceiving reality – in this case the perception of the material spirits and their ontological contexts. Animisms set the ontological premises for perceiving reality and the non-human co-inhabitants – being both of material and immaterial kind. We argue that this is the reason why the animisms of northwestern Siberia have persisted, in spite of the quest of the missionaries and colonising assimilations, since the new religions and ideologies have been built upon animistic ontological premises (c.f. Toulouze et al. 2022; Vagramenko 2017; Vallikivi 2022, 2024). Ingold's definition of animisms, although generalising and slightly Rousseauian in nature (the interdependence in northwestern Siberian animisms often entails a demand rather than reciprocity), offers a focus on the relational correspondences between the material and immaterial, and between human vital forces and non-human vital forces, which make the animation visible. Such a material-immaterial continuance, as seen below, does not only apply to Western categories of living beings (e.g. humans. animals, plants) but also to other materials and non-organic things.

A visual ethnography of material spirits

One of the first images portraying material spirits (N. *Syadei*) from northwestern Siberia is published in German historian Gotthard Artusius's publication from 1614 (Figure 1). The image portrays a sacred hill with twelve standing spirits surrounded by reindeer antlers stuck into the ground (Artusius 1614). Around the hill are six tundra Nenets, or Samoyeds as he calls them (an earlier Russian and Western name for Nenets), all worshiping the spirits. In front of them is another person on a sleigh pulled by three reindeers. It is evident that the image is made through a Christian lens, as the material spirits' appearance is a combination of Christian icons, Greco-Roman statues and Nenets material spirits. Furthermore, the clothing of the Nenets resembles medieval European clothing rather than Nenets traditional clothing and the reindeer are portrayed as deer-like. The act of worshiping takes the form of kneeling in front of the spirits – a practice common in Christian worshiping contexts and not in Nenets rituals (c.f. Islavin 1847:117). It is likely that the artist was not witness to the event, and that the image is based on a description of a tundra Nenets' ritual.Nonetheless, the image has value as one of the earliest depictions of the tundra Nenets material spirits in a sacred site context.

Figure 1. Nenets sacred hill (Artusius 1614).

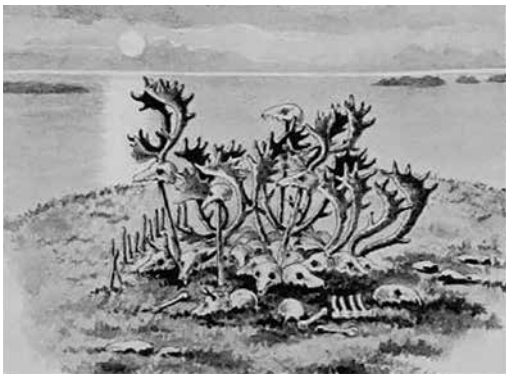

Figure 2. Sacred site at the island of Vaygach (Jackson & Montefiore 1895).

Another early image of tundra Nenets material spirits is published in arctic explorer Frederick G. Jackson's travelogue *The Great Frozen Land* from 1895 (Figure 2). It is a drawing of a sacred site situated on the southwest point of the island Vaygach (Jackson & Montefiore 1895:34). The island is sacred to the Nenets and is referred to in the tundra Nenets language as *khekhe ngo* – sacred and/or spirit island (Kharyuchi 2004:174). The image portrays a pile of reindeer skulls along with other bone remains. Some of the skulls are attached to wooden sticks while others are lying on the ground. Standing around the pile in a semicircle are ten small wooden material spirits which are facing the sun in the background.

Nenets ethnographer Galina Kharyuchi (2013:73) writes that the piles of skulls and bones are the chum (N. *mya*) of the master spirit that guards the sacred site and its vicinities, up to five kilometres in diameter. It is forbidden to conduct economic actives within this area (Kharyuchi 2018:132).

Figure 3 shows a contemporary, actively-used sacred site, photographed in 2001 at Yamal peninsula. No material spirits are to be seen in the pile but a photograph, taken by Russian ethnographer Leonid V. Kostikov, in 1927 at Gydan tundra, shows a material spirit, a master spirit, guarding a sacred site, possibly prior to the addition of reindeer offerings (Figure 4). This evidence dates this form of sacred site back at least four hundred years (c.f. Ivanov 1970:73). Russian archaeologist Sergey V. Ivanov (1970:97–98) argues that the material spirits portrayed in the image by Arthus (1614) and in figure 4 date to a pre-Nenets tradition, that is, from before 500 A.D. (Leontieva & Bugaeva 2013:126).

Figure 3 and 4 also show wooden poles. They are called *Symzy* in tundra Nenets and are sacred – coming from larch trees in the taiga zone which have been transported to the tundra on sacred sleighs (N. *khekhe khan*, Figure 5) (Kharyuchi 2013:45).

Figure 3. Sacred site on the Yamal peninsula. Photo: Bryan & Cherry Alexander, Arctic-Photo.

Figure 4. Sacred site at Gydan tundra, 1927. Photo: Leonid V. Kostikov, Russian Museum of Ethnography – РЭМ 4785-111.

Figure 5. Khekhe khan, Nenets sacred sleigh. Photo: Leonid V. Kostikov, Russian Museum of Ethnography – РЭМ 4785-126.

Offerings of reindeer skulls, pelts, ribbons of coloured cloth, rope, and belts, are attached to the poles as gifts to the master spirit of the sacred site (Islavin 1847:118; Kharyuchi 2013:18–25). Depending on the type of sacred site, for example family, clan, or situationally created sacred site (see Kharyuchi 2013:65), the sites can be guarded by more than one master spirit. Originally the sacred island of Vaygach, mentioned above, was the home of hundreds of material spirits before Archimandrite Veniamin destroyed the sacred sites and burned over four hundred spirits in 1827 (Islavin 1847:118–119).

As part of the offering ritual, the master spirit demands to be fed with reindeer blood and fat from a sacrificed reindeer, along with tobacco and vodka (vodka bottles can be seen among the antlers in Figure 3). This forms a ritual meal which is shared with the humans who themselves are eating the sacrificed reindeer and drinking its fresh blood (Islavin 1847:117; Khomich 1966:207).

The master spirits of the sacred sites are most often made of wood, but stone spirits occur too. The master spirits are about half a metre in length, often missing both arms and legs, with pointy heads and a carved face in the form of a mouth and eyes. Some deviate from the norm by having arms and legs, rounded heads, or being more log-like by lacking a head (Ivanov 1970:73–89; Khomich 1966:202–208).

Smaller wooden spirits, such as those portrayed in Frederick G. Jackson's (1895) travelogue described above (Figure 2), are also brought to the sacred sites to accompany the master spirit. These are sticks (*c.* 5–15 cm) which have been chosen because of their appearance, for example having a face or a head (Kharyuchi 2013:66). After some rough additional carvings, such as adding details in the form of a neck, a mouth, nose, or eyes, they are brought to the sacred sleighs and transported to the sacred sites. They become the assistants to the master spirit (Kharyuchi 2013:40) and were, in the past, potentially related to deceased relatives of their makers (Ivanov 1970:73).

All things that have spent a long time at a sacred site become animated – even non-spiritual things, such as stones and twigs, which can be taken from the sacred site and kept on the sacred sleighs (Kharyuchi 2018:126). The sites are a source of vitality and cause of animation but can, at the same time, be a source of sickness and death. If a sacred site is abandoned or not visited in a long time, it results in a harmful master spirit that needs to be dealt with or avoided (Kharyuchi 2013:24–25).

According to Ingold's definition of animism(s), the offering involves the giving of vital forces, including the soul(s) of the sacrificed reindeer and the materials of a living sacred larch tree (the material used to create the poles and the material spirits). What the tundra Nenets get back from the gods and the spirits is aid in hunting, fishing, herding and maintaining good relations with the co-inhabitant spirits (Lar 1998:10–13). This is the demanded reciprocal interdependence and the correspondence between the human and the non-human.

In the animistic ontologies of northwestern Siberia, as in most animistic ontologies, an animated being has more than one soul. The Cartesian division between a material body and an immaterial soul does not apply (Ingold 2022:56–57; Pedersen & Willerslev 2012:467–468), hence the addition of (s) when soul was mentioned above. There are no words in the Samoyedic languages (Nenets, Enets, Nganasan, and Selkup) that correspond to the Western notion of an immaterial soul housed *in* a material body (Gračeva 1983 in Eidlitz Kuoljok 1993:77). The souls, vitalities, or life-forces, can be material or immaterial continuances of materials, making it difficult to say exactly what counts as a soul and how many souls there are or might be (Gračeva 1983 in Eidlitz Kuoljok 1993:78; c.f. Kim 2000:461–465).

Among the Nenets, Enets, Nganasan, and Selkup there are at least two souls: the breath soul (N. *Yindq*, E. *Beddu*, NG. *Bachu*, S. *Qwej*) and the shadow soul (N. *Sidyangg*, E. *Ki* (?), NG. *Sidanka*, S. *Ella/Ilsat*) (Dyekiss 2019:12; Kim 2000:462–465; Vallikivi 2024:164). These two, together with the material body, make up a living human (Vallikivi 2024:164). At first it might seem like a hylomorphic dualism between the immaterial souls

(*morphe*) and the material body (*hyle*) but among the Enets and the Nganasan the breath soul is part of the heart or the chest and takes the form of strings, similar to sunbeams, that are exhaled and inhaled (Kim 2000:462). This results in the breath soul being part of the air shared with other living beings, including plants. Among the Nenets, when a being with a breath soul dies the soul lingers in the air and is able to hear and see what the living are doing around the dead body (Lar 1998:20–25). An upper world type of shaman, a *Tadibya* in the case of tundra Nenets, is needed to guide the spirit of the dead to the upper worlds of the sky and to the high god Num and prevent it from going to the underworlds of the god Nga, through which it can return to the middle world and cause harm to the living (Lar 1998:18–20).

Among the Nenets, the shadow soul relates to a person's hair. Whenever a person's hair is cut, it is saved and never left behind as it is believed that evil bird-spirits can collect the hair cuttings, resulting in the owner of the hair falling ill and not being able to work (Vallikivi 2024:91). Among the Selkup, the shadow soul is a humanoid version of the owner which can move freely and come and go as it like, potentially being the actual shadow of the material body (see detailed discussion in Kim 2000:463–465).

Theses souls are then an abstraction, lying somewhere in-between the immaterial and material. They do not assume binary positions, as in the hylomorphic and Cartesian models, but exist as relations or correspondences or, more specifically, as immaterial continuances of materials.

This notion of immaterial continuances of materials can be exemplified by drawing on one of the author's childhood memories from visiting her nomad Nenets family in the Gydan tundra.

At the age of ten, while playing with her cousins, Naglaya stumbled upon a duckling who could not fly due to a wing injury. She decided to take care of the duck and protect it from their dogs and potential predators. A little tent was constructed and the area was surrounded with a fence made from fishing nets. The adults were telling her to release the duck back into the wild as they strongly believed it might be a reincarnation of someone's dead relative's soul. As Naglaya was quite determined as a child, she decided to keep the duckling until it could regain the ability to fly again. Over the next few days she would check up on the duckling's progress and one day it was gone. The adults told her that the duckling had likely recovered and flown away but she knew they had released it as a way of maintaining good relations with the spirits and the ancestors.

The duckling is the immaterial continuance of past materials within the form the material duckling. The deceased human person, most likely its breath soul (air), was transferred, via a process of reincarnation, to the new material, in this case the body of the living duckling. The duckling is material in its bird form yet animated as an immaterial continuance of

the deceased human. It is an animal but also a spirit-subject relating to the souls of the deceased human. This spirit-subject is known as *Khekhe* in the tundra Nenets language (Kharyuchi 2018:123–124) and it is the animation, the life-giving, the subjectification of the non-human.

Estonian ethnographer Laur Vallikivi (2011:88, 2024:164) reports that the tundra Nenets material spirits have both a breath soul and a shadow soul. Furthermore, Kharyuchi (2013:18–25, 40, 2018:121) writes that the master spirits of the sacred sites are related to the gods by being their shadows and they are regarded as *Khekhe*.

Sacred sites with master spirits, similar to those of the tundra Nenets, are also found in taiga and the on the Taymyr peninsula tundra. Apart from their environmental settings, there are no differences between the creation and use of sacred sites among the tundra and forest Nenets. Similarly, the sacred sites of the tundra Enets and Nganasan do not differ much from those of the tundra Nenets (Kharyuchi, pers. comm.).

In the taiga, among the Selkups, forest Enets, and Kets, the sacred sites are sacred groves and small islands and promontories in rivers and lakes hidden from hunting and migration paths (Maloney 2016; Vajda 2016:302). Their material spirits are also subjects but instead of being housed in piles of skulls and reindeer antlers they are living in sacred huts (Rus. *ambarchiks*) located within the sites, or they are standing, supported by a tree, in the open-air. The spirits also demand ritual meals to be shared at sacred sites, along with offerings of colourful ribbons hung from sacred trees (birch or cedar). In return, the spirits provide aid in hunting, fishing, gathering, herding, and overall well-being (Donner 1922:131; Prokofyeva 1963:124; Maloney 2016; Vajda 2016).

Finnish ethnographer Kai Donner (1922:128) describes a sacred site close to the river of Ket and most likely among the Selkup, though possibly with the Kets – as early linguistic classifications complicate distinctions between these peoples. While at this site, Donner removed a stone from what he described as its temple. The photograph of this stone-spirit (Figure 6) shows a stone with the shape that looks like a neck which creates a head. A face, eyes and a mouth, have been carved onto the head and pieces of cloth are tied around it, forming its clothes. Donner had to give an offering of 20 kopeck in order to move the stone-spirit. These coins were added to previous coin offerings lying within the temple (Donner 1922:128). Donner gives no description of the temple but it is probable, based on the location, that it was a sacred ambarchik or a wooden chest, likely made of a birch or a cedar tree, which are regarded as sacred among both the Selkup and the Kets (Maloney 2016:121, 130; Vajda 2016:302).

The Selkups and the Kets also carve faces into the trunks of the living sacred trees (S. *Kåssyl*, K. *Holai*). These are the master spirits of the sacred

Figure 6. Stone spirit. Photo: Kai Donner, Museiverket VKK532:2344.

sites, and the other material spirits leaning against the trunk are the master spirits' children (Ozheredov et al. 2015; Vajda 2016:302). A photo of such a tree can be found in Donner's publication from 1922 (Figure 7). The caption says 'Skogsguden' (Donner 1922:134), meaning 'the forest god' in Swedish.

The sacred living and growing trees hold a fundamental place in the animisms of northwestern Siberia (Avdeeva et al. 2019; Lar 1998:28–29; Maloney 2016:130; Vajda 2016:302). It is from these sacred trees that the material spirits, who relate to the gods in the form of being an immaterial continuance of the gods and being materialised through the sacred tree, are made. As with all gods and spirits, they are not good or evil, they have their own agency. To live a good life, especially in past times, one had to stay on good terms with the material spirits in order to avoid harm, sickness and death caused by the spirits.

Figure 7. 'Skogsguden'. Photo: Kai Donner, Museiverket VKK532:2235.

Feeding the ancestors

Among all peoples of northwestern Siberia there are also material spirits, or ancestral images, that are kept at the camp sites. Among the tundra Nenets, these smaller humanoid ancestral images (referred to as *Khekhe* in Nenets, E. *Kekho* (?) NG. *Koika*, S. *Porge*, K. *Allel*) are created by duck bills dressed in pieces of cloth or fur similar to the traditional Nenets clothing. These ancestral images help with various tasks, such as dealing with bad spirits and providing aid in hunting, fishing and herding, as long as they are respected and cared for properly. They are, like the other material spirits of the sacred sites, neither good nor bad but follow their own will.

Not to be confused with the ancestral images are the metal pendants (humanoid and animaloid) attached to the Nganasan, Selkup, and Kets shamans' regalia which function as their spirit helpers. These relate solely to the

Figure 8. Screenshot of the ancestral images from the video 'Sharing a meal with the ancestors in Gyda tundra'. Photo: Anna Naglaya.

shaman to whom the regalia belongs, as well as to subsequent generations of shamans who inherit them and use them in rituals for specific purposes (Djarvoskin 2003; Dolgikh 1996; Gračeva 1996; Joki 1996; Prokofyeva 1963; Vajda 2010:135). Unlike the ancestral images, these pendants are not used by entire families or communities. The question of how an understanding of these spirits might contribute to discussions of shamanism in prehistory must be addressed separately, given the challenges of identifying prehistoric shamans from archaeological materials (Solfeldt, *forthcoming*).

Among the tundra Nenets there is also a type of material spirit made solely of cloth – both the body and its clothing (N. *Myad pukhutsya*). This material spirit aids women's work with the chum, childbirth and sickness, and it is created when a woman is newly married and moves into a new chum with her husband (Khomich 1966:204). The ancestral images, *Khekhe*, are inherited on the paternal side of the family.

During Naglaya's last visit to the Gydan tundra she made a short video (*Sharing a meal with the ancestors in Gyda tundra*, unpublished) depicting a typical encounter with ancestral images. In this video, a Nenets reindeer herder sits on the floor in his chum and in front of him is a table on which hot tea and bread has been served. In his lap he has three ancestral images lying on a reindeer pelt (Figure 8). His wife brings an empty glass, into which he pours vodka from a newly opened bottle. He then pours a drop of vodka from the glass onto the mouths of the ancestral images and says: 'the rest is for me'. After that he drinks the rest of the vodka, takes a piece of bread from the table, eats it, and continues to smoke his cigarette.

This video is of a ritual meal, a feeding of the ancestral images, similar to the feeding and the ritual meals at the sacred sites, described above. By caring for the ancestors and answering to their demands, the ancestors in return will care for the herder and his family.

The herder told Naglaya that these ancestral images are his dead relatives and that the reason for giving them vodka was a 'celebration, special day' of an unexpected visit from a friend. To understand the concept of dead relatives becoming material spiritual ancestors, which exist somewhere in-between the immaterial and the material, we return to the reasoning of souls among the Nenets.

When an ancestral image is made, the body – wood, stone, or an animal part – is taken from a sacred site. In return the master spirit demands an offering of a reindeer and additional cloth ribbons and coins. Clothing is then sewn and applied to the ancestral image's body. Over time, as the ancestral image is cared for, additional layers of clothing are added, and the ancestral image gradually grows in size (Vallikivi 2024:141).

Part the hair of the deceased relative, its shadow soul, is then applied to the ancestral image – transferring the shadow soul to the ancestral image. The ancestral images are kept for as long as the memory of the person becoming an ancestral image is preserved.

Finnish pioneer ethnographer and linguist Matthias A. Castrén pointed out, back in 1853, that the Indigenous Altaians of south Siberia do not regard their material spirits as representations. He writes:

> In our language, the word idol does not have the same meaning as how I will be using it in the following [chapter]. Usually, it is understood simply as an external image, a symbol of divinity, which is conceived as a separate entity from the idol, as if it were an existing essence unto itself. Among the Altaians peoples, idols do not have this formal significance, but most of them imagine that divinity is inherent in the idol, or so to speak, incarnated within it. Therefore, according to their view, the idols are actual gods […]. (Castrén 1853:197, *authors' translation*)

We argue, based on the analysis above, that the same applies to the ancestral images of northwestern Siberia. What can be concluded, based on this analysis, is that the material spirits, the master spirits of the sacred sites, and the ancestral images, made and used by hunter-herders in the northwestern Siberian tundra and taiga, are not art. They are not representations of an idea in the mind of the maker, which the maker wants to communicate to an observer of the material spirits. Hylomorphism and iconology do not apply to the animistic ontologies of northwestern Siberia. These material spirits are regarded as living subjects rather than static objects. Their origin relates to the gods, immaterial spirits or ancestors which are materialised

via the living and the sacred trees or animals and are shaped as humanoid beings based on the forms of unworked sticks, stones, and logs – a form that affects the human. '[…] a *khekhe* is thus not a mere representation of a deity – it *is* a deity, or rather, it is a relational being tied to the sacred site of its origin, being a *person in person*.' (Vallikivi 2014:142).

To explain these material spirits in terms of hylomorphism and iconology is reductive. To understand them, we must view them as ecological material and immaterial relations which affect the peoples (past and present) of northwestern Siberia, especially in relation to hunting, fishing, herding, gathering and well-being.

Conclusion: an animist perspective on the humanoid figurines of the distant past

In this article we have argued that material spirits, made and used among animist hunter-herders, must be viewed as fluid correspondences between the material and the immaterial. They are part of the on-going ecological relations between humans and non-humans sharing the same environment. In this environment, all things have the potential to be alive – not only humans and animals. Prehistoric humanoid figurines, we suggest, are best understood in relation to the animistic ontologies found in northwestern Siberia.

This research has identified six types of material spirits among the animists of northwestern Siberia: 1) the master spirits of the sacred sites, found among all peoples discussed here, in different sizes and contexts within the sacred sites, mainly aiding in hunter, fishing and herding, in relation to the gods and other spirits; 2) the smaller wooden stick spirits, found at sacred sites among Nenets, which assist the master spirit of the sacred site; 3) the ancestral images, found among all peoples discussed here, which are kept in the camps and are the ancestors which aid in various everyday tasks, in keeping sickness away, and ensuring well-being; 4) the cloth spirit, found among the Nenets, which has particular functions regarding women's work in the chum; 5) the carved tree spirits found among the Selkups and Kets, the masters of the sacred sites, mainly aiding in hunter, fishing, and herding; 6) the non-worked material spirits, such as stones and twigs and other things that have spent a long time at a sacred site, which are often kept on the sacred sleighs. The sacred poles and the sacred sleighs found among the tundra Nenets should also be considered in relation to this typology of material spirits. They are not humanoid material spirits in the same ways as the categories described above, yet they are sacred, being regarded as *khekhe* among the tundra Nenets. They are a fundamental part of the sacred

sites and are derived from sacred trees. The Nganasan, Selkup, and Kets shamans' material spirits and various animaloid material spirits (attached to the Nenets' sacred sleigh, Figure 5), not dealt with in this paper, could potentially also be added to this typology.

Hylomorphism and iconology are often opaquely embedded in the interpretations of figurines made and used by prehistoric hunter-gatherers – creating overarching representational interpretations in which prehistoric figurines are viewed as static objects of art.

Based on this analysis of the material spirits of northwestern Siberia, such representational interpretations result in an unlikely characterization of the ontologies of the Palaeolithic, Mesolithic, and sub-Neolithic hunter-gatherers. Archaeologists should not solely focus on studying the forms of figurines and what they are supposed to portray. As archaeologists Lynn Meskell (2017) and Rebecca Farbstein (2017), in their overviews of this field of study, have both stated, we can no longer ignore the figurines' contexts. Here, we argue that this context extends beyond the typical archaeological context of find locations, structures and layers at archaeological sites. Context also includes the material the figurines are made of and the potential immaterial contexts they evoke, including immaterial aspects of archaeological sites and structures. For example, we argue that humanoid figurines found in burial contexts do not necessarily have the same function as those found in camp site contexts. And when it comes to loose finds, where the context is unknown, archaeologists must ask themselves 'what traces does a sacred site leave?', especially considering that sacred sites may have been seen as dangerous places, as well as locations in which economic actives were forbidden.

Regarding the dualism of 'portable art', to which the prehistoric figurines belong, and 'parietal art' (cave art), we argue for a category in-between. This category includes the carved tree spirits in the ethnographic material of the Selkup and the Kets and, from the archaeological record, the Shigir idol from the Urals mountains (Terberger et al. 2021) and the figurines from Gorbunovo peatbog in the trans-Urals (Chairkina 2014). We argue that the division between 'portable art' and 'parietal art' is not useful when it comes to integrating animist reasoning into the interpretation of the prehistoric images. It is evident that prehistoric figurines could travel (Lucenius & Brorsson 2021), while the ancestral images of northwestern Siberia travel at least as far as a nomadic human, since they are kept and cared for as long as they are remembered – these memories spanning across the generations. Such a generational time-perspective, along with the sacred site perspective, in which the master spirits are placed and stay until the sites are forgotten and abandoned, needs to be considered in relation to the chronology and chorology of prehistoric figurines.

Lastly, regarding the notion of prehistoric figurines as toys (see Iršėnas 2007), traditional Nenets toys are not separated from the animistic ontology, since they are a mentor and teacher to the child, having their own voices, and can become harmful if not cared for properly (Sázelová et al. 2014:57–59). The binary positioning of toy versus material spirits should not be taken for granted. Polish ethnographer Marie A. Czaplicka (1914:200) describes how Russian modern made toy-dolls became material spirits in northwestern Siberia in the beginning of the 1900s. Such a dualistic reasoning partly derives from the notion of hylomorphism, in which nature stands against culture, body versus mind/spirit/soul, and the material versus the immaterial. Instead, we argue, that material spirits in animist hunter-gatherer and hunter-herder societies are fluid connections between material and immaterial worlds. These spirits are embedded in ecological relations wherein all elements of the environment, not only humans and animals, are potentially alive. We suggest that prehistoric humanoid figurines reflect ontologies similar to those found in northwestern Siberia. Exactly how these relations work and what the figures do is a question for further research.

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Eyeing the Beholder

Anthropomorphic Clay Figurines and Reciprocal Gazing

Tobias Lindström

Anthropomorphic clay figurines comprise an enigmatic category of finds associated with Pitted Ware culture sites during the latter part of the middle Neolithic period (*c.* 2900–2300 BC) in the Baltic Sea region. As with most figurative objects, previous research has often been preoccupied with questions of representation, for example focusing on what the figurines might depict. In this paper, the anthropomorphic figurines are instead explored through their physical properties, primarily their ability to look back at their human makers, handlers and onlookers. Considering these figurines as clay beings that have the ability to look back at their viewers shifts the perspective from representation to presentation. This conceptual shift results in a more dynamic picture of human-figurine interactions at Pitted Ware culture sites.

Keywords: Stone Age, portable art, humanoid, human-figurine relations

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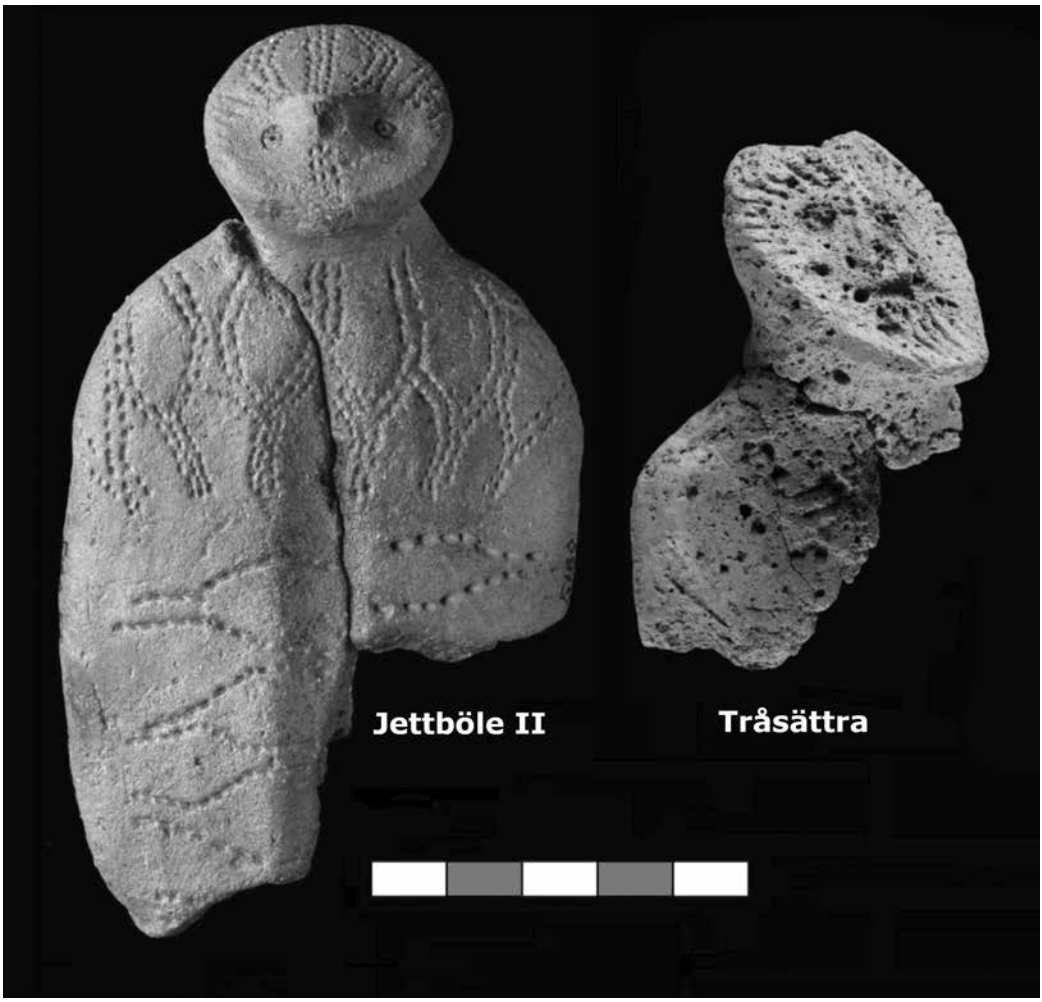

Figure 1. Examples of anthropomorphic figurines from Jettböle II (NM 5180:57, 90; photo: Markku Haverinen/Museiverket) and Tråsättra (1228818_HST; photo: Nathalie Hinders/SHM). Note the tilted heads, which give the figurines distinct upwards gazes.

Introduction

Beginning in around 2900 BC, anthropomorphic clay figurines start to appear at several sites in eastern Sweden and Åland (Finland) associated with the marine hunter-gatherer groups known as the Pitted Ware culture (PWC). The eyes of these figurines are prominently featured in the middle of their upwards-tilted faces, seemingly probing and seeking the human gaze. These artefacts have almost always been viewed as enigmatic and,

accordingly, they have been the subject of many different interpretations over the years. The figurines in question are undoubtedly viewed as expressive, charismatic objects, and their ability to stimulate the imaginations of both archaeologists as well as the public is well attested. When new finds are publicized by news media, there is a propensity to describe them as 'curious' or 'mysterious'. As more and more of these anthropomorphic figurines have been unearthed, patterns of similarity and variability have emerged within the assemblage. Despite the growing number of these artefacts, our knowledge of their significance and use remains limited. I argue that this is the result of a research tradition too preoccupied with questions surrounding representation.

This article instead explores the relationships between humans and anthropomorphic figurines at PWC sites. To accomplish this, the anthropomorphic figurines are examined from a perspective that avoids purely representational or symbolic analysis (see e.g. Harris 2018; Eriksen 2022; Lindström 2024:85–86). The figurines have previously been interpreted as gods, humans, seals or human-seal hybrids (Björck et al. 2020:16; Cederhvarf 1912; Stenbäck 2003:86–87; Storå 2001:48–51). In this paper, instead of treating them as representations of beings, they are treated as beings themselves. Following this, I explore the ways in which their physical characteristics facilitated certain types of human-figurine engagements, particularly eye contact or 'reciprocal gazing'. Reframing them as beings, rather than representations, challenges preconceived notions of their meaning and use, and has implications for our understanding of the human-figurine interactions at the PWC sites.

Leaving representation aside: Figurines as beings

The study of prehistoric figurines has, for a long time, been moored in symbolism and representationalism. This approach is founded on the idea that successful identification of what an image depicts will provide the key to understanding why it was depicted (see e.g. Back Danielsson et al. 2012; Nanoglou 2009; Wengrow 2003). Prehistoric figurines are thus reduced to a single aspect: what they are believed to depict. They are often viewed as material stand-ins for beings, whether physical or spiritual, that are not actually present, with many discussions treating them as representations of individuals (Bailey 1994; Hamilton 1996) or mother goddesses (e.g. Gimbutas 1974). The research into the PWC anthropomorphs is no exception to this, with interpretations that describe them as depictions of gods, spirits, ancestors, shamans, shamanic spirit helpers, seal-human hybrids, prominent people, cult heroes or dead people in wrappings (see Björck et

al. 2020:15–16; Cederhvarf 1912; Nilsson Stutz 2006; Núñez 1986; Storå 2001:48–51; Wyszomirska 1984:119).

The focus on representation and categorization in the study of PWC figurines, and figurine studies in general, has resulted in an interpretative roundabout where a myriad of equally plausible (or implausible) interpretations are stacked on top of each other. This inclination towards representation and categorization can cause us to look past the objects themselves, leaving the figurines absorbed by the categories in which they have been placed (cf. Weismantel & Meskell 2014:234). Although these artefacts might very well depict something, it is not universally the case that representation (and the separation of the depiction from that which is depicted) is the key concern in the creation of figurines. Indeed, there are many figurative traditions in which images are treated differently, as alive and potent, possessing their own wills and wants (e.g. Freedberg 1989:11, 32–33; Gell 1998:129; Graeber 2005; Howey 2020; Jones 2017:171; Mitchell 2005:5–6, 29–31). Images often defy the subject-object divide; this is made evident by the way in which the image may also be given the same name as the spiritual entity that it materializes or for which it acts as a vessel (Alberti 2013; Graeber 2005, 2015:29; MacGaffey 1990, 1994, 1998; Pedersen 2011:158).

If we allow ourselves to momentarily bypass questions of representation, we can simultaneously allow for other aspects to enter the discussion (Eriksen 2022:67; Gosden 2020). There are avenues of investigation that do not depend upon taxonomical determinations, with one such avenue being characterized by a greater focus on the materiality of figurative imagery.

The specific properties of three-dimensional imagery in general, and figurines in particular, are important to note. While my focus here is chiefly centred upon what can be termed the visual properties of figurines, I am mindful of the critique aimed at the so-called 'ocularcentrism' in the field of figurine studies. The privileging of vision has, according to some researchers, diminished the importance of other senses in relation to figurines and related three-dimensional depictions (Bailey 2014; Eriksen 2022:68; Papadopoulos et al. 2019). Doug Bailey (2014) has, for example, argued persuasively for the importance of knowing by touching, while Mary Weismantel (2013, 2015) has argued for a kind of embodied 'slow seeing' in relation to carved stelae, stressing that visual apprehension can sometimes demand an active and engaged human viewer.

The above approaches bring the human body, its stature, abilities, and movements into consideration and thereby avoid treating carvings and figurines as two-dimensional pictures or presenting humans as disembodied eyes. By focusing on their materiality, we can ask what forms of interaction they facilitated with humans (e.g. Bailey 2014; Fahlander 2021; Freedberg 1989; Mitchell 2005; Morgan 2014:87; Weismantel 2013). What can

figurines do in their engagements with humans? What sort of interactions with a maker, handler or onlooker did they demand, incite or invite? With these questions in mind, we shall now turn to the anthropomorphic clay figurines found at the PWC sites and explore how their physical properties encouraged reciprocal gazing between humans and figurines.

The PWC anthropomorphs: An outline

In the Neolithic of Northern Europe, figurines are primarily associated with foraging communities, such as the PWC and the neighbouring Comb Ceramic culture. They are virtually absent at Funnel Beaker culture associated sites in this area (Iversen et al. 2024). PWC sites generally appear in clusters, close to the shoreline (Björck 2003; Österholm 1989:168). Osteological finds indicate a subsistence based on sealing and fishing, something which is also supported by stable isotope analysis of human bone collagen (see e.g. Eriksson 2004; Fornander et al. 2008; Lidén & Eriksson 2007). Bones from domesticated animals and small amounts of carbonized grains (Ahlfont et al. 1995; Vanhanen et al. 2019) are present on many PWC sites, but these domesticates did not constitute staple foods.

The PWC anthropomorphic figurines are coil-shaped and consist of a head, an armless torso and a foot piece. Heads are generally round or oval with slightly dish-shaped faces, a centrally placed nose or snout-like protuberance, marked eyes and, in some cases, also mouths and nostrils (Figure 1). The torsos, commonly featuring clearly marked shoulders, taper into foot pieces that often feature pronounced toes and heels. Some of the figurines with unusually large, protruding foot pieces have been interpreted as depicting sitting or kneeling humans (Björck et al. 2020:130–132). The figurines vary considerably in height from a couple of centimetres up to more than 20, although accurate size determinations are problematic due to the fragmentary state of most artefacts. The shapes and postures are similar regardless of size. A variety of decorations consisting of impressed pits and drawn lines in different patterns are present on most of the figurines. Depending on their placement, these decorations have been described as depictions of hair, facial hair, clothing or tattoos. Figurines sporting markings on the chin and sides of the face have been interpreted as depictions of male individuals, although it is also possible to interpret these 'beard-like' markings as tattoos. The markings resemble chin tattoos worn by women among circumpolar indigenous groups such as Iñupiaq, Yup'ik, Qilakitsoq and Chukchi (Bogoras 1904:254, pl. XXIX, fig. 2 & 3, fig. 186; 1907:342–343, 360; Krutak 2019). While rounded applications resembling female breasts are found on a handful of the figurines (see e.g. Björck et al. 2020:fig. 79;

Cederhvarf 1912:311–312, taf. V 3a), most figurines do not show any clear indication of biological sex. Another feature found on some figurines are 'head pits' at the crown of the heads. These pits have been interpreted as holes used for fastening decorative and perishable objects such as straw, sticks or feathers (Cederhvarf 1912). Micro computed tomography (µCT) scans of one large figurine from Tråsättra lends support to this theory (see Björck et al. 2020:198–199; Ericson 2019).

Examining the sites at which these anthropomorphic figurines were found, we can determine that they belong to the latter part of the middle Neolithic period (MN B) and that they are especially common on Åland (see for example Lindström 2024:98–104; Núñez 1986). While clay figurines in general, including zoomorphic or indeterminate figurines, are regularly found on PWC sites, anthropomorphic figurines are rarer and most examples have been found at only a handful of sites dated to MN B. Until quite recently, few anthropomorphic figurines had been found at the Swedish PWC sites (Broström 1978; Segerberg 1978). Although many examples have now been found at sites located on the Swedish mainland, particularly from excavations connected with large infrastructure projects since the early 2000s, Åland is still the core area for PWC associated anthropomorphic figurines. Contacts between Åland and several of the Swedish PWC sites with anthropomorphic figurines are also evident in the form of finds of flaked rhyolite or similar igneous rocks (often labelled 'quartz keratophyre' in Nordic archaeological publications) typically found in abundance at the Ålandic sites (Björck et al. 2020:157; Darmark 2006; Kihlstedt et al. 2023; Runeson 2023:27).

Parallels have often been drawn between the PWC figurines and the figurines of the so-called Comb Ceramic culture (CCC), particularly the standing anthropomorphic figurines associated with the late CCC phase which is coeval with the younger PWC phase (Núñez 1986; Wyszomirska 1984; cf. Loze 2005, 2008). Given the almost 1000-year hiatus between the so-called bent- or foetus shaped anthropomorphic figurines from the Early Comb ceramic period and the standing anthropomorphic figurines from the middle Neolithic, any direct links between them seem improbable (see also Núñez 1986).

Regarding the specific, on-site find contexts of the figurines, it is notable that most have been found alongside pottery sherds, flaked stone and animal bones in the deep cultural layers at the PWC sites (Björck et al. 2020:164; Edenmo et al. 1997; Lindström 2024:113–117). For a long time, archaeologists connected these figurines with ritual activities and ritual structures such as burials (see Wyszomirska 1984). Since their representation in ritual find contexts is modest at best, the jury is still out regarding their function. Their potential role in what can be described as 'mundane ritual' will be discussed below.

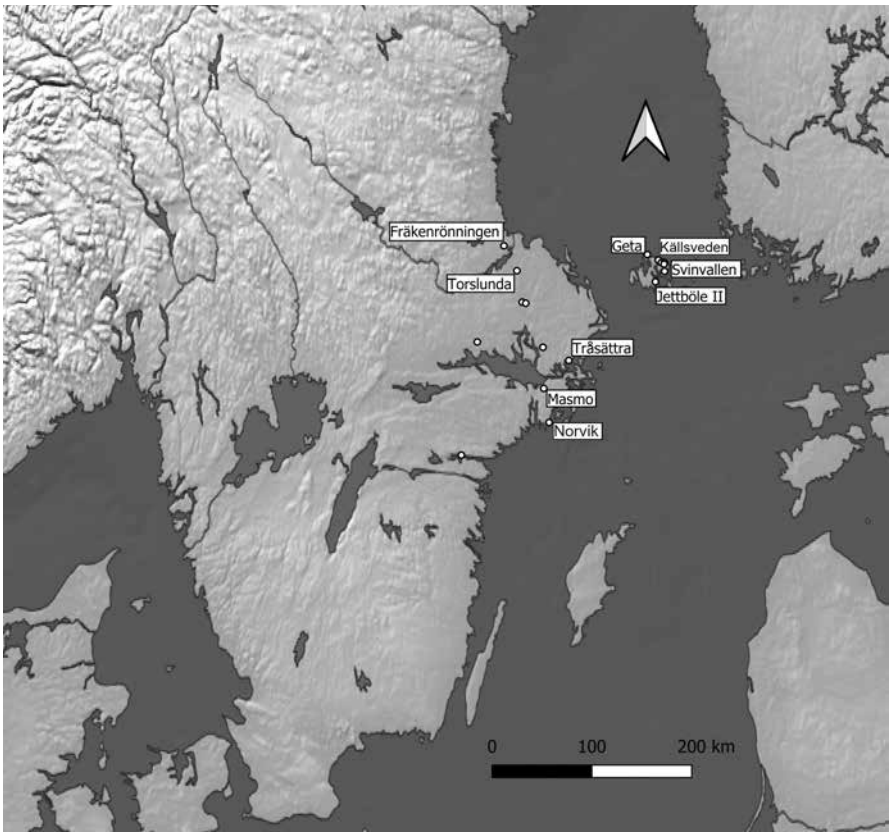

Figure 2. Map of PWC sites with the finds of anthropomorphic figurines and figurine fragments considered in the text (labelled).

The 'interactability' of anthropomorphic figurines

For this paper, 62 figurines and figurine fragments with facial markings for eyes, mouths and nostrils, and/or tilted heads, have been compiled (table 1). The figurines in question have been found at the Swedish sites Fräkenrönningen, Masmo, Norvik, Torslunda and Tråsättra, and the Ålandic sites Geta, Jettböle II and Svinvallen (Figure 2). Most of the figurines and figurine fragments are included here with their respective inventory numbers, the exception being the finds from Geta. A full report on these finds is expected during 2026 (Fast & Soisalo 2023).

The identification of eyes, mouths, nostrils and tilted heads can often be problematic due to the fragmented state of the figurines. The porous clay- or ceramic ware can make it difficult to separate eyes from naturally occurring holes, particularly when only one of the possible 'eyes' is preserved. Some

Table 1. Distribution of eye-mouth and nostril markings, as well as tilted heads, on 62 anthropomorphic figurines. In many cases, only the lower- or upper part is intact.

Site	ID no.	Part	Eyes	Mouth	Nostrils	Head tilt	Head pits	Comments
Fräkenrönningen	GM 39308:43	Head	X					
Geta	ÅM 829:66	Head	X	X		X		
Geta	ÅM 833:4	Head	X	X				
Geta	ÅM 837 (2023)	Head	X	X				
Geta	ÅM 837 (2023)	Head	X	X		X		
Geta	ÅM 837 (2023)	Head	X	X				
Geta	ÅM 837 (2023)	Head	X			X		
Geta	ÅM 837 (2023)	Head/ torso	X			X	X	
Geta	ÅM 837 (2023)	Head	X	X	X	X	X	Atypical eyes: round stamps
Geta	ÅM 837 (2023)	Head	X					
Geta	ÅM 837 (2023)	Head	X	X		X	X	
Geta	ÅM 837 (2023)	Head	X			X	X	Atypical eyes: crescent shaped stamps
Geta	Field season 2024	Head/ torso	X	X		X		Mended with resin
Geta	Field season 2024	Head	X			X		
Geta	Field season 2024	Head	X			X		
Geta	Field season 2024	Head				X		Eye part not intact
Geta	Field season 2024	Head	X					
Geta	Field season 2024	Head	X	X		X	X	Atypical eyes: only one pupil. Atypical mouth: pits below nose
Jettböle II	NM 5180:57, 90	Head/ torso	X			X	X	
Jettböle II	NM 4782:471	Head	X			X	X	
Jettböle II	NM 5180:168	Head/ torso				X		Face damaged, only facial orientation could be determined
Jettböle II	NM 4782:355	Head	X			X		
Jettböle II	NM 4782:444	Head				X	X	Face damaged, only facial orientation could be determined
Jettböle II	NM 4782:330	Head	X	X		X		
Jettböle II	NM 5180:556	Head/ torso	X		X	X		
Jettböle II	NM 5180:367	Head/ torso	X			X		
Jettböle II	NM 4782:336	Head				X		Eye part not intact
Jettböle II	NM 4782:450	Head	X			X	X	
Jettböle II	NM 5180:108	Head	X					

Site	ID no.	Part	Eyes	Mouth	Nostrils	Head tilt	Head pits	Comments
Jettböle II	NM 5180:143	Head	X					
Jettböle II	NM 5180:434	Head		X		X		Eye part not intact
Jettböle II	NM 5180:667	Head	X					
Jettböle II	ÅM 704:159	Head	X			X		
Jettböle II	ÅM 704:184	Head	X			X		
Källsveden	NM 4789	Head	X	X	X	X		
Masmo	108675_HST	Head	X	X				
Norvik	F3003	Head				X		Eye part not intact
Svinvallen	ÅM 687:1	Whole				X		Eyeless
Svinvallen	NM 16431:55	Head/ torso				X	X	Face part not intact
Svinvallen	NM 16431:645	Head		X				Eye part not intact
Torslunda	SHM 21307	Head/ torso	X			X		Atypical eyes: diminutive
Tråsättra	1228818_HST	Head/ torso	X	X		X	X	
Tråsättra	1228865_HST	Head	X			X		
Tråsättra	1228736_HST	Head	X			X	X	Elongated groove on top of head
Tråsättra	1228756_HST	Head/ torso	X				X	Atypical eyes: empty spaces encircled with dots
Tråsättra	1228816_HST	Head				X		Eye part not intact
Tråsättra	1228841_HST	Head		X		X		Eye part not intact
Tråsättra	1228855_HST	Head				X		Eye part not intact
Tråsättra	1228859_HST	Head/ torso				X		Eye part not intact
Tråsättra	1228726_ HST/1228821_HST	Intact				X		Eyeless
Tråsättra	1228731_HST	Head	X			X		
Tråsättra	1228736_HST	Head	X					
Tråsättra	1228747/1228782	Whole	X			X		
Tråsättra	1228749_HST	Head	X			X		
Tråsättra	1228740_HST	Head/ torso				X		Eyeless
Tråsättra	1228731_HST	Head	X					
Tråsättra	1228800_HST	Head	X	X		X		
Tråsättra	1236583_HST	Head	X					
Tråsättra	1232112_HST	Head	X					
Tråsättra	1228830_HST	Head	X			X		
Tråsättra	1228828_HST	Head	X					
Tråsättra	1228815_HST	Head		X		X		Eye part not intact
Total	**62**		**46**	**18**	**3**	**45**	**13**	

faces are so dotted with holes that it is virtually impossible to accurately identify facial features. However, without much doubt, the eye markings are the most consistently marked facial feature among the anthropomorphic figurines found at the PWC sites. Eye markings (46) are more than twice as common as markings for mouths (18), and almost fifteen times more common than nostrils (3). Only three figurines are completely eyeless. The eyes are often marked with two parallel, small impressions surrounded by stamped circle. Some anthropomorphs deviate from this and exhibit what will be referred to here as 'atypical' eyes, either due to being diminutively marked or marked in an unusual manner. These atypical eyes include those marked with miniscule, incised dots (Figure 3a), and eyes seemingly marked by negative spaces surrounded by decoration (Figure 3b). These atypical eye markings, as well as the lack of eye markings altogether (Figure 3c), will receive special attention later. Mouths are commonly horizontal slits below the nose, but there are exceptions such as the large pit impression on the figurine from Masmo (108675_HST), as well as the row of small pits on one of the figurines from Geta. Nostrils are few and far between and are always made in the form of two pits in, or just below, the protruding noses.

In total, 45 of the 62 figurines and figurine fragments were identified as having upwards-tilted heads, although due to the fragmented nature of the figurines, a definitive determination is often problematic. None of the figurines are obviously forward-facing. As previously mentioned, the tilted heads can indicate that the figurines were oriented towards towering onlookers, for example humans. This interpretation has been suggested, albeit not explored further, in a recent paper (Kashina 2023). In line with the prevalent view of these artefacts as symbolic and/or religious, it is hardly surprising that earlier explanations have tended to gravitate towards interpretations that describe the figurines as depictions of human shamans in a submissive, adoring position in relation to 'higher powers' residing in the sky (Artursson et al. 2023; Björck et al. 2020:16).

What is significant regarding the PWC associated anthropomorphic figurines is that the facial markings are quite unevenly distributed. It does not seem that a full set of facial markings was essential for all figurines. The complete lack of eyes among the zoomorphic figurines found at PWC sites is also an indication that realistic depiction was not the point in figurine making (Lindström 2024:94–97). In comparison to bodies of flesh and blood, the PWC anthropomorphs are clearly incomplete. Interestingly they are also incomplete in different ways, with some lacking mouths and nostrils, while others lack eyes. The eyes, as well as the head tilt as a director of the gaze, are singled out in this paper. It should however be mentioned that the other markings could conceivably be approached in a similar fashion. Indeed, the facial features of figurines are often a factor in human-figurine

relations among circumpolar foragers. Regarding the household spirit figurines of the Siberian Khanty, Peter Jordan has, in passing, described them as 'having eyes and ears to see and hear all' (2003:fig. 6.13). A marked mouth can also be of great importance, since it enables a figurine to receive food offerings. Among the Siberian Chukchi, such food offerings are given in the form of tallow or bone marrow that is smeared on the mouths of figurines (Bogoras 1907:350, 364). The conclusion that stems from such insights into how figurines have been used in the ethnographic present is both simple and profound: the physical features of figurines can endow them with certain sensory capacities that they otherwise would not possess. In turn, these sensory capacities influence human-figurine interactions.

ATYPICAL EYES AND EYELESS FIGURINES

The prevalence of eyes among the anthropomorphic figurines, as well as their tilted faces, suggest that they could reciprocate the gaze of the onlooker. But what are we to make of the, albeit few, figurines that are 'eyeless'? Most humans have eyes, and indeed most anthropomorphic figurines from other regions and periods are given eyes. The reason why some eyes are entirely omitted or, alternatively, marked in a manner distinguishing them from other figurines, could of course be attributed to the 'artistic license' of the figurine makers. Possibly, eyes could have been painted onto the figurines. The PWC associated anthropomorphs might, from a representational perspective, be viewed as being accurate depictions, with the eyes missing because they are depicting dead humans with their eyes closed (cf. Jonuks 2021). In a similar vein, the lack of limbs could be explained by describing the figurines as depictions of dead humans wrapped for burial (Nilsson Stutz 2006). Ethnographic accounts suggest that the mere presence of eyes might be what differentiates images of humans from images of powerful spiritual beings (Minkin 2020). Another aspect to consider is that the appearance of eyes and their capabilities are often not considered to be identical in humans and spirits. In several Inuit traditions, spirits are said to possess a different way of seeing and can sometimes be recognized by their unusual looking eyes. The eyes might be oriented differently, for example vertically rather than horizontally, and the eyesight of spirits is generally considered to be stronger than that of humans or animals (Laugrand & Oosten 2016:254, 259).

Another explanation, following Doug Bailey (2007), would be that the figurines are deliberately incomplete, and that the incompleteness has psychological effects that helped Neolithic people negotiate personal and communal identities. When we, as humans, are confronted with such incomplete figurines, we focus our attention on the glaring omissions, and our brains fill in the gaps. The absences thus offer room for contemplation

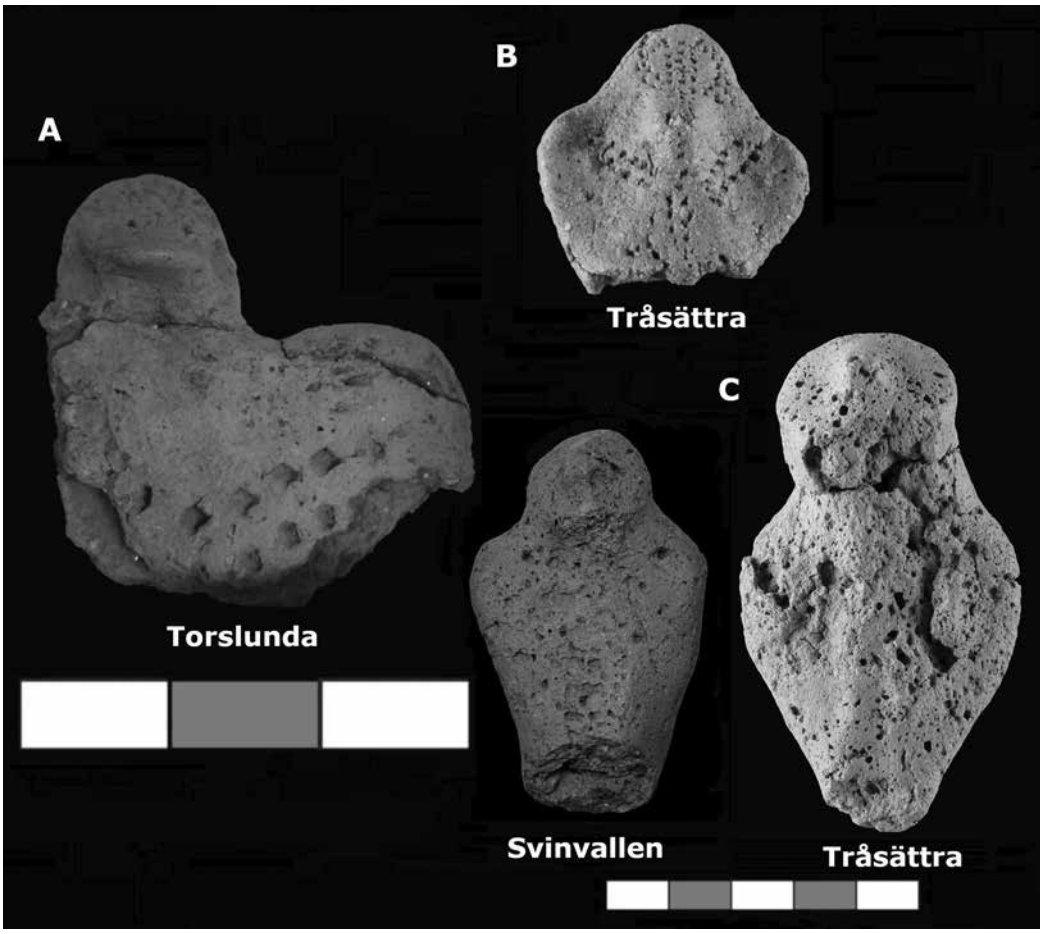

Figure 3. A couple of figurines exhibiting unusual eye markings or a complete lack thereof. a: Diminutive eye markings on a figurine from Torslunda, Uppland (SHM 21307; photo: Helena Andersson/SHM), b: Negative eye markings on a figurine from Tråsättra, Uppland (1228756_HST; photo: Nathalie Hinders/SHM), c: Two 'eyeless' figurines from Svinvallen, Åland (ÅM 687:1; photo: Veronica Lindholm/Ålands museum) and Tråsättra, Uppland (1228726_HST/1228821_HST; photo: Nathalie Hinders/SHM).

in a way that the presences do not and force us to make inferences regarding that which is missing (Bailey 2007:121). It should be noted that while the Balkan Neolithic Hamangia figurines discussed by Bailey always lack facial features, most PWC anthropomorphs exhibit at least some of them.

Along with Bailey, I believe that the absence of certain features in the PWC associated figurines is neither representational nor accidental. Instead of this absence being related to aspects of personal identity, it could be seen as a way of limiting the agency of the figurine-beings. Perhaps the eyes

could make some figurine-beings dangerous? Among indigenous peoples of Siberia, figurines used as charms can be purposely left unfinished. This is because the more detailed a figurine is, the higher the risk is that it might catch the attention of evil spirits, or that the spirit that it embodies may take control and emancipate itself (Sázelová 2014:128). Omitting certain features such as extremities, eyes, nostrils and mouths, or marking them differently, could be understood as a means of reducing the capabilities of certain potentially erratic and harmful beings (cf. Fahlander 2021) or clearly marking them out as such.

LOCKING EYES WITH THE NON-HUMAN

Although the PWC associated anthropomorphic figurines are quite small, as the diminutive suffix suggests, the plentiful decorations and the possible feather applications suggest that they were nonetheless visually prominent. For humans, decorated and marked objects in general are easier to distinguish than undecorated ones (Mühlenbeck et al. 2017). Alfred Gell (1998:74–76) has argued that even non-figurative decoration is inherently functional, making objects 'come alive', and that it is attention drawing; decoration has an allure that captures the viewer (Gell 1998:82).

Returning to the gaze and attempting to further explore the proposition that the PWC anthropomorphs were designed to look back at their beholders, we might ask ourselves what this exchange accomplished. What happens when one gazes into the eyes of such non-human, albeit human-like, beings? Eye markings are the most prominent feature in prehistoric anthropomorphic imagery (Watson 2011). Putting eyes on something is generally all that it takes needed to make inanimate objects 'come alive' (Watson 2011) and eye markings can thus function as basic 'building blocks' of animation. Faces, whether real, artificial or incidental, produce powerful responses in our brains, and we identify emotions such as joy and sadness in the 'faces' we see in clouds, the moon or electrical outlets (see Alais et al. 2021; Guthrie 1993; Hadjikhani et al. 2009; Hodgson & Galvenston 2006). Further underscoring the importance of eyes, they are also the most important features in human facial recognition (Keil 2009).

In addition to the mere presence of eyes, how they look and how they manage to be the most salient part of a face, the direction of the gaze also bears importance. Humans seem to prefer a direct gaze from a young age (Senju & Johnson 2009). Furthermore, a direct gaze signals interest in the observer and can function as a 'preliminary to interindividual interactions' (George & Conty 2008). In other words, a direct gaze precedes, and sets the stage for, sociality between the two who lock eyes. Crucially for this paper, the positive connotations and social aspects of a direct gaze are valid also when it comes to figurative images. In an experiment with different

portraits of Jesus Christ, the ones in which the gaze is directed straight-on towards the viewer were repeatedly associated with more positive values than the ones in which the gaze is averted (Folgerø et al. 2016). Although tested on two-dimensional portraits, the results may, to a certain extent, be transferable also to three-dimensional objects such as figurines, with the caveat that the three-dimensional objects can be manipulated and the direction of their gaze somewhat controlled.

What happens when one looks into the eyes of the supposedly inanimate, only for it to reciprocate the gaze? For a believer, seeing a sculpture or similar image of a spiritual entity, such as a deity, and feeling it reciprocating their gaze, can be a profound and enchanting experience. Certain images have active, probing eyes and function as focal objects or interactive visual devices, that meet the eye of the viewer as a 'corresponding other' (Morgan 2014, 2018; see also Mitchell 2004:352). Gell (1998:118–120) describes this form of reciprocal, relational gazing as 'imagistic devotion' and sees it as opposed to devotional practices such as prayer or scripture reading. Through imagistic devotion, the union between the devotee and the divinity comes about through the profoundly important eye contact, which trumps other representational details that might mark the identity of the specific divinity. The reciprocation of the gaze is for Gell (1998:120) an 'ocular exchange' which creates intersubjectivity and animation through the realization that one is being literally looked at by a divine being. Through this process of ocular exchange, a sort of mutual apprehension is achieved whereby we can begin to see ourselves through the eyes of the other (Weismantel 2013:30).

The PWC anthropomorphs, apparently by design, drew the gaze of humans and promoted an ocular exchange between people and figurines. This has implications for our understanding of the use of anthropomorphic figurines at the younger PWC sites. How the figurines might have functioned will be discussed momentarily.

Discussion: The PWC figurines as beings

The PWC anthropomorphs appear suddenly, in a distinct and recurring form suggesting adherence to some sort of established convention. They are ubiquitous at a handful of sites but are rare or non-existent at most others. Looking at, and being looked back at by, anthropomorphic figurines was not practiced across the entire PWC area. For the subset of the PWC that made and used these figurines, they might have had a unifying function that strengthened the local communities. Were they materializing spiritual entities in order to facilitate social interaction with them?

Their use notwithstanding, they likely inspired strong feelings in the people who shared their gaze. The age-old question of exactly how the figurines were used remains unanswered and might even be impossible to answer. At Tråsättra, the site with the most figurine fragments to date, figurines were found virtually everywhere, leading the excavators to conclude that they must have been a concern for everybody at the site (Björck et al. 2020:164). Of course, there is not a straightforward correlation between the find contexts of the figurines and the contexts in which they were used: they could have been used for rituals, while broken or otherwise unusable figurines could have been unceremoniously discarded after completion (e.g. Larsson & Lindberg 2008:310).

Although this paper has been more concerned of the 'hows' rather than the 'whys' of human-figurine engagements, it is still important to discuss the function (for lack of a more suitable word) of figurines. Ethnographically documented figurine use suggests that figurines are multi-purpose, not easily classified as either ritual or quotidian by modern parameters. Figurines are used in both play and ritual, and those used as playthings and those used as ritual objects may be visually indistinguishable from one another (Laugrand & Oosten 2008; Ucko 1962:47). There are numerous anthropological examples of children making and using clay figurines resembling humans or animals as toys (e.g. Fewkes 1923, 1938: 30, 34, 55). The same can be said for the use of figurines to summon and command spirits, for example among Yoruba sorcerers (Morton-Williams 1960:36, fig. 2; Witte 1987) and circumpolar shamans, who use them as spirit-helpers (Fitzhugh & Driscoll Engelstad 2017:375).

Archaeologists have often viewed figurines as religious objects, and as material representations of spirits or divine entities. This is also true for the anthropomorphic figurines found at the PWC sites, which have been described as 'idols' (Cederhvarf 1912). While obviously being interpretatively loaded, 'idol' is also a somewhat derogatory term. Although archaeologists today may not intend to convey negative connotations with the use of this word, the term 'idol' denotes a graven image of a false god. In monotheistic religions, worship is supposed to be practiced in relation to the one 'true' God, while worship directed towards other entities, or 'false gods', is considered idolatry (see e.g. MacGaffey 1994:126). Terms such as 'idol' and 'worship', therefore, seem at best insufficient and at worst outright misleading in relation to the PWC anthropomorphic figurines, and perhaps in relation to many other types of figurines from other geographical areas and time periods. Indeed, the religiosity of small-scale groups is often horizontal rather than vertical, meaning that their surroundings are populated by an array of spirits or godlings who can be interacted with directly, rather than through prayer (Boyer 2001).

What is often seen in the use of figurines and similar objects is not vertically oriented worship, directed towards powerful beings residing in an otherworldly realm, where the figurine functions as a symbol of one's devotion. Figurines and similar objects are instead pragmatic, functional objects designed to allow the users to influence spirits and access spiritual powers (cf. Witte 1987:130). In general, then, vernacular religious rituals are not so much centred around praying and hoping as they are aimed at influencing and actively bringing about change.

The PWC figurines might have been ritual or religious objects, but we should try to divorce their use from modern, doctrinal religiosity. In small-scale societies, ritual is often integrated into daily life and is part of supposedly 'mundane' tasks (e.g. Bradley 2005; Brück 1999; Hofmann 2020). The overall distribution of figurines on the sites, as well as their ability to look back at people, lends support to the interpretation that the figurines were involved in interactions with the PWC people on a fairly regular basis. There is little to suggest that their use was limited to a certain class of people, for example a priesthood, or that they were treated as precious relics. The figurines could very well have been used in public gatherings. Some examples are quite large and would have functioned in communal settings where there was a demand for a certain degree of visibility (see Hofmann 2014), while others are too small to have been effective in that regard.

There are many good ethnographic examples of figurative imagery, providing refreshing perspectives that challenge the conventional views of prehistoric figurines as 'idols'. Even where figurative images function as powerful spiritual beings, they are not necessarily approached in the sort of god-fearing humility one might expect (e.g. MacGaffey 1990, 1994). They are interacted with as beings who, while perhaps possessing great powers, are not omnipotent residents of some abstract, otherworldly realm. Instead, they inhabit the same world as humans. The term 'fetish' has been used for these, but they are more appropriately described as power objects or medicine figurines. Here, I will restrict myself to the example of the *minkisi minkondi* (sing. *Nkisi nkondi*) or 'spike fetishes' from West Africa (MacGaffey 1988, 1990, 1994), although the anthropomorphic figurines (*sigidi*) of the Yoruba people, Nigeria, function in a similar fashion (Wolff 2000).

Minkisi minkondi are often made in the form of anthropomorphic wooden sculptures in which spirits are given a local habitation, a process that, in turn, makes spiritual powers available for human use (MacGaffey 1988:190). The minkisi minkondi are used in a form of defensive magic by medicine men to rectify misfortunes or illnesses commonly caused by witches. By driving iron nails or wedges into these wooden sculpture-beings, or by taunting them, the spirit is awakened and sent off in pursuit of witches and other wrongdoers. The case of the minkisi minkondi also

exemplify that PWC figurines were not necessarily designed with the purpose of accurately depicting a certain spiritual entity. Although mistakenly associated with a westernized and sensationalized pop-culture idea of the 'voodoo doll' (see Armitage 2015:92), minkisi minkondi are neither made to resemble an intended victim nor the spirit that is to take possession of it. The physical characteristics are instead a means of ensuring that they can act in the desired, effective manner. *Nkisi nkondi kozo* is the name of a nkisi in the form of a sculpture of a two-headed dog, with one head at each end. Nkisi nkondi kozo is not however a depiction of a two-headed dog spirit. This particular physical form is intended to endow the sculpture with a dog's ability to track witches, both in the world of humans and the world of the dead (hence the two heads looking in opposite directions).

As far as ethnographic examples go, the idea of the static 'idol' is decidedly less inspiring than the multifaceted power object. Viewing the PWC anthropomorphic figurines as interactable beings, engaging with their makers and handlers, and divorcing them from traditional ideas of worship can help create a more dynamic understanding of how they might have functioned at the PWC sites. They were probably not only symbols or conduits for beings that were not present but, as figurine-beings, demanded human attention. After all, they seem to be probing for it. Viewing them in this way is to treat them as part of the lives of humans. Approaching the PWC figurines as active in the day-to-day lives of humans unlocks a potentially productive future avenue for further exploration of their role in PWC society.

Conclusions

In this article, I have argued that the anthropomorphic clay figurines found at several younger Pitted Ware culture sites invite a shift from representational to relational interpretations, redefining their role within middle Neolithic contexts. Instead of solely focusing on deciphering what these figurines might depict – be it gods, humans, or human-animal hybrids – they can be understood as beings with the capacity to "look back", promoting dynamic engagements with their human counterparts. This re-evaluation places their physical attributes front and centre and highlights their potential for reciprocal gazing, thereby challenging traditional symbolic interpretations.

The PWC associated anthropomorphic figurines are virtually always amply decorated, and often have prominent eyes, upwards-tilted heads and, in some cases, pits that might have been used to fasten feathers or plant material. All these things contributed to their striking visual qualities, and their eyes and upturned gazes made them visual objects that could

also look back at their beholders. The variation in facial features, and their associated abilities, hint that not all figurines needed (or were allowed to?) see, smell, eat or speak. Other examples were imbued with these abilities, which allowed for certain interactions with humans.

Sharing gazes with figurative images, particularly those recognized as spiritual beings, can create profound feelings of intimacy and reassurance in a viewer. That is not to say that they were necessarily omnipotent, otherworldly beings. If they functioned as materialized spiritual entities, they were interactable participants in the world of humans. Perhaps they could be asked, coerced or tricked into helping people.

By emphasizing presentation over representation, this approach deepens our understanding of human-figurine interactions. It not only redefines the significance of the figurines within the Pitted Ware culture but also expands our understanding of the lived experiences of Neolithic foraging communities in the Baltic Sea region.

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Making Faces

Facial Imagery and the Non-Representational in Later Prehistoric Europe

Helen Chittock[1] & Andrew Meirion Jones[2]

This paper examines the interplay between representational and non-representational art in later prehistoric Europe, aiming to form a starting point for more detailed and expansive study on this topic. We will approach later prehistoric imagery from an angle that has not been extensively explored, focusing on the deliberate use of ambiguity and the occasional appearance of representational images – particularly human bodies and faces – against a background of predominantly abstract and geometric imagery. We will hone in particularly on the imagery of Neolithic Britain and Ireland and the imagery of the European Iron Age, drawing on examples from existing research to establish new questions, and focusing especially on the affective potentials of faces and other bodily elements in later prehistoric imagery. We argue that images should always be viewed as being 'in the making' and we consider how Neolithic and Iron Age images *became* representational, emphasizing their emergent and ambiguous characteristics.

Keywords: Neolithic, Iron Age, Britain and Ireland, Europe, art, emergence, affect, faciality

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Introduction

The visual culture of later prehistoric Europe presents a conundrum. While much of the imagery archaeologists encounter is non-representational, alongside this we observe the emergence of images of bodies, particularly of faces. How are we to understand this phenomenon? And how was this early representational imagery perceived and understood? In this paper we will discuss the occurrence of faces in later prehistoric art against the wider backdrop of non-representational patterns, and consider the context and role of the face within a category of ambiguous images. We will draw on existing research on the visual culture of the British and Irish Neolithic (*c.* 4050–2300 BCE) and the European later Iron Age (from *c.* 450 BCE until *c.* 100 CE), using key examples to illustrate our observations and provide a starting point for more in-depth and systematic comparison.

TERMS, DEFINITIONS AND PARAMETERS

The ideas presented in the paper broadly relate to decorative practices in later prehistoric Europe. 'Later prehistory' refers here to the Neolithic, Bronze Age and Iron Age, while 'Europe' refers to the landmass covered by the modern-day continent of Europe. The periods of time covered by later prehistory vary across Europe, particularly in Scotland and Scandinavia, which experienced 'the long Iron Age'. During this long period of time and across a huge area, the making and use of art underwent much change. Nonetheless, we have observed potential commonalities in the way that images were conceptualized and presented, perhaps relating to broadly similar philosophies and ontologies.

The examples given in the paper relate to two more specific cases within these broad parameters: the Neolithic in Britain and Ireland (*c.* 4050–2300 BCE). The examples from the European later Iron Age relate to artefacts traditionally included in the category of La Tène art, which centred on Central Europe from *c.* 450 BCE, and spread to other areas of Europe during the later first millennium BCE, particularly westwards to Britain, Gaul and Iberia, and eastwards into Eastern Europe (although its boundaries are, of course, blurry in every sense). The term Early Celtic Art, which is often used as a synonym for La Tène art, will not be used in this paper, as there is not space to adequately summarize the issues with this term (but see for example Chittock 2014, 2021:10; Collis 2003:71–92; Gosden & Hill 2008).

The word 'art' is used in this paper as a form of shorthand, to refer broadly to traditions of mark-making, although both authors have written on the issues with viewing prehistoric objects, patterns or images as 'art' in its modern, Western sense (Chittock 2014, 2020, 2021; Jones & Cochrane 2018). More specifically, we also use the terms 'pattern' and 'image' to refer

to the elements that make up the traditions we are discussing, focusing particularly on the apex between these two elements. We use 'image' to refer to visual representations *of* things and beings. 'Pattern' is borrowed from Cyril Fox's seminal work, *Pattern and Purpose: A survey of Early Celtic Art in Britain* (1958), and in this paper it refers specifically to the non-representational. While Fox never explicitly defines the word in the context of his work, it has proven useful in describing arrangements of motifs, as it is a more specific and less loaded term than alternative possibilities, such as decoration or ornament (see Chittock 2021:20–21).

Lastly, we need to address one notable gap in our discussion: Bronze Age art. This gap occurs because substantial parts of our discussion focus on Britain where Bronze Age imagery is notably sparse unless we consider cup and ring marked imagery and the few depictions of weapons in mortuary and monumental contexts (Bradley 1997). For other regions of Europe, such as Scandinavia, Iberia and Central Europe, however, there are rich traditions of imagery during the Bronze Age (Ling et al. 2024). The regional diversity of European Bronze Age art means that incorporating all of them into our discussion would necessitate a far longer paper. The relationships between image and pattern in each tradition would require its own examination. For this paper, an analysis of the British and Irish Neolithic allows us to achieve our aim.

WHAT DOES THIS PAPER AIM TO DO?

The authors were involved in two different research projects that analysed visual materials from the British and Irish Neolithic and the European Iron Age. The 'Making a Mark'[1] project analysed three key regions in the Neolithic of Britain and Ireland (Jones & Díaz-Guardamino 2019), while the 'European Celtic Art in Context'[2] project, analysed the archaeological and geographical contexts of 'Early Celtic Art' (Nimura et al. 2020). Both projects provided extensive overviews of visual materials from these two periods and locations. In both regions and periods there is a predominance of geometric and curvilinear imagery, but in both regions and periods we also observe the emergence of figurative representational imagery. As the two authors have previously analysed this imagery separately, this paper instead offers a comparison of the two regions and periods and a preliminary analysis of the processes involved in the emergent practice of representation.

The image traditions of the British and Irish Neolithic and European Iron Age are visually arresting but difficult to comprehend, being made up

1 Directed by Andrew Jones 2014–2016.

2 Directed by Chris Gosden 2015–2018 (Helen Chittock was Post-Doctoral Researcher 2017–2018).

of three-dimensional geometric and curvilinear designs, often with no obvious representational dimensions. Recognized images of people, animals and objects make up a small proportion of Iron Age art (Chittock 2020:79), whilst in the Neolithic they are almost absent, with just a few images that might be regarded as humans and only a single set of images of deer (Valdez-Tullett et al. 2022). Despite this, inspired by the post-Renaissance traditions of representational and allegorical imagery (see for instance Eco 1959), many archaeologists have been keen to see clear imagery in designs whose representational elements are far more elusive and ambiguous. For the Neolithic period, the spectacular passage tomb art of Ireland has been regarded as representational. For example, in Co. Meath, stone 7 at the Fourknocks I passage tomb has been described as an image of a face (Hartnett 1957), and George Eogan (1986:32) described the design on the stone at the juncture between passage and chamber of the W tomb at the great Knowth passage tomb as a 'ghostly guardian'. More recently, a design on the great Newgrange passage tomb, Co. Meath, has been regarded as resembling a whale (Hensey 2015:79–94). Meanwhile, Tim Darvill and colleagues (2005) have argued that certain incised lines on the Cronk Yn How stone, Isle of Man are images of deer.

In Iron Age art, there is a small figurative element that is seen as clearly representational, with humans and other animals depicted in bronze, gold, stone and sometimes bone; as stand-alone statues and figurines and also as elements of tools, weapons and personal ornament (see for example Aldhouse-Green 2004; Chittock 2020; Megaw & Megaw 1989). This category, however, is blurry and there is a far greater number of ambiguous images concealed within arrangements of motifs, with archaeological work dedicated to finding, identifying and discussing these hidden images (Foster 2014; Foster & Batten 2022; Megaw 1970).

In the contexts of the assemblages of later prehistoric images and patterns discussed in this paper, we must acknowledge the objects that are missing. The surviving evidence comprises a sample of the most durable finds, but the potential for images and patterns to have been created in organic materials that have since decayed is very wide-ranging. Bryony Coles' survey of wooden figures from Britain and Ireland (1990), dating broadly from the middle of the Neolithic to the middle Iron Age, presents a small sample of anthropomorphic images made from a widely-available and easily workable material, which, in most taphonomic conditions, will not have survived. This work is simply one example that demonstrates the potential for there to have been large and varied assemblages of objects and structural remains made from organic materials and bearing images and patterns, which have not survived in the archaeological record.

It is not our aim to dispute or debate claims for representational imagery in later prehistory, especially given the recent discoveries of deer imagery at Dunchragaig cairn, Argyll, Scotland, a region with predominantly non-representational rock art (see Valdez-Tullett et al. 2022). Instead, we aim to understand later prehistoric representational imagery contextually, against the background of the non-representational art it coexists with. As part of a broader program that understands images as always being 'in the making' (Back Danielsson & Jones 2020; also see below) our focus in this paper is on how images become representational against a background of largely non-representational mark making and imagery. We do this by examining the contexts of images, looking at images as components of objects. Rather than presenting representational imagery as inevitable, our analysis instead emphasizes representational imagery as an emergent phenomenon, where transformation occurs within a meshwork of representational ambiguity: we particularly highlight the instability of these early forms of representation. Just as the Egyptologist Rune Nyord (2021) questions what constitutes an image in Ancient Egypt, so too our analysis troubles comfortable assumptions about what constitutes a representational image in later prehistory (see also Wilkinson 2022).

Studying later prehistoric imagery

Traditional archaeological studies of later prehistoric art have focused on seeking meaning within representational images, following art-historical traditions of interpretation. In an Iron Age context, there has often been a tendency to interpret anthropomorphic images as deities, largely based on written and epigraphic evidence from Roman-occupied Europe (Aldhouse-Green 2004; Green 1995:466). Hybridized and modified human images have, in the past, been referred to as named characters from Greek and Roman mythology: Janus heads and satyrs for example (Jacobsthal 1944; Megaw 1970:263;). It is sometimes argued that Iron Age deities took on the human forms of Roman Gods as Mediterranean traditions of iconography influenced Iron Age art during the later Iron Age (Green 1995:466). However, earlier Classical accounts from the later first millennium BCE are also interpreted as stating that Iron Age Europeans did not make images of their Gods (see for instance Diodorus Siculus, Library of History, XXII, 9). The biases inherent in Classical sources make this a complex issue, and the assumption that particular kinds of images shared the same meanings over large and culturally variable areas is problematic. For the British and Irish Neolithic there is less opportunity to draw on Classical literature, though in 'The Eye Goddess' O.G.S. Crawford (1957) attempted to utilize

Near Eastern sources as a springboard to interpret the imagery of Neolithic Britain and Ireland.

During recent decades, influenced by the groundbreaking work of Alfred Gell (1998) in the anthropology of art, many prehistorians have shifted their attention towards what images and patterns *do* (Chittock 2014, 2021; Garrow & Gosden 2012; Gosden 2013; Jones & Cochrane 2018; Jones & Díaz-Guardamino 2019; Joy 2011, 2020). This has been a profitable avenue of enquiry which has led to the reassessment of both British and Irish Neolithic mark making practices (Jones & Díaz-Guardamino 2019) and Celtic art in Britain and Europe (Garrow & Gosden 2012; Garrow, Gosden & Hill 2008; Nimura et al. 2020). We do not wish to diverge from this approach, only reconsider how it may help us to illuminate representational imagery from this particular standpoint.

Emerging from this wider project are interests in the processes involved in making prehistoric art and, furthermore, the idea that images are constantly 'in the making' (Back Danielsson & Jones 2020). The argument that images are in the making stems from the recognition that traditional approaches to imagery are 'inadequate to the task of understanding the manifold material and visual character of the images excavated and studied by archaeologists' (Back Danielsson & Jones 2020:1). To understand images differently we foreground a series of aspects of images including their unfolding, their transformation and their multiplicity. All of these aspects of images are discussed in what follows, but here we simply wish to frame this in terms of the ambiguity of imagery.

Embracing ambiguity

There are many later prehistoric images that are thought of by archaeologists as being clearly representational. In the Iron Age, birds and certain mammals are depicted in bronze and sometimes in gold and non-metallic materials, adorning a wide range of weaponry, tools, vessels and personal ornament, for example (see Chittock 2020:80–81 and 83 for a summary of instances of anthropomorphic imagery on some of these object types). Anthropomorphic and, less commonly, zoomorphic images also exist as stone statues in certain areas of Europe and at certain times (Chittock 2020:81–82; Megaw & Megaw 1989:152–154, 168–171, 265–258), while bronze and chalk figurines are concentrated within parts of middle and late Iron Age Britain (*c.* 400 BCE–43 CE, see Chittock 2020:82). Human figures, particularly faces, constitute a fairly large proportion of these images (Chittock 2020:72). This type of uncontested imagery, however, is comparatively rare in Iron Age Europe, and exists within a much more extensive range

Figure 1. Late Iron Age (100 BCE–43 CE) harness plate from Santon, Suffolk. Human faces displaying both 'Cheshire Cat' and 'duck-rabbit' characteristics can be seen here, along with stylized birds head motifs. Reproduced by permission of University of Cambridge Museum of Archaeology & Anthropology (1897.225A).

of swirling, curvilinear patterns. Here, archaeologists are presented with a challenge caused by the boundary between image and pattern, which, in this particular art tradition, is deliberately blurred. For every 'clearly representational' image, there are many more arrangements of motifs that suggest figures and faces, but that cannot be confidently classified as either image or pattern, often falling into either of these two categories depending on the archaeologist viewing and writing about them. Vincent Megaw coined the term 'pseudo-faces' (1970) to refer to this phenomenon, describ-

ing human faces that are perhaps visible in certain lights or from certain angles, but which can quickly disappear from view, leaving only arrangements of non-representational motifs. The term refers to a category somewhere between arrangements of motifs and anthropomorphic depictions – Megaw (1970:274) also borrows the term 'Cheshire cats' from Jacobsthal (1941:308, 1944:19) to refer to these arrangements, making reference to the famous feline character from Lewis Carroll's 'Alice in Wonderland', who could disappear at will, leaving only his smile behind. A separate, but related, phenomenon is the arrangement of motifs in ways that can be interpreted as different figures from different angles. This is illustrated by Aldhouse-Green (2004:196–197) using a fragment of gold openwork plaque from Bad Dürkheim, Germany, depicting two different faces depending on the angle from which it is viewed (see also Megaw 1970:272). The phenomenon is also well-represented in a group of Late Iron Age and Early Roman champlevé enamelled harness fittings from Britain (Figure 1; see also Foster 2014). Ginoux (2020:134) borrows Ludwig Wittgenstein's famous 'duck-rabbit' concept to explain the multiple ways of seeing designs. This analogy also aptly describes the shifting nature of designs between abstraction and representation.

Due to the intersection between image and pattern in Iron Age art, therefore, archaeologists are often faced with apparent representational imagery – ambiguous or hybrid creatures that clearly have limbs or eyes and mouths, but which are not readily recognizable as belonging to a specific species (Foster 2014). Moreover, an image of a creature interpreted as a particular species by one archaeologist can be seen as a different species by another – a good example of this is a pair of creatures that appear on roundels on the Witham shield from Lincolnshire, UK, which have been interpreted as horses (Megaw & Megaw 1989:198) and bulls (Hitchcock 2022:164), among other things.

As has previously been discussed (Jones & Díaz-Guardamino 2019, 2021), taking a long chronological view of the Neolithic we can observe that certain features of human anatomy have been emphasized since the beginning. For example, phalluses were carved from chalk and bone as early as the 38th to 36th centuries cal. BCE, and are found deposited in the ditches of long barrows and causewayed enclosures, such as the Trundle, Sussex and Windmill Hill, Wiltshire. This tradition continues into the later Neolithic and chalk phalli are also known from the ditches of henges, for example the large chalk phallus found at Maumbury Rings, Dorset. There seems to be an emphasis on isolated features of the human body throughout the Neolithic. Phalluses of chalk and bone are one example, another would be stylized images of faces, such as those seen on the 'eyebrow' motifs on the Folkton Drums, Yorkshire (Figure 2). Like the examples we discuss from the

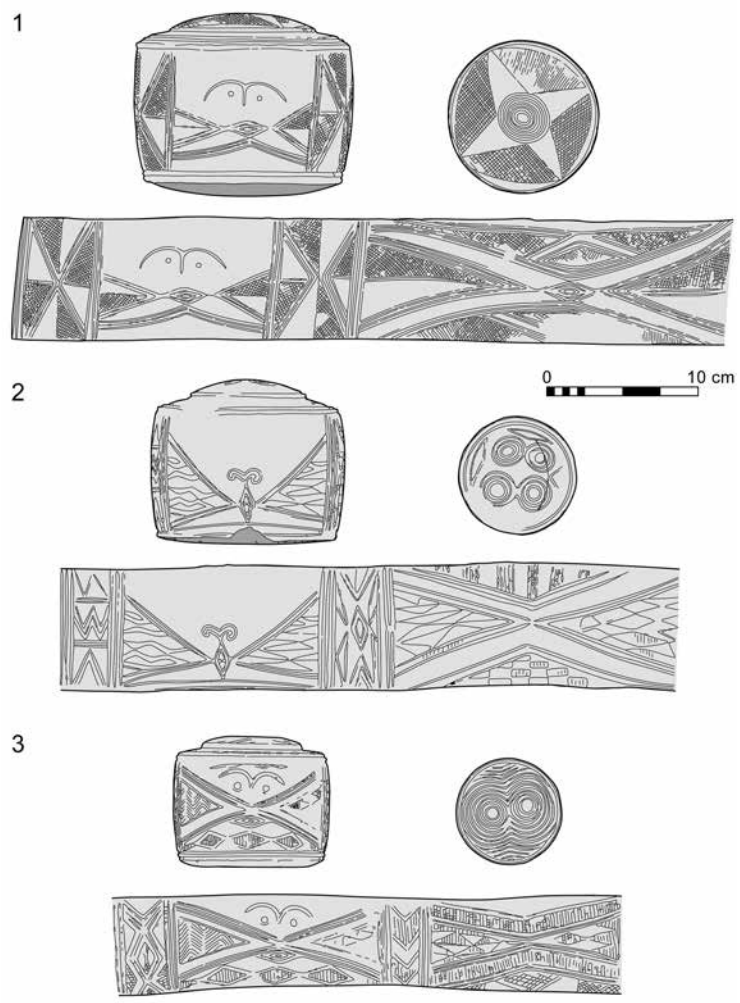

Figure 2. The Folkton Drums, Yorkshire, England. Note the ambiguous 'eyebrow' motifs on all three objects, but particularly drums I and III. Image: Aaron Watson.

Iron Age these eyebrow motifs are decidedly ambiguous, and both a duck-rabbit and Cheshire Cat effect are evident as 'faces' emerge from geometric designs. It is not until much later in the Neolithic that we begin to see all features of the human anatomy coalesce into figurative forms. In the case of some examples, like the 'god-dolly' from the Sweet Track, Somerset – a hermaphrodite with numerous gendered features (Figure 3) – we observe a degree of representational ambiguity. We also observe anthropomorphic figurines emerging in the Northern Isles of Scotland (Orkney) around the 32nd to 29th centuries cal. BCE. Recent examples at the Links of Noltland have a distinctive shouldered human form (Figure 4), and in the case

Figure 3. The Somerset levels 'god-dolly', found beneath the wooden trackway Bell B, Somerset, England. Image: Marta Díaz-Guardamino.

of the most well-known example (the so-called 'Orkney Venus') we also observe the eyebrow motif in the head area of the figurine. This figure is again ambiguously gendered and could be either a male or female figure.

Difficulties in the interpretation of ambiguous representational images are, therefore, well documented in studies of later prehistoric art (see for example Chittock 2020; Foster 2014; Jacobsthal 1944:19; Jones & Díaz-

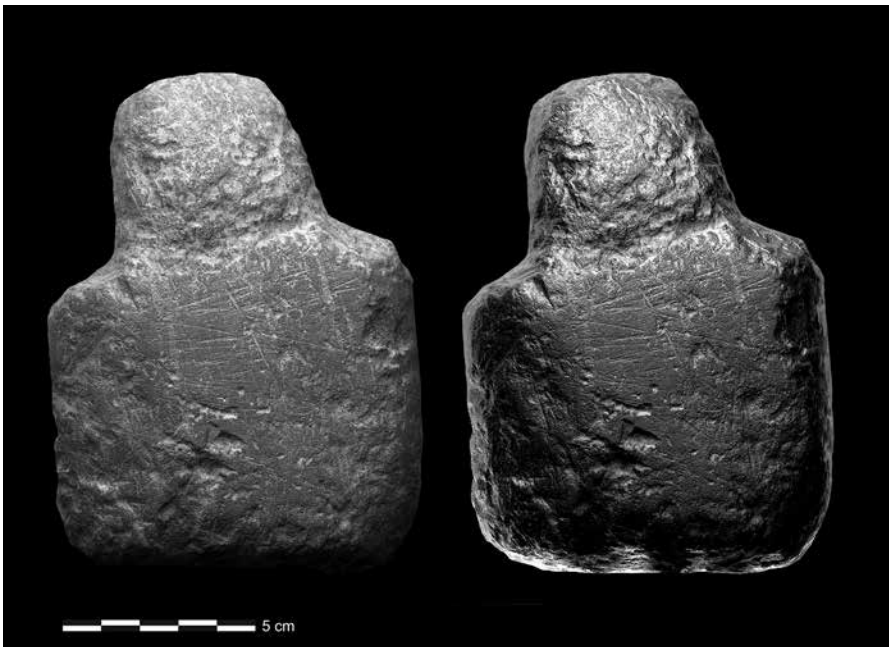

Figure 4. RTI of larger figurine from the Late Neolithic settlement of Links of Noltland, Westray, Orkney, Scotland. Image: Marta Díaz-Guardamino.

Guardamino 2019:190–192; Megaw 1970). We argue here that the types of ambiguity we describe are deliberate features of later prehistoric art. They occur partially as the result of the makers of objects playing with pattern and form, and the resulting complexity has 'the power to intrigue' (Joy 2019), inviting the viewer to consciously try to comprehend the marks and shapes they see. At least, this is the effect they have on the archaeologists who study them. 'Dwell-time' is a phrase used, for example, in advertising, marketing and also in museums, referring to the amount of time a person spends looking at an exhibit or advertisement. We can perhaps apply it here in the context of later prehistoric objects – their complex and ambiguous designs increase dwell-times and perhaps contribute to the 'technologies of enchantment' (Garrow & Gosden 2012; Gell 1992) that make them effective and significant.

In addition to this possibility, ambiguity can also make designs open to multiple interpretations. Jones has described figurative aspects of Neolithic art that, at times, appear abstract, as 'conditional' and 'situational' (Jones 2019:191), where the appearances of objects are altered depending on their contexts of use, as well as who is using them. Chittock (2020:74) has also applied this idea to Iron Age art, with the argument that this was a deliberate aspect of Iron Age design.

Later prehistoric faces and faciality

Despite the difficulties faced by archaeologists when trying to impose interpretative categories onto later prehistoric art, it is widely acknowledged that faces and heads play important roles in Iron Age art traditions.

An Iron Age preoccupation with human heads has been explored by Armit (2012) in the context of headhunting, the practice of decapitating and curating human heads. Some depictions of human heads have been interpreted as representations of this practice, with a tradition of stone sculptures of this kind centring on southern France. Perhaps the most famous examples of these sculptures are from the second century BCE oppidum of Entremont (near Aix-en-Provence, France), where numerous stone sculptural fragments have been found to show representations of severed heads, some grasped by hands (Armit 2012:182). Whilst the depiction of severed heads in stone forms fit into a regional tradition of stone anthropomorphic depictions in southern France during the fifth–second centuries BCE, heads and faces appear throughout a much wider range of Iron Age designs across Europe, often on objects such as personal ornament and weaponry coalescing into other regional traditions (Chittock 2020). Anthropomorphic heads form parts of hybrid creatures that make up the forms of Maskenfibeln, a type of brooch, in Central Europe during the Early La Tène period (*c.* 450–380 BCE) (Bagley & Schumann 2013:131–134; Megaw & Megaw 1989:84–88). Hidden faces appear on torcs and bracelets in the Marne region of France, southwestern Germany and Switzerland during a similar period in the Middle Iron Age (Megaw & Megaw 1989:136–137). Anthropomorphic heads form the pommels of a group of swords and daggers, many of which include stylized bodies that form the handles/grips of the weapons, with these objects covering a broad geographical distribution during the Middle to Late Iron Age (Fig 5; Carlson 2011; Chittock 2020:83; Megaw & Megaw 1989:164–166; Stead 1979:61).

There is less of an emphasis on faces and heads in the British and Irish Neolithic compared to the Iron Age, though, as mentioned above, Crawford (1957) was convinced that circular motifs on passage tombs were evidence of an 'eye-goddess' cult that could be traced through prehistoric Europe back to the cult of Ishtar in Syria. 'Eyebrow' motifs do occur as carvings in chambered tomb and passage tombs, at the Holm of Papa Westray North, Orkney (Ritchie 2009) for example, though eyebrow motifs have also been discovered at the settlement site of Braes of Smerquoy, Orkney (Richards & Jones 2016:87). They need not be confined to 'cult' contexts, as Crawford imagined. The clearest examples of faces are the 'eyebrow' motifs we find on selected artefacts like the Folkton Drums (Figure 2), or the 'Orkney venus'. Faces do also emerge in another curious context: the Knowth mace

head. The mace head discovered in the eastern tomb of the great passage tomb at Knowth, Co. Meath, Ireland (Eogan 1986; Eogan & Cleary 2017) is one of the most elaborate and accomplished artefacts from the Neolithic period. The mace head has a double spiral motif on its side positioned above the central hole for the shaft. Combined with the pressure flaked areas in the upper and lower brown regions of this mottled brown and white flint artefact, when turned to face the viewer the spirals give the appearance of eyes, the hole a mouth, and the pressure flaking in the upper and lower regions the appearance of textured hair and beard. Each of these examples –Folkton, the Westray venus and the Knowth macehead – only compose themselves as faces when interacted with; the faces of these objects become most apparent when faced by a human observer.

As mentioned above, Iron Age anthropomorphic images have often been seen as depictions of deities, sometimes participating in associated mythic narratives (Megaw & Megaw 1989: 21–23, 176). Aldhouse-Green (2004) also discusses some images as depictions of mortal individuals. It has been noted, however, that the faces of Iron Age figures tend to be generic and featureless (Chittock 2020:87–88). Facial expressions are generally limited to a downturned mouth (see Figure 1 for a particularly extreme version of this, emphasized by an openwork design) and staring eyes, and identifying features limited to stylized moustaches and hair. This presents a contrast to the detailed depictions of clothing and weaponry worn on the bodies of these figures, some of which can be related directly to objects in the archaeological record (see Chittock 2020:88). It also raises a question about what these faces were designed to do, considering that they are missing the individualized features and expressions that make faces vehicles for communication and recognition. One of the aims of this paper is to examine the reasons why faces are overrepresented in later prehistoric art, in comparison to other body parts. Humans use our faces as a way of communicating, and in the recognition of other individuals. However, the generic, standardized, stylized and expressionless faces of later prehistoric art do not seem useful in either of these functions.

Human faces have, arguably, taken on new roles and been put to new uses in recent decades. Facial recognition algorithms are being implemented increasingly frequently in a wide range of domains: social media, surveillance, border control, targeted advertising and police profiling are examples given by Celis (2020), who alludes to the harmfulness and problematic nature of some of the uses of this technology through the imposition of 'algorithmic and statistical regimes of power' (Celis 2020:73). The COVID-19 pandemic arguably has accelerated reliance on platforms such as Zoom for communication, where visual communication occurs through the face only, removing much of the body language that contributes to in-person

interactions. The face has certainly taken on heightened significance since 2020 and our analysis of faces in prehistoric contexts should be understood in this background.

The philosophers Gilles Delueze and Felix Guatarri (1987:123–164) introduce and examine the concept of facialization. Facialization describes the 'overcoding' of a subject with a face, a component of the 'abstract machine of faciality', which supplants and supersedes other semiotic systems (Deleuze & Guattari 1987:136). Their work wishes to divest the face of any auratic power (of the kind described by Walter Benjamin) conferred on it by such contemporary media as advertising, TV and film, and instead wishes us to focus on the face as an abstraction and a locus of multiple affective possibilities. We adopt these ideas with caution here. Much of Deleuze and Guattari's discussion of the face is most applicable in a contemporary context and therefore less useful when exploring prehistory. However, we do find the idea that faces act as loci for affective possibilities useful.

There are several questions regarding faces (and other bodily components) that we could draw from Deleuze and Guattari's discussion. We could regard abstracted faces as being diagram-like and consider what these diagrammatic faces did in prehistoric contexts. Can we understand standardized faces in this sense? We could also consider what constitutes and makes up a face in different prehistoric contexts. What are the minimal characteristics that might be regarded as a face: eyes, a mouth? How do we consider faces that emerge and dissolve, such as the 'pseudo-faces' mentioned by Megaw? The philosophical discussion of facialization forces us to think about the power of the face but the ambiguity of faces in prehistoric contexts also invites us to consider how the power and significance of the face emerges.

Presentifying the body in later prehistory

We have argued above (also see Chittock 2020) that the ambiguity in Iron Age art described above is a deliberate design feature that leaves images and patterns open to multiple interpretations. Cochrane and Jones (2018:172) have, similarly, referred to certain Neolithic objects as 'situational'. Alongside this we also observe quite unambiguous examples of representation, such as carved phalli in bone or chalk from the British Neolithic, and birds, mammals and humans rendered in metal in the Iron Age. There seem to be two different forces at play here: one clearly focusing our attention on aspects of figuration, the other drawing our attention to the ambiguity of representation. Drawing on the work of Gilles Deleuze, particularly his work on framing and affect (particularly of faces) in cinema (Deleuze 1986), we will now consider the affects produced by these two different forces.

We recognize, in line with Darryl Wilkinson (2022), that naturalist depictions are ontologically significant and that the appearance of naturalist, or representational, imagery may signal particular ontologies of media (Jones & Díaz-Guardamino 2021 discuss this for the British Neolithic). Here we explore how these differing ontologies of media emerge over time. We find the Egyptologist Rune Nyord's discussion of the concept of 'presentification' (Nyord 2021:56–57) particularly useful to consider the relationship between unambiguous images in the Neolithic and Iron Age as making an ontological connection with what they depict – there is a clear ontological connection between chalk or bone phalli and parts of the human body, while clear connections could also be established between Iron Age bronze figurines and the birds, mammals and humans they depict. These images present and draw attention to exactly what they depict. But what of the ambiguous images? It seems interesting that ambiguity occurs when human-like images are articulated together with either geometric designs or other components of the human form. It is the juxtaposition of these images that produces a sense of ambiguity. While the geometry of the face is made obvious by its positioning in the human form, the expressive qualities of the face are ambiguous, and the face may be disguised by geometric images.

It is when images are disengaged from the human form that their power and affect is most readily apparent (they are 'presentified' and stand in for aspects of the human), but when they are composed together in human form faces in particular become masks of ambiguity; they are rendered as locations of uncertainty, of possible differentiality, locations of becoming human? For the Neolithic we could consider the multi-gendered figurines (Figs. 3 and 4) as loci of potentiality, as forms in which what it means to be human was yet to be decided.

In the case of the Iron Age, we also observe the presentification of certain kinds of things like animals, but against this we observe several things: ambiguous faces emerge when humanlike images articulate with geometric forms. Even when we observe decidedly human forms the faces depicted are often unexpressive (Chittock 2020:87–89). Curiously, some of the most unambiguously human figures are those incorporated into 'useful' objects like bladed weapons (anthropomorphic sword and dagger handles for instance Carlson 2011; Fitzpatrick 1996; see also Figure 5) and bone comb handles (Fitzpatrick 2020). Similar to the Neolithic, human faces are masks of ambiguity – they are either difficult to define, or unexpressive if they are better defined. It is only when human forms are merged as components of useful objects that the potentiality of humans is brought to the foreground.

The concept of presentification allows us to underline the different ways that images work in the Neolithic and Iron Age. We can observe unambig-

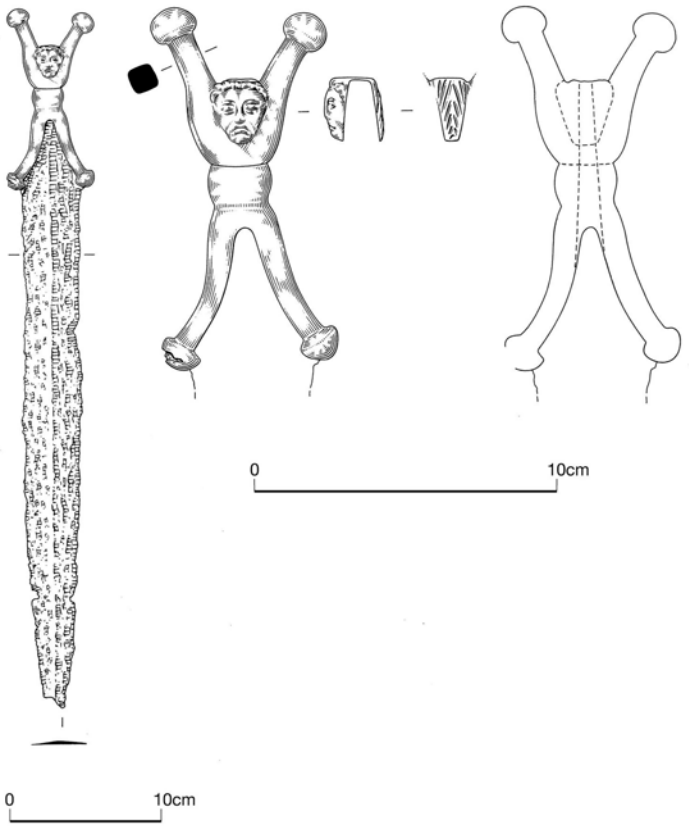

Figure 5. A sword with an anthropomorphic hilt from Salon, Aube (Grande-Est, France) ©The Trustees of the British Museum. Shared under a Creative Commons AttributionNon-Commercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) licence.

uous presentification where images are clearly meant to evoke and stand in for aspects of humans and animals. In other cases, we can consider an ambiguous form of presentification, possibly delineating the potency and creative potential of the human form. The potency and potentiality of the human form is most apparent when we observe ambiguous human forms. In the Neolithic as multi-gendered forms, and in the Iron Age as figures inserted as components in objects like swords or bone combs. In the Neolithic the potency of the human form is enacted through the presentation of multiple gendered features, in the Iron Age this potency is enacted through the utility of objects.

In all of these cases we can observe that the human form appears to be a mutable and emergent source for understanding differing relationships with the world in Neolithic Britain and Ireland and Iron Age Europe.

Conclusion

In this paper, we have used examples from Neolithic Britain and Ireland and later Iron Age Europe to demonstrate potential for understanding how later prehistoric representational imagery came to be formed. It is particularly important for our account that we have problematized representation and have not taken representation and symbolism to be *de facto* or matter of fact. By exploring how representational imagery emerges against a background of abstract and geometric images, we are able to show how certain kinds of representational forms, particularly images of the human face and body, come to be presented. We argue that these emergent human forms acted as loci for affective potentials. The examples used, therefore, suggest ways in which we can begin to understand how representational imagery operates when we analyse images as being fundamentally mutable and in the making.

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REVIEWS & NOTICES

Stella Macheridis

Animal Husbandry in Iron Age Scania, with a Catalogue

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Review by László Bartosiewicz

The Iron Age in south Scandinavia (*c.* 500 BCE and 1050 CE) brought about numerous changes, affecting the region in diverse ways. Animals undoubtedly played an important role in this dynamic period, but more research is needed to fully understand how the keeping and use of animals interacted with societal and environmental developments. The meat provisioning of settlements at the time largely relied on animal husbandry. Livestock also served as a source of renewable products such as milk, wool and draught power. However, this new summary by Macheridis illustrates a great diversity in the taxonomic composition of assemblages both in time and space. The main diachronic trend identified is a relatively sudden transition from an emphasis on cattle in the Early Iron Age, to the increasing use of pigs and also sheep at later settlements. The study shows that animal remains is of key

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importance in understanding underlaying environmental and social phenomena whose complex determined Iron Age life in southern Scandinavia.

Archaeozoology began in Denmark (Forchhammer et al. 1851–1856), at a time when archaeology emerged as a discipline hand-in-hand with zoology and geology (Kristiansen 2014:14; the latter being also carefully considered in this book). Following World War II, the earliest faunal reports in southern Sweden were published by Johannes Lepiksaar (1961), as a new generation of scholars gave momentum to the study of animal bones from archaeological sites across Europe. The book begins with a summary of reports on Iron Age animal remains in Scania from the 1960s until today, showing an upswing in activity from the 1990s onwards. Along with the professionalization of the archaeological sector, the increase of archeozoological reports intensified by the 1970s. Since then, osteological studies have been carried out at both research excavations and contract projects. The changing proportions between the different working conditions is neatly illustrated by Macheridis's overview of faunal specialists employed, comparing the numbers of those locally hired, externally commissioned or working in academia (p. 21, Figure 1). In spite of the broad basis of resulting publications, a review of the heterogeneous body of information concerning Iron Age animal husbandry has long been overdue.

In order to sharpen the focus on the practical aspects of animal exploitation, analyses in this work are limited to mundane food refuse, excluding special deposits, for example wetland assemblages and ritual contexts such as burials. As indicated in the title, the book also includes a catalogue, which offers a valuable empirical basis not only for this volume but also for future research.

The catalogue includes 130 Iron Age assemblages from Scania (as of 2020). Of these, 77 waste-related contexts from 58 settlements yielding at least 100 identifiable bone specimens (NISP) were used in detailed analyses. Throughout the book, the patterns produced by the analysis of Early and Late Iron Age animal remains are consistently reviewed in terms of spatial relevance and regional variation. The south-east and north-east of the study area could be contrasted as representing different Iron Age sociopolitical developments. However, mid-Scania was sparsely populated, yielding no faunal assemblages for comparison.

Even if recorded by different authors in different periods of research, there is both a need and a temptation to quantitatively analyze such a valuable body of data. However, inevitable compromises need to be made when summarizing the vast and diverse set of data accumulated over six decades. Limiting the number of variables considered decreases resolution. On the other hand, including too much, often scanty information could compromise the representative value of the study. A careful selection of criteria is

thus necessary in search for patterns on which the absence of consistent taphonomic information or inter-observer bias have a limited effect. Prior to analysis, Macheridis reviews the heterogeneous material in terms of three potential shortcomings of some 'old collections': lack of screening, contextual information and documentation (p. 45). The geological diversity of the studied region (especially soil pH) has also influenced the degree of post-depositional bone preservation as noted in the catalogue. Given the plethora of challenges, the circumspect evaluation of biasing factors could be a textbook example of thoughtful, critical consideration.

One may wonder, for example, whether a minimum of 100 identifiable bones per assemblage may be considered representative. As Iron Age materials in the area are dominated by the remains of livestock, this number is acceptable, although significant contributions by various wild animals could bias such small samples: their contributions may look inflated when studied in terms of percentages. A special value of the catalogue is that very small assemblages are also listed: even if unsuitable for synthetic, quantitative analyses, they do contribute to the overall picture.

Among domesticates, a typical dilemma is posed by the significant but difficult differentiation between the remains of sheep versus goats that relatively few analysts carry out on a regular basis. One in ten caprine bones (9.7%) have been identified as sheep or goat in the 77 analyzed assemblages (p. 49, Table 1). This could be the only case, when sample sizes may impact on taxonomic richness: the relatively rare goat remains have smaller probability to be manifested in small assemblages, even when the emphasis is laid on four key taxa of livestock – one of them being caprines (p. 46).

Decades of research have shown (Casteel & Grayson 1977; Gautier 1984; Lyman 2008) that the controversial calculation of minimum numbers of individuals (MNI; White 1953), heavily influenced by individual analysts, varies unpredictably between assemblages. This significant inter-observer bias renders them useless in meta-analyses. Therefore, they were not used (p. 47) as correspondence analysis was the method of choice in exploring the data set.

Roman Iron Age to Migration Period finds show a polarization between pig and horse remains (p. 58, Figure 9). A similar trend is less pronounced in the Migration–Vendel periods (p. 64, Figure 10). In these examples total variances may be influenced by the less than 10% contributions of horse and the increasing consumption of pork. Horses are intimately associated with social identity (such as aristocratic or military), thus having strong symbolic connotations. They probably best represent the contemporary recognition of domestic animals as sentient property, having emotions and playing social roles beyond their economic value (Frie 2021: 35). The overall contribution of horse to NISP reaches 10% only during the Late Bronze

Age–Pre-Roman Iron Age (1100–0 BCE). Otherwise horses played a negligible dietary role, even during the Vendel–Viking periods (p. 50, Figure 6). Whenever kept, they must have played more important roles than being merely sources of meat. On the other hand, pigs could have no secondary uses beyond pork production.

The Bronze Age to the Pre-Roman Iron Age assemblages show high frequencies of bovid bones relative to those of pig and horse. In the Roman Iron Age, bovid-based meat consumption turned to a focus on beef. However, a diachronic shift emerges towards a more evenly mixed system of meat provisioning. Compared to the Early Iron Age emphasis on beef, the increased consumption of pork and mutton is apparent. The author calls this phenomenon the 'triadic shift', that is the change to a balanced animal husbandry based on cattle, caprines (predominantly sheep), and pig. By the end of the Iron Age the triadic structure of animal husbandry seems firmly established. Notably, horses are no longer considered part of this picture. Nevertheless, a slightly higher abundance of horse bones seems to coincide with the emergence of upper social strata at Vendel–Viking period settlements: horsemeat remained important where the elites lived.

Macheridis convincingly argues for a multifactorial explanation behind these tendencies, including both environmental and societal developments. The long-lasting cold event and climate instability caused by volcanic eruptions beginning in 536 CE and the ensuing famine may well be responsible for a decline of settlements at the end of the Migration Period. This phenomenon also seems related to power struggles and concomitant social polarization in the region. Cattle-dominated traditional husbandry possibly also became untenable as increasing areas in the south and mid-west were devoted to cereal cultivation, limiting graze for resource intensive cattle herding. The increased importance of pigs seems related to the emergence of major central settlements as well as the possible symbolic significance of pork.

The 'triadic shift' took only a few Late Iron Age human generations (around the Migration and Vendel periods), marking a turn to a better balance between the three livestock species: cattle, sheep and pig. It must have resulted from the interplay between various processes, of which deteriorating climate was only one. Increasing pork consumption may also be related to the intensification of crop cultivation, whose by-products could be fed to pigs. The demand for wool must have increased with the emergence of sail manufacturing.

The analytical part of the book is an up-to-date complement to Jennbert's (2011) multidisciplinary study of Iron Age animal-human relationships, linking the archaeological material with osteological finds and Old Norse written sources in which animals are depicted as imaginative beings

with distinct characters. Jennbert discusses their functional, symbolic, and metaphorical roles. In comparison, the present book focuses on the osteological evidence of livestock. The attention paid to geology, natural and cultural geography as well as landscape, sets the stage for an emphatically archaeological, material-based analysis of animal remains.

In her book, Macheridis convincingly sets the stage for the evaluation of meat consumption at Iron Age settlements, a widely accepted proxy to animal husbandry. Interpretations pay careful attention to geology, natural and cultural geography. In spite of the tangible results, many of the issues articulated by the author require further research. The book thereby sets a standard to be observed in future zooarchaeological work within the context of multidisciplinary projects aimed at disentangling the roles of nature and society in shaping Iron Age history. It will also be a useful guide to anybody interested in the changing roles played by animals in times of accelerated environmental and/or social change.

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Matthew. J. Walsh, Sean O'Neill & Lasse Sørensen (eds)

In the Darkest of Days: Exploring Human Sacrifice and Value in Southern Scandinavian Prehistory

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119 pages, including 19 figures and 13 tables plus 41 plates
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Review by Sophie Bergerbrant

The book is an anthology that contains twelve articles and one introduction. There are 19 authors that has contributed to the book, the majority being active in Denmark. There are also contributors from Finland, Norway, Sweden and the United Kingdom. The articles deal with archaeological material that could be related to human sacrifice from the Mesolithic to the Viking Age, as well as Norse texts related to human sacrifice. The majority of the articles focus on human sacrifice in the Iron Age.

The book is generally well-edited, and the language is largely very good. A few sections are difficult to follow, likely due to the style of individual authors in those specific sections. I have only found one error concerning the archaeological material. The classic Swedish wetland sacrifice site Kärringsjön was placed in Härjedalen instead of Halland (Walsh et al. 2024a). However, this mistake did not affect the overall discussion.

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The book has many different approaches to human sacrifice, making it clear that the articles have developed from a conference rather than a project. For example, many articles use slightly different definitions of sacrifice. Wåhlin (2024:52), for example, defines sacrifice as giving something or someone up to make sacred rather than directly connecting it to ritual killings. This definition works very well for the studied site, Svennum, where six human skulls were deposited in a structured way in a wetland area. In contrast, Jensen (2024) indirectly suggests that human sacrifice includes ritual killings, as the article discusses structured homicide in the Viking Age. The introduction would have benefited from discussing more in detail the different uses of sacrifice through the book. Currently, the introduction presents a picture of human sacrifice that differs from some of the individual authors. This leaves the reader to pick up on the sometimes subtle or not-so-subtle differences in the authors' views. The book both suffers and gains from these varying definitions. On the one hand, it loses coherency, and the reader must remember the individual definitions of sacrifice in each article. On the other hand, it opens up for future discussions about human sacrifice within archaeology.

Most articles agree on how difficult it is to identify human sacrifice in archaeological material. Jensen (2024:91) argues that 'archaeology is poorly suited in distinguishing between sacrifice and execution, but well suited to distinguish between opportunistic killings and structured killings'. Laffranchi et al. (2024) have elsewhere shown that distinguishing between an accident, a bridge collapse, and a human sacrifice can be difficult too.

Many of the articles focus on human remains found in wetlands (Asingh 2024; Fredengren 2024; Lynnerup & Wåhlin 2024; Mannering 2024; Ravn 2024; Sørensen & Nielsen 2024) but some articles deal with human remains in other contexts (Pantmann 2024; Walsh & Reiter 2024), such as graves or loose human bones. One discusses white stones as replacement for humans (Walsh et al. 2024a) and another Old Norse skaldic poetry (Edholm 2024).

Out of the eight articles that in some way discusses human sacrifice based on materials found in wetlands, I will highlight one: the article written by Sidsel Wåhlin (2024) about the Svennum site in northern Jutland. The site is a recently well-excavated wetland area where, among other things, six human skulls were found. The article highlights the potential new understanding that can come from modern excavations. The analysis shows that the skulls where not fresh at the time of the deposition in the wetland and that they were deposited in a structured way. It also explores the skulls' relationship to other deposited material.

Unfortunately, the animal bones do not seem to be radiocarbon-dated. If they had been dated, it would have given us the possibility to understand the relationships between the deposition of the human remains and the ani-

mal remains. As many of the other articles dealing with human remains in wetlands (e.g. Mannering 2024), this article shows how complex the question of interpreting such remains is. This book highlights the importance of contextualizing each find of human remains in wetlands to avoid simplification.

A conclusion after reading the book is that, in spite of the introduction's (Walsh et al. 2024b) strong argumentation for a continuous practice over a millennium in Scandinavian prehistory, arguing for human sacrifice in prehistory is very difficult. Two of the final three articles (Jensen 2024; Jessen & Olsen 2024) argue for a judicial context for some of the beheaded Viking Age skeletons, although within a ritual setting. The final article (Edholm 2024) discusses taking your enemy's life in battle as a human sacrifice to Odin. This article, in other words, has a very different take on human sacrifice than the traditional archaeological understanding. The structure of the book leaves the reader with the thought that human sacrifice was probably not as common as some of the editors argue in the introduction. The book would probably have benefitted from a shorter, more neutral introduction and a final chapter summing up the evidence presented in the articles, perhaps tightening the analytical concepts to show how the editors interpret evidence of human sacrifice through Scandinavian prehistory. This would make it easier for the reader to evaluate the editor's argumentation for continuous, but changing practice, of human sacrifice through most of Scandinavian prehistory. However, the book can be read as a background to a discussion about the possible existence of human sacrifice in Scandinavia, and if so, when and where. It will create a debate and new research that will hopefully bring research forward on the question if human sacrifice existed in some or all prehistoric periods in Scandinavia.

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Aija Macāne

Stone Age Companions: Humans and Animals in Hunter-Gatherer Burials in North-Eastern Europe

Doctoral dissertation in Archaeology
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Review by Charlotte Damm

Macānes doctoral dissertation sets out to examine the diversity in human-animal relationships amongst hunter-gatherers in north-eastern Europe. The empirical basis for the investigation is the animal remains from burials in three different areas (Latvia, Sweden, and Russia) covering the eight to the third millennium BCE.

The main set of data derives from five cemeteries, Zvejnieki, Skateholm I–II and Sakhtysh II–IIa, all mostly excavated several decades ago. Macāne has re-evaluated and re-examined the data to provide a consistent presentation based on up-to-date osteological knowledge and contextual evidence. This means that not only was all available osteological remains examined, but a great deal of effort was involved in studying the documentation to determine their contexts. Only finds identified as directly associated with a

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burial was included (e.g. excluding finds with uncertain contexts or possibly from grave fill). Differences in preservation and documentation caused some limitations in data acquisition. Zvejnieki is not only by far the largest cemetery used across five millennia, but it also has overall better preservation and, in some respects, better documentation, providing secure associations between animal remains and individual burials, whereas relatively more data had to be excluded from the analyses of Skateholm and Sakhtysh. The study is based on material from 98 burials from Zvejnieki, 39 from Skateholm and 39 from Sakhtysh.

The osteological examination attempted to specify each find to taxon and anatomical element, and when possible, age, sex, tooth wear and other properties were noted. Appendices of all burials with details of the burial, and of the animal remains and their position in the grave are included.

The majority of the animal remains are teeth. They total 3100 included in the study while other animal remains only add up to 1024 (figure 1.5). More than two thirds of the teeth were recovered from Zvejnieki (2263), as were nearly half (450) of other remains. Since many of the teeth (and a few other finds) were modified, the type of modification was also noted and recorded in the appendices.

The core of the thesis presents the results of the analyses. It is divided into six chapters (carnivores, ungulates, rodents, birds, fish and reptiles and finally modified human remains), with subchapters for each species. The presentation of each is consistent, making it easy to look up any detail for a specific animal. There is a general introduction to the animal, its habitat and ecology, and a brief overview of the presence of the species in hunter-gatherer contexts in north-eastern Europe, followed by the presentation of the finds at each of the five cemeteries. This includes information on the human burials and the position of the animal remains in the grave. The last section for each species is a discussion summarizing the results, pointing out patterns and variations and reflecting on the composition of the finds and the human-animal relations for the species. Each of the six main chapters has a final subchapter summarizing the finds.

The systematic presentation of the animal remains from the five cemeteries, based on a thorough re-evaluation and re-examination, is a significant contribution to the study of north-eastern European hunter-gatherers. Much of the data has not been available previously and it is obviously of great importance to have secure identifications and contexts for all the species present, rather than for a few select ones. While remains from some species are rather numerous and often mentioned in publications on hunter-gatherers (such as red deer, elk, wild boar, bear, dog) a wide variety of other species are present (for example wild cat, badger, hedgehog, wild horse, tortoise, and marmot), and this study brings them to our awareness.

While some patterns in the data were confirmed (e.g. the numerous remains from red deer and elk) some interesting new discoveries were also made. For instance, the osteological re-examination resulted in the identification of numerous, previous unrecognized, badger teeth at Sakhtysh IIa (p. 126). Surprisingly beaver ancle bones were more common than beaver teeth at Zvejnieiki, and it is suggested that the incisors and mandibles are tools rather than adornments (p. 235).

However, as duly noted by Macāne, the biases in the data must be borne in mind. Approximately 75% of the material are teeth, but both preservation issues and documentation practices may have led to the disappearance of other remains. This in itself leads to a bias towards larger mammals (as their teeth are best suited for pendants and other adornments), which does not necessarily reflect human-animal relations correctly, considering the assumed importance of furs, feathers and other easily degradable remains.

With the additional skewness of the dataset caused by difference in number of included burials and chronological span, Macāne wisely views the emerging patterns as tendencies rather than definitive results (p. 284).

As indicated in the title this study aims to depart from the traditional perspective of human exploitation of animals for economic purposes, arguing instead for a relational approach to human-animal interaction. The initial presentation of this perspective (chapter 2) is general, providing a brief overview of trends in human-animal relation studies and hunter-gatherer ontologies over the past couple of decades. No specifics of Macānes own approach are provided apart from the indication that a focus on the individual characteristics and life histories of the animals present in the burials may reveal information on human-animal relations (p. 27). This is followed up in the subchapters for each species where Macāne evaluates the importance of the animal in the past hunter-gatherer community. Here she typically considers regional variation in availability, the importance of meat, fur, feathers and possible cosmological significance. She also notes characteristic behaviours of some of the animals and how this may have impacted on human perception, but the emphasis is predominantly on human values and benefits rather than on human-animal relations.

The relational approach is better exemplified in the final chapter. There Macāne first explores the wider geographical and chronological tendencies in the material. The results from Zvejnieki show a clear dominance of ungulates in early burials with a shift to carnivores sometime in the fifth millennium BCE, a pattern that seems to be repeated at Skateholm and Sakhtysh. The significant shift in species preference from prey to predator is a highly interesting observation. The later period also shows a general increase in species variation, a relative decrease in animal teeth and an increase in non-animal and foreign items and materials in the burials. As

Macāne emphasizes, these changes from the late fifth and fourth millennium BCE coincides with many other changes in the north-eastern hunter-gatherer communities, including more extensive networks and arguably a different attitude and relation to the environment demonstrated in different extraction and production practices.

Macāne continues by discussing human-animal relations from several different angles. Only selected elements of the animals entered the burials. Most prominent were parts of the head (teeth, antler, mandible and skull) or limbs (leg or wing bones), which in many cases were still recognizable as deriving from a particular species and sex, and therefore could be associated with particular abilities and characteristics. In several instances several teeth from on individual not only occur in the same burial but is placed in anatomical order, suggesting that the human-animal relation was (at least in some cases) not just with a generic animal, but with a particular individual.

Interesting differences in human-animal relations also emerge. Both Skateholm and Sakhtysh have dog burials, but these are absent at Zvejnieki, where dog teeth on the other hand are fairly common. Zvejnieki also has many seal tooth pendants, while such are absent at Skateholm (and less surprising at Sakhtysh). The importance of wild boar in these communities is well known and the use of tusks pendants often linked to the ferocity of this animal. At Zvejnieki most tusks are from female animals and frequently found in child burials, which could be linked to the female sows' protection of their young. Macāne discusses many other aspects of human-animal relations. However, while she provides many noteworthy examples, she does not present a coherent relational approach.

To sum up, the thesis is highly valuable for anybody interested in the prehistory of north-eastern hunter-gatherers. The thorough re-evaluation of the animal remains from Zvejnieki, Skateholm and Sakhtysh significantly increases the data available for comparisons and overviews. The data and analyses will be crucial in studies of each of the three areas and beyond. The extensive and consistent presentation of individual species makes it very useful for both quick consultations and wider studies. The thesis indicates significant cross-regional shifts and local variations, that can be anticipated to be explored further in future studies of human-animal relations.

Paola Derudas

Documenting, Interpreting, Publishing, and Reusing: Linking Archaeological Reports and Excavation Archives in the Virtual Space

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Review by Daniel Löwenborg

The use of 3D models to document excavations has become increasingly common in archaeological practice. Because of their possibilities, 3D techniques have enthusiastically been included in the toolbox of the modern, digital archaeologist, as a fascinating way to quickly produce high-quality representations of archaeological trenches, features and finds. In contrast to a traditional plan drawing on paper or even 2D GIS, a 3D model can show a phase of an excavation in great detail and allows the user to interact with the model by zooming and rotating. This makes it possible for anyone to explore the different parts of a trench in detail, almost as though seeing it during the excavation, opening up possibilities for reuse and re-evaluation

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of the documentation. Following technical advancement, it is now fairly straightforward to create high-quality 3D models as part of fieldwork, something which has contributed to their wide application in both research and contract archaeology. However, there are considerable challenges when it comes to integrating these models in a proper documentation of an excavation and making the data useful and relevant, especially if not intended only as an illustration. How 3D GIS technology can be used as a scientific tool in archaeological excavations and reporting is the topic of Paola Derudas' doctoral thesis. Through different case studies and a number of iterations of technical platforms, she develops and tests how 3D models can be more than engaging illustrations and contribute to different aspects of the archaeological practice.

The thesis consists of five research papers, three that have been published in international peer-reviewed journals, one that was submitted when the book was published, and one available as a manuscript. Derudas is the first author of all papers and the sole author of one. The research centres on exploring how documentation using 3D techniques can be used for interpreting, publishing and reusing archaeological results. Extra focus is placed on how these methods for documentation can be used to 'refine new practices rooted in reflexivity and multivocality' (p. 11). The research is closely linked to practical implementation of the systems during fieldwork as part of education and research excavations in Sweden, where the usefulness of the systems is evaluated together with the archaeologists. As part of the project, a number of technical platforms are designed and tested. Each system solves some problems and highlights needs for further development. It starts with the *Interactive Visualization System* (IVS), an online system that makes it possible to make the documentation available for collaboration with off-site specialists. The next one is the *Interactive Reporting System* (IRS), 'a dedicated set of tools for using the system as a primary means for editing a dynamic archaeological report' (p. 25). The final system is the *Archaeological Interactive Report* (AIR). This is 'a web platform designed to incorporate and archive the full set of archaeological records (including data from advanced 3D recording technology) and edit multiple narratives linked with the excavation archive' (p. 21).

The three frameworks are tested through four 'experiments' as part of excavations. The first two are field courses in archaeology at Kämpinge, a Mesolithic site in Skåne, and Södra Sallerup a Bronze Age and Iron site Age just east of Malmö. Testing the system as part of field courses allows thorough evaluation of the usefulness of the methods in engaging with the archaeological material and documentation in an educational context, and to test the potential of the systems for interpretation and deep learning. The third experiment is part of a research excavation at Västra Vång, an

Iron Age central place in Blekinge. Here the system is tested with experienced professional archaeologists for documentation, management of data and publication. This is also when the AIR system starts to be developed, and it comes into full use at the maritime excavations of the Gribshunden ship, where the system is put to the test in the challenging environment of underwater archaeology.

The different experiments that are presented in the research papers highlight challenges and possibilities with using 3D technology in archaeology. This relates both to technical solutions and existing platforms, but the focus is always on the extent to which the technology helps the archaeologists to document during the excavation and to interpret and reflect on the results as part of writing the report. A review and evaluation of different online archaeological publication systems is presented in paper three. It should be noted that none of the experiments involve contract archaeology with the specific financial and regulative conditions for this. The focus is on developing methods and designing technical frameworks, without clearly pinpointing a specific target audience as the future users of the system. However, the technical solutions that are developed are open-source and could be adopted by anyone with sufficient technical competence.

AIR builds on the Content Management System Omeka S. It was designed and developed in collaboration with the French National Institute of Art History, building on the experience they have of working with data management for cultural heritage information. AIR enables the combination of web-based 3D visualization together with data organized using techniques that are oriented towards the semantic web. This will make it possible to do more advanced and complex queries in the future, when there are semantic definitions of the information and systems available that can understand how contexts, finds and the results of scientific analysis relate to each other so that this can be explored using modern search engines.

At this stage, it is primarily the situation of the single excavation that is addressed. Derudas presents in-depth discussion about the interpretive process as part of the excavation, the possibilities of writing the report, and the interactive exploration of the site afterward through the online systems that integrate the 3D content with the other parts of the documentation and interpretations. The rich documentation and the powerful visualisation techniques allows multivocality in the interpretations and encourages different perspectives, both with the participants during the excavation but also in reusing the documentation and the reporting system afterwards. With the detailed documentation comes unique possibilities of revisiting an excavation in 3D, enabling other perspectives to be explored and new interpretations (as previously shown for example by Dell'Unto & Landeschi 2022:78–82).

The possibilities of combining and aggregating results from different excavations and the promise of Big Data approaches is mentioned but is mostly something for future development. Currently there is much investment in research infrastructures that are seen as essential for making archaeologists able to undertake large-scale data analysis and contribute to research questions such as long-term social dynamics and climate change through the synthesis of archaeological information (Huggett 2023:16). Here, the end goal is primarily the single report, albeit in this form it is an interactive online report that allows anyone to engage and explore the digital content to great length. The benefits of making the data itself available and reusable is discussed in the introductory chapter, where the system is evaluated for FAIRness and the possibilities of working with semantic mapping solutions such as CIDOC-CRM and RDF in the future.

The project takes major steps to further advance archaeological methodology. How archaeologists document and interact with material in the field and during the post excavation phase is important as archaeological sites are replaced by their documentation when the area is needed for modern development. This project builds on extensive expertise in the use of 3D GIS, developed over many years at the DARKlab at Lund University, establishing it as a world-leading environment for 3D GIS in archaeology. Derudas improves this further through pairing 3D visualisation techniques with semantic web solutions. It may not be realistic to expect AIR to be widely adopted in contract archaeology in the near future, due to the complexity of the technically advanced system and the organizational situation within contract archaeology. However, the final paper of the thesis, about Gribshunden, is a very powerful and convincing demonstration of the strengths of the AIR system. It shows how the technical system can support documentation strategies in a complex excavation situation, allowing both a reflexive approach and powerful 3D visualizations to aid research and interpretations. Here lies the main strength of the AIR system: it can be developed into an essential tool for managing the very challenging kinds of excavation situations that marine archaeology presents. Another strength lies in making more of the original documentation accessible to everyone, including the public, for whom the interactive elements may be more engaging than traditional reports or data. The most important potential, as I see it, is for extensive research excavation projects conducted over many years, where documentation can be combined with later excavations and revisited to continually expand knowledge and interpretation of a site. While most archaeological excavations may not undergo extensive reinterpretation, some sites are returned to repeatedly over decades. With the possibility of reinterpretation and multivocality that AIR provides, the documentation from these kinds of excavations can be used and reused much more

efficiently. As such, AIR has the potential to transform the archaeological practice of excavating and documenting (complex) archaeological sites.

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Anton Larsson

Landslide Archaeology: Past Hazards and Disasters in the Göta River Valley and Beyond

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Department of Archaeology and Classical Studies, Stockholm University
Stockholm Studies in Archaeology, 82
Stockholm University, 2023
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Review by Christina Rosén

On September 23, 2023, a landslide destroyed part of highway E6 in Stenungsund in western Sweden. Tons and tons of quick clay swept down a slope, damaging nearby buildings and completely covering the road as well as some ancient monuments. This was not the first (nor perhaps the last) time the highway was destroyed in such a way, as the Göta River valley is very prone to landslides. Many such events are known from historical sources, folk memory, and place names. However, landslides have seldom been on the archaeological radar. Until now, that is.

Anton Larsson's doctoral dissertation *Landslide Archaeology: Past Hazards and Disasters in the Göta River Valley and Beyond* is a deep dive into the consequences of landslides for people and their landscapes, as well as for ancient monuments and other traces of human activity in the landscape.

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Larsson covers a multitude of aspects on the topic by making use of several kinds of sources. This is, as we shall see, both a strength and a weakness.

This compilation thesis consists of five papers, all with Larsson as first or sole author.

The Köpingen Landslide, Trollhättan, Sweden: Assessing Minimum Age using Archaeological Evidence for a Scandinavian Late Iron Age Trading Site (Larsson forthcoming a) makes use of radiocarbon dates and artefact typologies to date the Köpingen landslide along the Göta River, atop which a trading site was established by at least the eighth century CE.

Jordfallet at Bohus: Reinterpreting the ^{14}C Dating of a Medieval Landslide Event (Larsson & Dury 2022) revisits the 1958 ^{14}C-dating of the great Jordfallet landslide near Kungälv in western Sweden and confirms the preliminary determination of this event to 1249 CE, previously based on the Icelandic Annals. Over the past century, this event has been discussed by various scholars as well as amateur archaeologists in connection with the establishment of the medieval town of Kungahälla and the Ragnhildsholmen castle. The ^{14}C-dating is an important contribution to these discussions.

Memories of Disaster: Tracing the Material and Immaterial Remains of the 1648 Intagan landslide (Larsson forthcoming b) discusses the deadliest Swedish landslide in the past few centuries, killing well over a hundred people and shifting the borders between Norway and Sweden. The article discusses the problem of connecting archaeological finds to this singular event and shows that almost none of the finds made in the area can be traced to the landslide with any certainty.

The 1703 Skrehall Landslide: A Historical Archaeological Perspective on Disasterscapes (Larsson 2023) is a case study of the 1703 Skrehall landslide at the border between the Swedish parishes of Fors and Rommele. Archaeological fieldwork led to the discovery of surviving remains from a country road recorded in cartographical material before 1703. The study introduces the concept of the 'disasterscape' as a useful terminology in studying small-scale, localised disasters in the past.

Landslides vs Archaeology: Case Studies of Site Loss and Emergency Fieldwork in Västra Götaland County, Sweden (Larsson 2021) explores how landslides have impacted archaeological sites in the landslide-prone region Västra Götaland from the mid-twentieth century onwards, and how archaeologists have had to respond to these disasters. The paper showcases a set of local case studies and argues for a cohesive and systematic approach to the many different impacts of global anthropogenic climate change including landslides.

The summarising body of work (Sw. *kappa*) is divided into 6 chapters. Chapter 1, *Introduction*, presents the research aims, sources, and limita-

tions of the thesis. Among the sources are field surveys and excavations, geological data, cultural heritage databases, newspapers, historical maps, toponymic evidence, church records, court records, and recorded folk memory.

We are given an overview of different types of landslides as well as of the Göta River with its branches and tributaries. The author also states that 'there are no natural disasters' (p. 17), meaning that landslides often have anthropogenic root causes. This is connected to a discussion of risks and vulnerability. Larsson also highlights what in my view is an important topic, namely the rural proletariat – the landless crofters – as a group more exposed to the risks of landslides than the landed peasantry.

Chapter 2, *Landslide Archaeologies*, gives the reader a research history of landslide archaeologies and a methodological overview of how landslides can be dated, which includes geoarchaeological techniques. A discussion of cultural heritage perspectives is presented involving the risk for destruction of ancient monuments, and for interpreting geological formations from landslides as human-made structures.

In chapter 3, *Evolving Perspectives*, Larsson presents some landslide terminology in the Swedish language including the usage of landslide-related toponyms across the Göta River Valley and present-day Western Sweden, from the medieval Norse saga literature to how Early Modern scholars and clergymen described these events and the ways in which they have been reflected in regional folklore.

In chapter 4, *Encountering the Disasterscape*, Larsson examines the disasterscape from several perspectives, from the individual, personal reactions to various societal responses to the disasters and their immediate aftermaths. He points out perspectives that we might never discover using archaeological methodologies alone, particularly when it comes to sensory experiences or societal reactions and responses, touching on the subject of sensory archaeology. This is an interesting, although difficult, subject that could have been more elaborated. To cite Fahlander and Kjellström (2010:5):

> It is difficult enough to interpret similar kinds of information in contemporary society with living informants, and the degree to which it is possible to conduct analyses and access or rescue this type of information from the depths of history may be questioned.

Chapter 5, *Life by the Scarp*, looks at human-landslide interactions and the many ways people have adapted to and tried to mitigate landslides. The re-shaping of landscapes could lead to changes in land ownership and the need for new borders. Some possible positive side effects of landslides are pointed out, such as improved access to minerals, water, plant foraging, hunting and fishing.

In chapter 6, *Landslides in the Anthropocene*, the author states that (p. 162):

> My aim [...] has been to provide a better understanding of how people in the Göta River Valley and the broader region that today forms Western Sweden were impacted by past landslides, and also how the material remains of their communities may be impacted by these landslides in coming years.

So, how did it go?

Landslide Archaeology is certainly an important contribution to Scandinavian archaeology and cultural heritage management, providing insights and information into a subject that is seldom discussed in archaeology. However, some aspects need to be discussed.

One of my main concerns is that this is a book that tries to do many things at the same time. It introduces a new research field within archaeology, it pleads for improved cultural heritage management regarding landslide sites, and it lifts up many voices from the past. It can sometimes feel a bit overwhelming. Many topics are introduced that could have benefitted from a more in-depth discussion, such as sensory archaeology, risks and vulnerability, anthropogenic climate change, and the use of historical archaeological sources and methods.

Larsson situates himself in within the field of historical archaeology (p. 25):

> To my mind, there is no inherent difference between a 20th-century folktale, a 19th-century photograph, an 18th-century map, a 17th-century ledger, a medieval artefact, a prehistoric landscape feature, a radiocarbon analysis result, a stratigraphic record, a macrofossil sample, and so on, that is large enough to justify their exclusion from an interdisciplinary study.

Historical archaeology certainly involves looking at a topic by drawing from several sources, but to my mind, the point of view needs to be the archaeological questions, the material. The concept of *triangulation* is invoked by the author as a way to use a diverse set of materials to draw conclusions that any one type of material would be unable to supply on its own. However, a critical analysis of the sources in relation to the material and the research questions is important, something which is not fully elaborated on here. I would have welcomed a discussion about *why* there is no inherent difference between the different sources used. A map, for example, was created for different reasons than a folktale or an artefact, which surely affects how they can be used and interpreted in archaeological research.

There are some important take-aways from this book, the main one being a raised awareness and much improved knowledge of landslides and their consequences. Larsson also points out how the research material inherently

favours the propertied, monied classes. The subalterns (for example crofters) on the bottom of society are more seldom reflected but at the same time more exposed to damage from landslides. The study of the landless people, the subalterns, is gaining traction within the field of historical archaeology (Hansson et al. 2020), and I am glad to see it included here.

For the cultural heritage sector, including contract/rescue archaeology, Larsson's concept *improbable archaeology* is useful. Landslides can destroy archaeological sites, but they can also generate archaeological data by revealing artefacts, structures or stratigraphies previously hidden below ground, something which is nearly impossible to foresee. He also points out the occasional tendency for archaeologists to confuse geomorphological formations with manmade structures, for example how the structure of debris fields can be mistaken for prehistoric sites.

All in all, this is an interesting and important book, and I am sure it will be much used in cultural heritage work as well as in academic research and teaching.

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Carina Bennerhag

Steel Making Hunter-Gatherers in Ancient Arctic Europe

Doctoral dissertation in History of Technology
Department of Social Sciences, Technologies and Arts
Luleå University of Technology, 2023
49 pages plus four peer reviewed papers (Appendices A–D)
and tables of sites included in the analyses, of analysed material
and of radiocarbon dates (Appendices E–G)
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Reviewed by Marianne Skandfer

Steel Making Hunter-Gatherers in Ancient Arctic Europe is Carina Bennerhag's PhD thesis, the culmination of many years of research related to two interdisciplinary projects at Luleå University of Technology: *Ironworking in a Hunting Environment* and *Iron in the North*. Their starting point is the results from a large rescue-archaeological project conducted by the Norrbotten County Museum, with Bennerhag serving as the excavation project manager. During her PhD project, these results have been supplemented by comprehensive additional investigations and data.

Bennerhag has examined evidence for metal production between *c*. 300 BCE and 400 CE (Pre-Roman Iron Age–Roman Iron Age), geographically

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confined to the northernmost parts of Finland, Sweden, and Norway. The thesis comprises an introduction and four papers, all co-authored, with Bennerhag as the first author of three. Two papers have been published in international peer-reviewed journals and the remaining two were submitted in 2023. It includes tables of sites analyzed, materials examined, and radiocarbon dates. All components are in English, making them accessible to an international (non-Scandinavian) audience. The list of 42 sites with observed traces of iron handling results from the author's studies of published and unpublished ('grey') literature in archives, examinations of databases, and visits to museums with archaeological material in Finland, Sweden, and Norway. The list of analyzed finds is based on Bennerhag's documentation of selected items: 237 objects including a variety of archaeological finds, most notably slags – production waste from different types of processing, technical ceramics, and prehistoric iron deposits. Of the 82 radiocarbon dates, several were obtained as part of the PhD project. In total, 43 are marked as results of 'this study', although the majority are from rescue archaeology projects at the Norrbotten County Museum. This underscores the close interconnection between developmental archaeology and research in this project. Notably, 20 of the 42 sites included in the study remain undated (Bennerhag 2023:10).

Steel Making Hunter-Gatherers in Ancient Arctic Europe aims to investigate the potential wider geographic distribution of ancient iron production technology processes observed in the Norrbotten material by including all evidence of early iron production and use in northern Finland, Sweden, and Norway. It also seeks 'to achieve a more profound understanding of the probable social/organizational conditions for the implementation and further integration/adaptation of iron and steel production within/among ancient Arctic hunter-gatherer societies' (Bennerhag 2023:4). The overarching goal is to enhance our understanding of prehistoric northern hunter-gatherers through a focus on iron production.

Paper I, *Hunter-Gatherer Metallurgy in the Early Iron Age of Northern Fennoscandia*, published in *Antiquity* (2021) and co-authored with Lena Grandin, Eva Hjärthner-Holdar, Ole Stilborg, and Kristina Söderholm, presents excavations of two multi-phased hunter-gatherer dwelling and iron processing sites – Sangis and Vivungi – in Norrbotten county, northernmost Sweden. Through interdisciplinary cooperation combining archaeological site and find documentation, metallurgical analyses, and radiocarbon dating, the paper identifies several stages of metal processing, different techniques, variations in raw material selection, and the ability to produce different qualities of iron, including high-carbon steel, all dated between c. 200 BCE and 100 CE. Clear evidence of iron smelting, primary bloom smithing, as well as secondary object smithing is found at the Sangis site,

whereas the latter process has not been identified at Vivungi. The results firmly establish ancient iron processing in the northernmost part of Europe.

Paper III, *Ancient Arctic European Hunter-Gatherer Steelmakers in the Limelight* (unpublished), co-authored with Kristina Söderholm, builds upon the first paper. This well-structured and informative method-oriented publication presents metallurgical analyses of materials from 42 sites in northern Norway (n=10), Sweden (n=28), and Finland (n=6). The results demonstrate that metal production and smithing were known and practiced among northern Fennoscandian hunter-gatherers in the final centuries before the BCE/CE transition. The authors argue that larger landscapes and their resources – taskscapes – should be considered as integrated parts of early metal processing in the north and discuss how this novel technology must have been scheduled to fit with other, typically seasonal, activities conducted within northern hunter-gatherer societies. However, the discussion only considers the two well-documented production sites in Norrbotten, and little attention is given to the variations in iron technology presence identified between sites and different parts of northern Fennoscandia.

While the material- and method-oriented papers present novel and solid results regarding early metal technology in northern Fennoscandia and offer inspiring insights into a very fruitful interdisciplinary study, the two other papers and parts of the introductory section, which are concerned with the research environment and process, are more challenging to read. The PhD project is situated within a context of European historical, archaeological, and technology-historical research on iron production, which, according to Bennerhag and her co-authors, has primarily been directed towards the beneficiaries of metal in farming societies and later for nation-building. It is claimed that existing research is still structured around nineteenth-century social-evolutionary frameworks including linking lifestyle with technological capacities. This has severely hampered understandings of the introduction of new technology, specifically iron technology, in 'peripheral' parts of the world, and the possibility of metal processing within prehistoric hunter-gatherer context has been actively excluded (Bennerhag et al. 2023). The critique includes a categorization of essentially all existing research up to today as representing evolutionism and diffusionism. Some of it appears too generalizing and at times unreasonable, for instance, in criticizing previous research for contributing little to the understanding of the recent results from Sangis and Vivungi, and for being too caught up in general evolutionary explanations to realize the potential of the new data (Bennerhag et al. 2023:273–274). Söderholm and Bennerhag (n.d.) describe the marginalization of research results as a direct outcome of the northern origin of the data, but also suggest a tension between an apparent lack of academic interest and local (Sámi) expectations for new insights into their own dis-

tant past. They reflect on how they experienced that national, regional, and local expectations of historical narratives influenced the research process, but the ways these expectations were expressed remains somewhat unclear.

These parts of the PhD thesis can be criticized for the same issues that Bennerhag and her co-authors criticize previous research for: broad generalizations and a specific narrative with little room for alternative interpretations. Reading the thesis, I was struck by how my impression of the northern region's status in relation to areas further south differed from her/their descriptions, both in terms of national history narratives, cultural heritage management systems, and archaeological excavation and research efforts between Norway, Sweden, and Finland. Further, although topography and vegetation differ substantially across the vast region, descriptions seem to adhere to a Norrbotten landscape template. Donna Haraway's critical concept of 'situated knowledge' struck me as useful in my reading. Haraway introduced it in her 1988 article *Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective*, to emphasize that there is no such thing as passive study objects or neutral viewpoints. Haraway insists that as researchers and parts of research environments, everything we do is influenced by our context, and all parts of the knowledge production process itself influences our research. It became clear to me that, although claiming to be about the larger 'Arctic' Fennoscandia, the research history and description of the empirical situation are almost solely based on the situation in northern Sweden. Bennerhag inadvertently engages with the concept of situated knowledge on the final page of her introduction. Here, she suggests that researchers analyzing patterns of ancient activities within a landscape may benefit from having personal knowledge and experience of the European Arctic's unique landscape and climate (Bennerhag 2023:25). This assertion seems to be a self-reference, and the point could have been further developed, perhaps in conjunction with the experience of producing new historical knowledge within a local context. The authors' situatedness is evident in their use of several key concepts, including 'periphery'. Although a major point is that the northern region has been unjustly treated as a periphery in archaeological and historic research, and of limited relevance to the question of metal technology introduction, the study region and study sites are presented as peripheral and remote also in these papers. The center-periphery structure seems to embrace various spatial categories and is treated as a timeless constant, such as between 'south' as 'national', and 'north'/'Arctic' as both different and fundamentally local, but also in the relations between model concepts of inland and coast (Bennerhag et al. 2023).

The interpretation of how iron technology was assimilated by northern hunter-gatherer societies during the final centuries BCE is grounded

in the methodological concept of *chaîne opératoire*, which delineates the technology of executing a task as a sequence of bodily movements that incorporate reflective knowledge and practical skills (Hodder 2012:53). Another key interpretive concept is taskscape, developed by Tim Ingold to describe the mutual interlocking of practical operations carried out by skilled agents within a physical and social environment (Ingold 2000:194–200). The ambition is to synthesize these two concepts and, with the help of the archaeological record, gain insight into how various activities were performed and scheduled in the specific landscape of northern hunter-gatherers and early iron producers (Bennerhag 2023:25). The contribution found in Paper III (Bennerhag et al. n.d.) is a commendable start, moving beyond the notion of 'the entire/full chaîne opératoire' as strictly about the metal production sequence to shed light on the array of typically seasonal activities that had to be planned around iron production tasks (Bennerhag et al. 2021:1523, n.d.:24). Highlighting investments in activities that paid off several months or even years later is a particularly insightful approach, as it challenges the long-standing misconception of hunter-gatherers as being fundamentally opportunistic.

In summary, the thesis presents incontrovertible evidence of iron and steel production/technology in northern Fennoscandia during the final centuries BCE, the full production sequences having been identified through high-quality archaeological investigations supported by targeted metallurgical analyses and direct radiocarbon dating. The results represent a significant achievement of interdisciplinary collaboration between archaeology, metallurgy, and technical history. Originating from public developmental archaeological investigations, the project exemplifies how rescue archaeology can evolve into pioneering research. However, the pervasive critique of existing research for overlooking or disregarding northern evidence of early iron processing could have been more nuanced, in my opinion. As I see it, many of the limitations in previous research in this field, as in so many others, can likely be attributed to constrained research resources. Additionally, advancements in and the relatively lower costs of radiocarbon dating over the last few decades – now allowing direct dating to become a standard procedure in archaeological investigations – have provided a new dataset that revolutionizes our ability to identify culture-historical connections for sites without typologically datable objects and for chronologically mixed sites.

The investigation of the thesis' aims, to understand the geographic distribution of ancient iron production technology processes observed in the Norrbotten material and to explore the implementation and integration of iron processing in ancient northern hunter-gatherer societies on a wider geographical scale (Bennerhag 2023:4), is only just beginning. The implications

of the results warrant further exploration along several avenues: What historical trajectory was this implementation part of? Starting from the local setting, which affordances characterize sites where complete production sequences are identified, and could differences in local landscapes/taskscapes have influenced the adoption of iron technology in the larger northern Fennoscandian region? (I suspect access to large amounts of firewood is key). I concur with Bennerhag et al. (2023:273) that previous research has overly focused on quantity rather than quality. This thesis demonstrates how meticulous site documentation, improved dating methods, and the application of metallurgical techniques can yield groundbreaking new knowledge from a (still) relatively sparse archaeological record.

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New Report: Prioritization in Museum Collections: A Part of War and Disaster Preparedness

Susanna Carlsten

Due to the changed security situation following the full-scale Russian invasion of Ukraine in 2022, Swedish museums have had to focus on preparedness issues more than in a long while. Since last year, a report from the Swedish National Heritage Board (Carlsten 2023) provides support for value assessments and prioritizing what objects to evacuate in the event of war or disaster. Because how do you select a few objects out of thousands in a collection? The report aims to highlight literature, research and experiences that can support museums in prioritizing. It includes a literature review, suggestions for valuation methods and descriptions of hands-on experiences from three museums that manage varied collections; cultural-historical and archaeological objects as well as art and archives.

Collections priority lists can be used for preventive and emergency evacuation as well as salvaging. War and disaster are wide terms and include many types of risks and scenarios, from flooding and fire to vandalism (Ashley-Smith 1999; McWilliams 2024). The report assumes that values are neither static nor inherent, that they change over time and depend on who is doing the valuation (Génetay & Lindberg 2014). The process of prioritizing is usually divided into three steps. The first step is to identify the different values of objects, and then their significance (to put it simply: the sum of all values). Prioritization normally follows these two steps of evaluation and often considers more than values, such as risk and material conditions. Some methods use risk and the material conditions of the

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object (for example material sensitivity, portability) as assessment criteria for valuation and prioritization. Others argue that the value of an object is the same regardless of risk or conditions and that these aspects should therefore only be addressed *after* the valuation.

Experiences from three Swedish museums

The Vasa Museum and the Naval Museum began assessing their exhibited objects, reasoning that they are probably most valuable and vulnerable in the event of an armed conflict. A limited time schedule made it impossible to study every single object in detail. Instead, the team started by looking at larger categories to be able to narrow it down. The assessment criteria, based on ISO 21110:2019, were used to support discussions and weighting. The museum's focus and collection policy have also been important for the assessment.

Helsingborg Museum started prioritization of stored objects with the help of the *Significance 2.0* assessment guide (Russel & Winkworth 2019). They experimented and gradually simplified the method as well as the assessment criteria. The work became more efficient as the museum worked its way through the collections. Today, the first step, if possible, is to establish the provenance of the objects. Experience has shown that this is one of the most important factors in determining the significance, together with the objects regional connection – which is linked to the museum's focus and collection policy.

Dealing with archaeological objects

The presented methods are used for various collections, including archaeological ones. In terms of assessment criteria, some methods can be adapted according to the type of collection. Museum of Helsingborg's and the Naval museum collections contain many ancient artefacts and maritime archeological objects. In the case of the Vasa Museum, basically the entire collection, including the ship itself, is a maritime find.

A general recommendation is to collaborate with different specialists in the prioritization process. At the Naval Museum, the selection was discussed with marine archaeologists. At the Vasa Museum, researchers studying maritime archaeological textile finds were given the opportunity to comment and make suggestions. Both museums included ethical aspects as an assessment criterion, involving considerations regarding human remains, repatriation et cetera. Sometimes it can be important to prioritize an inter-

related group of objects, for example depot finds or skeleton parts. Museum of Helsingborg chose not to set a fixed numeric limit. Since they pack most of the prioritized objects on evacuation trolleys, they let the size of objects decide if there is space to add more to the list.

Depending on the assessment method and criteria used, more or less importance can be given to risk aspects and material properties of the object (for example Brokerhof et al. 2017). Organic materials such as paper, wood and textiles are obviously sensitive to water and fire. On the other hand, inorganic materials, especially gold, silver and gemstones can be particularly vulnerable in war scenarios where theft and looting are likely to occur.

Better some than none

Value assessment should be seen as an integral part of collection management. The work is demanding but can be adjusted according to resources and time. One way to motivate and get additional benefits of the work is to take the opportunity to simultaneously digitize and update database information. The report stresses the importance of a known provenance, thus a suggestion is to spend time on researching the history of the object, where possible. Perhaps the museum's archives can provide information on who donated the object or whether it is linked to a particular geographical location? The list should not be seen as static, but rather as adjustable. Last but not least, it is better to have selected a few objects to the priority list than none at all. Otherwise, the selection may have to be done urgently, in worst case by emergency workers with no prior knowledge of the collections.

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Svenskt HällristningsForskningsArkiv Launches New Website

Ashely Green[1] & Christian Horn[2]

Svenskt HällristningsForskningsArkiv [Swedish Rock Art Research Archives] (SHFA) released a new website in 2023 to provide easier access to the database of Swedish and international rock art documentation that is maintained by SHFA (https://shfa.dh.gu.se/). This new resource aims to account for various needs like user-friendly access to an ever-increasing amount of material, higher resolution images and image viewer, and a built-in 3d model viewer (Figure 1).

The new SHFA resource is comprised of a website and database solution, which were developed by Gothenburg Research Infrastructure for Digital Humanities (GRIDH) with the support of SHFA (see also Green et al. 2024). The database of rock art documentation includes photos and visualisations of rock art, photos of sites and the documentation process, and scanned documentation, spanning from the 17th century to recent high-resolution visualisations and 3D meshes. Since its inception, SHFA have digitised over 80,000 documents and curated these into a publicly available database of over 26,000 images. For each image, the metadata and high-resolution image are stored in a database which uses GRIDH's Django-based database solution, Diana (Table 1).

This metadata allows us to provide researchers with several search functions and, in future releases, will also allow for gallery filtering and data summarisation. All metadata is returned in calls to the public API. A pub-

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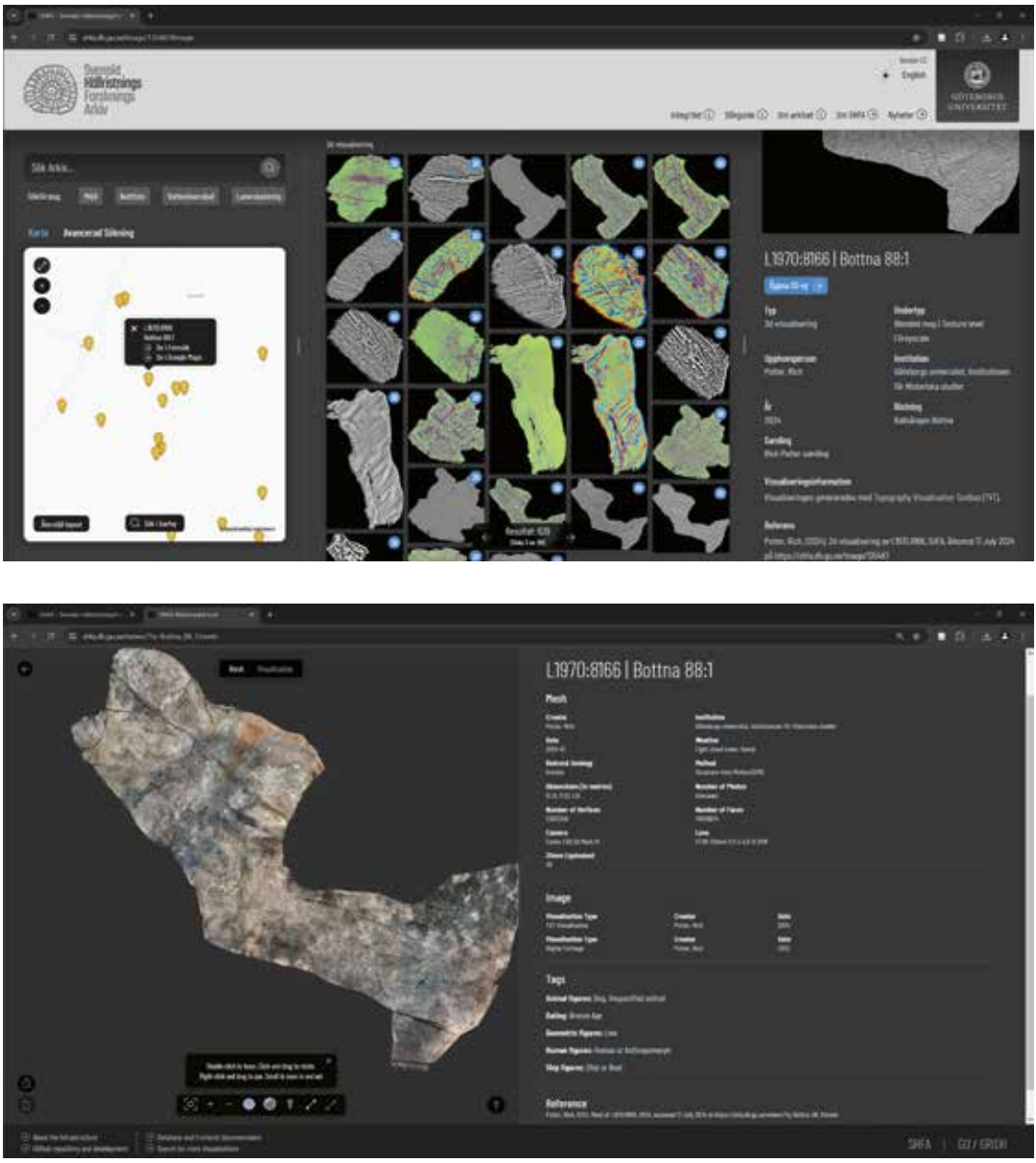

Figure 1. Top: Main interface of SHFA's new website with search bar, map interface, search result viewer, and detailed information of the selected result. Bottom: 3D model viewer of the new SHFA website.

lic or open API (Application Programming Interface) is a set of protocols that allows open access for users or other software to an existing software or database.

Table 1. The metadata are stored in a database which uses GRIDH's Django-based database solution, Diana.

Information recorded in the database
Unique IDs for persistent links
IIIF image
Site info
Image collection
Creator(s) and institution
Year of original documentation
Group of rock art panels or a geographic region
Image type
Keywords assigned by archaeologists to describe the image content, motifs, and possible dating of carvings

Additional nformation recorded for 3D meshes if available
Recording method
Camera specifications
Weather conditions
Number of vertices and faces in the mesh
Mesh dimensions

The SHFA frontend has a 3-column layout which uses the Vue3 framework and Split.js library. The first column provides users with the three search options – a simple free-text search bar, a map search, and an advanced search for combinations of metadata fields. The middle column shows a paginated gallery of search results. The last column becomes visible when a gallery thumbnail is clicked and displays the IIIF image viewer with the associated metadata and, if Swedish rock art, the site description fetched from Riksantikvarieämbetet beneath. Those metadata fields with an associated API can be clicked to start a new search. In the mobile version of the site, these columns are rearranged into a row layout with the same order.

An icon is displayed on the gallery thumbnail to indicate a 3d mesh is available and a button in the metadata section to open the 3d viewer in a new window. The 3d viewer pages use the 3DHOP, Potree, OpenLime, and Openseadragon libraries. The mesh can be manipulated in the viewer and IIIF images of visualisations are available in a carousel, with the mesh metadata shown opposite the viewer frame.

With this updated layout and additional metadata, as well as the increased user-friendliness of the new site including search guides in Swedish and English, the rock art documentation has become more accessible for use in high

impact research. A CC-BY licence and suggested citation for each image allows for easier use of the material, while the newly implemented map feature makes it easier to find local and transregional comparative rock art. The international material from Norway, Denmark, Italy, and Spain makes the new web resources a research resource and a hub for a wider international audience of researchers supporting their work. To accompany the greater prevalence of 3D documentation, we developed a tool for better and easier to publish visualisations of 3D data (Horn et al. 2022) which is also available online (https://tvt.dh.gu.se/). These aspects not only support new publications, but also new research projects that further knowledge about those who created the rock art, and how to protect and communicate it.

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New Research Grant: The World in the Viking Age: A Centre of Excellence at Uppsala University

Neil Price[1], Charlotte Hedenstierna-Jonson[2] & John Ljungkvist[3]

In June 2023, the Swedish Research Council established 15 national Centres of Excellence, each funded for an initial five years with a possible five-year extension as they become self-reliant. Our team at Uppsala University was fortunate to be awarded one of these generous grants to set up a Centre for *The World in the Viking Age* (WIVA) as a collaborative, interdisciplinary meeting place for the study and wider communication of a defining episode in global history.

For centuries, the so-called Viking Age (*c.* 750–1050 CE) has been subject to political misappropriation and projected, monochrome stereotype – making it all the more urgent to emphasise that the people of the time were individuals as varied and complicated, in every way, as ourselves. This spotlight on diversity, in all senses of the term, lies at the heart of the WIVA Centre: our objective is to recover a Viking Age that does not care what we think of it, a pluralistic past as it was (hard though that can be to access), not as anyone would wish it to have been.

The ideas behind the WIVA initiative have their origins in the 10-year research project on *The Viking Phenomenon*, from the same funders, which began in 2016 and is still ongoing. The notion of a Norse diaspora has now become commonplace in studies of the period, but also requires decon-

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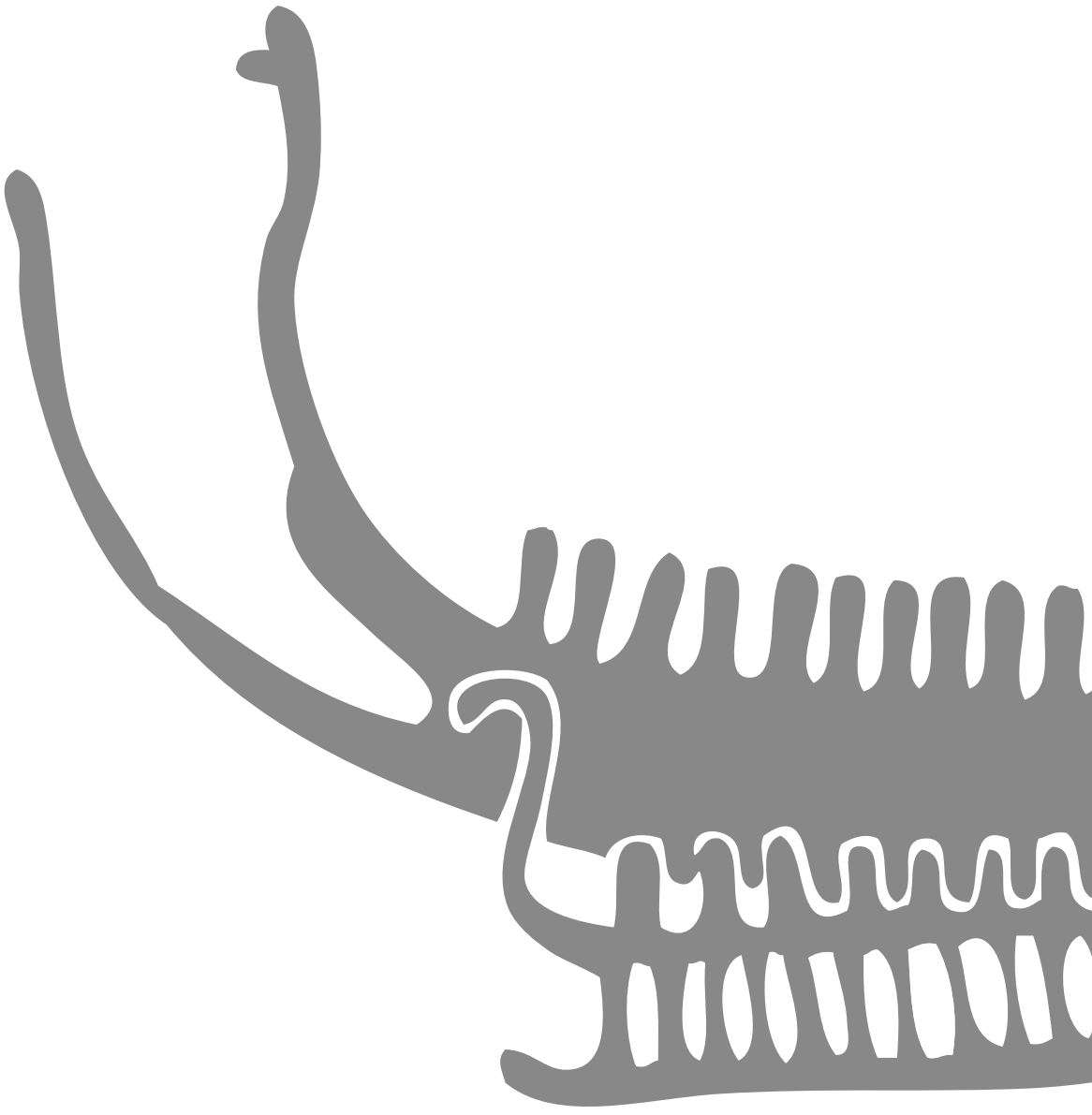
struction. Moving past the illusory, Eurocentric notions of a 'western' and 'eastern' Viking Age, it is possible to perceive the finer grain of Scandinavian cultural encounters. We aim to explore the full span of the extended, Afro-Eurasian world of the Norse, looking primarily south and east along the Silk Roads, tracing their activities in networks of early globalisation that connected the Baltic to the Mediterranean, the Indian Ocean, Asia, and the China Seas – places where the Scandinavians were as often in a minority, but also at a disadvantage. Integral to this is recognising, and addressing, the unintentional parochialism of Viking studies and the geographical marginalisation of scholarly research opportunity, at odds with the vast reality of the diaspora.

The core team at start-up in January 2024 includes the Director and Co-directors (the authors of this note), and our Coordinator, Ms. Rahaf Abu Shaer. We are supported by a 12-person International Advisory Board, drawn from eight countries and nine disciplines. In practical terms, the Centre will be recruiting 20 International Visiting Researchers (IVRs), who will each spend three months in Uppsala. There is no hierarchy among the IVRs: after the award of a doctorate, these posts are open to researchers at any stage of their careers. Flexibility is built into the Centre's design, not least in terms of expected outcomes. Some IVRs may produce a paper; some may be working on a book; others may give a seminar or two, or some public lectures; still others may simply talk and think: the point being that longer-term contacts and productive exchanges of ideas are the priority for us in this context. The decision to create so many IVR positions was motivated by what we see as a crucial need to bring in scholars *from* (for example) west, central and east Asia, or from north and east Africa, to discover what new insights and perspectives they can contribute to a Scandinavian research environment.

By the time this note is published, alongside the start of IVR recruitment we will also have issued open calls for applications to fill the first of five full-time Early Career Researcher (ECR) positions, in the form of two-year postdocs. A new interdisciplinary, two-year MA degree programme will also be launched in due course, again addressing the same theme of the world in the Viking Age; the ECRs will contribute to its teaching. All these activities will be supplemented by seminars, workshops, informal contact events, and public outreach.

Finally, WIVA is an invitation, not a fixed entity. The Centre is not a research project, but rather a home and a hub for them, as well as a base for teaching. We need to populate WIVA with projects, programmes, and people, and we hope that others will wish to join us on this exciting journey.

Learn more at: https://www.uu.se/en/centre/centre-for-the-world-in-the-viking-age-wiva



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