COMPLEXITY AND DYNAMICS

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Settlement and landscape from the Bronze Age to the Renaissance in the Nordic Countries (1700 BC–AD 1600)

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Social dynamics at the Augland ceramic workshop: The introduction of soapstone in paste recipes from the Roman Iron Age and early Migration Period in southernmost Norway

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Abstract

This article focuses on the transmission of technological knowledge and social change at Augland in southernmost Norway around AD 200–450/60. In the first 150 years of this period the Augland artisans produced a regionally standard and relatively "frozen" set of pottery shaped by coiling/roughout techniques and tempered with granites (known as the *southern mode*), while the final century was characterised by a dual production mode that also included the manufacture of the novel and regionally distinct bucket-shaped pottery (known as the *western mode*). The latter was made using a markedly different plate/mould technique, eventually tempered with soapstone and asbestos. The social dynamics behind this technological change remain ambiguous, and the long-forgotten Augland site offers a unique opportunity in this regard, being the only known locality where soapstone tempering was incorporated into the southern mode. This study explores how and why the new material entered the production of the typical bucket-shaped type. At the same time, however, the evidence clearly indicates that potters experimented with soapstone for other ceramic pastes and shapes, even across crafts. We approach the material in four analytical stages: (1) analysis of raw material content; (2) evaluation of craft specialization; (3) fine-tuning the chronology for ceramic recipes; and (4) discussion of the social dynamics of knowledge transmission.

Keywords: Pottery, technological change, craft learning, social memory, soapstone, Roman Iron Age, Migration Period

Introduction

A major challenge for Iron Age settlement archaeology in Scandinavia is to be able to relate changes to living spaces to the everyday technologies and craft activities that took place there. The methodologies in use are simply better tuned to analysis of spatial organisation and landscape use than to studies of production. Consequently, it is notoriously difficult to assemble evidence for entire *chaînes opératoires* and to pinpoint these in space and time,

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Figure 1. Map of Augland and its surroundings. Illustration: Steinar Kristensen, Museum of Cultural History, University of Oslo.

Figure 2. Different pottery techniques in use at Augland. Top: N-technique coiling typically used for handled vessels (Lindahl *et al*. 2002:23, fig. 10). Photo: S10905 from Nedre Valheim, Hjelmeland. Bottom: plate/mould technique used for making bucket-shaped pots (Kleppe and Simonsen 1983). Photo: S2268a from Nedre Valheim, Hjelmeland. Both photos: Terje Tveit, Museum of Archaeology, University of Stavanger.

and to identify with some regional precision just where and when changes to social organisation of production happened. A rare exception is the recent identification of craft milieus in south-western Norway during the Migration Period (AD 400–550) in which artisans decorated metal objects using Style I animal art and worked seamlessly across the boundaries between crafts using metals (gold, silver and bronze), glass and clay (Fredriksen *et al.* 2014). Another significant exception is the Augland settlement site in southernmost Norway (fig. 1), with a large ceramic workshop that flourished for at least 250 years before production came to an end around AD 450/60. Excavated in the mid-1970s, Augland has remained largely unexplored due to the lack of a comprehensive mapping and report, until recently (Fredriksen *et al.* 2020). During the first 150 years of the period we are spotlighting, the workshop milieu produced a range of pottery characteristic for the Late Roman Iron Age (AD 200–400) and widely distributed in southern Norway. Typically, the pottery is tempered with granite and shaped using either a form of coiling, known as the N technique, or a simpler roughout technique. The last century of production, however, is characterised by a dual production mode. A novel mode known as bucket-shaped pottery had been introduced by the end of the fourth century. The latter was made using a distinctly different plate/mould technique, and eventually tempered with soapstone and asbestos. Based on probable origins of the two modes, the regular pottery is here referred to as the southern mode and the bucket-shaped type as the western mode (fig. 2).

Significantly, Augland is the only known site with a documented merging of southern mode shaping techniques with western mode paste recipes, in particular the inclusion of large amounts of talc-rich steatite, commonly known as soapstone[1]. This makes the ceramic assemblage an ideal case study of how two production modes met and interacted, providing a unique opportunity for studying knowledge transmissions and their outcomes in a single workshop context. At Augland, the introduction of the western mode was followed by the introduction of soapstone as a temper, possibly as part of a wider societal development where a novel interaction network gained foothold and expanded. While the origin of this western mode is still a matter of debate (e.g., Rolfsen 1974; Jørgensen 1988; Lönn 2009), it is safe to assume that southwestern Norway, perhaps in particular Jæren in Rogaland (fig. 1), was a core area where its production gained momentum from a very early stage (Kristoffersen and Magnus 2015). Also, during this early stage it was primarily associated with cooking (Kleppe and Simonsen 1983). Interestingly, what seems to be initial experimentation with soapstone in ceramic pastes at Augland may be related to production of the "little cooking pot" (Bøe 1931), which is traditionally linked to the southern mode. This leads us to hypothesise that the dynamics between the two modes – and especially the collaboration between craftspeople with knowledge and skills within the respective modes – is the main driver behind the introduction and regular use of soapstone in ceramic pastes at Augland. Working from this hypothesis, we seek to establish when and how soapstone as a tempering agent was introduced, and to build a relative chronology of the technological process. We will do this by identifying key ceramic recipes and relating these to evidence of other crafts, in particular non-ferrous metalwork.

In a recent article (Fredriksen *et al.* 2020), we argue that coping with the new manufacturing technique slowly contributed to the downfall of the previously thriving

ceramic craft milieu at Augland, which came to an end in the mid-5th century. The demise of the Augland workshop correlates with the roughly contemporaneous demise of the Fjære and Oddernes[2] elite milieus, two nodal points in a southernly oriented network with contacts across the Skagerrak (Skjelsvik 1961; Rolfsen 1976; Larsen 1990; Grieg 1990 [1939]; Rolfsen 1992:35–39; Stylegar 2006:208–213, 2007:82–99; Kallhovd and Stylegar 2014; Sæther 2018). Significantly, petrographic studies have established clear links between Augland and Fjære (Hulthén 1986:73–75). It is important to emphasise, however, that while production ended at Augland, the western mode continued to thrive until the mid-sixth century elsewhere, especially in western Norway.

The departure point for this examination is the co-existence of the two production modes, or technical groups (Roux 2017:107). The earlier southern mode culminated in the black-burnished wares (Bøe 1931), generally characterised by sophisticated coiling and drawing techniques, and in a wide repertoire of vessel shapes and stylistic features that remained relatively unchanged for at least two centuries. The ceramic tradition can therefore be deemed uniform, static or frozen (Rice 1996) and thereby characterised as a "closed learning network", with a strict and faithful reproduction of techniques and decorative style (Wallaert-Pêtre 2001:482–485). The bucket-shaped pots of the western mode were, on the other hand, made using a plate/mould technique that, at least in its early phase, was easier to copy by non-specialists (Kristoffersen and Magnus 2015:119). The available chronological data indicates that the western mode entered Augland in the second half of the fourth century, and that manufacture at the site ceased around 450–460 or shortly after (Fredriksen *et al.* 2020). This means that the co-existence of the two modes was characteristic for the workshop's last century of use. By identifying more accurately when and how the introduction of soapstone into potting took place at Augland, we will be in a better position to understand key factors behind this introduction, and the social dynamics of its continued use until the demise of the workshop.

In the following, we will:

- Give a general overview of the site and discuss the raw material contents of the western mode.
- Evaluate the organisation of production, craft specialisation and technological change.
- Provide a relative chronology for Augland's ceramic recipes in the final century before production came to an end around 450/60.
- Discuss the dynamics of knowledge transmission, by relating the introduction of novel raw materials and shaping methods to the broader societal context. Evaluate the technological changes and assess the most likely regional sources of origin for the soapstone used at Augland.

State of research on the Augland site

In 1974 and 1975 the Museum of Cultural History (KHM) in Oslo excavated the Augland site, situated west of the river Otra in Kristiansand, Vest-Agder, Norway (Rolfsen 1980). The unearthed area of approximately 2500m^2 lay on a stream terrace 20 metres above sea level, surrounded by river valleys (fig. 1). The unusually large production site was primarily centred on potting. However, evidence of non-ferrous metalwork and iron smithing clearly indicates cross-craft knowledge exchanges. The artefact material includes glass beakers, jewellery, beads, spindle whorls, arrowheads, knives, files, fishhooks, fishing sinkers, whetstones, crucibles, smoothing stones, slags and burnt bones (Rolfsen 1980:15).

The lack of a report including mapping from the original excavations has hindered substantial work on Augland. Information has been extracted from shorter articles (Rolfsen 1980, 1992; Stylegar 1999, 2006, 2007) and municipal reports[3]. The Augland excavations uncovered a total of c. 55,000 ceramic fragments, moderately estimated by the excavator to represent 700–800 vessels of the regular southern mode and c. 80–90 vessels of the western bucket-shaped mode. Most likely, however, the total number of vessels is significantly higher. The excavations revealed four rectangular house plans as well as a pit-house and a circular dug-down house (Rolfsen 1980, 1992). The house plans all contain postholes and firepits. In between these house plans four basins of raw clay and 14 kilns were unearthed, as well as a range of other structures, such as graves, charcoal pits, cooking pits, slag pits and refuse pits (Rolfsen 1980:85–87, 1992). Seventeen radiocarbon (^{14}C) dates from the site have so far been established. These range from 170 BC to AD 650 (cal., 2-σ), with a peak of activity in the third and fourth centuries AD. The activity ground to a halt around AD 450 (Fredriksen *et al.* 2020).

The potters did not need to travel far to find clay. The clays in the preparation basins, characterised by Hulthén (1986:65) as silty, fine, rich in biotite mica and iron (Fe) with low levels of calcium (Ca), most probably originate from the river valley next to the site (Rolfsen 1980:16). This initial interpretation was supported by Hulthén's (1986:59–61, 76–77) study. Hulthén (1986:65–73, 77–78) also classified the ceramic assemblage into five groups. This was based on clay and tempering materials, shaping techniques, surface treatment, decoration, and firing method. Her groups A–D correspond to the dominant southern mode, characterised by the use of local clays mixed with crushed granite. Hulthén further narrowed group A-D into two main types: 1) fine grained vessels constructed by the N-coiling technique (groups A and D) employed for serving food and drink, and 2) rougher pastes associated with roughing/drawing technique (groups B and C) for cooking and storage. The firing method was uniform for Groups A–D: reduced firing conditions and a temperature range between 600 and 700 °C (Hulthén 1986:73–77).

Significantly, Hulthén's Group E is markedly different. This refers to the western mode bucket-shaped pottery. Materials seem to have been brought in from neighbouring areas to the northwest. Hulthén identified the use of sand, granite and talc as tempers, and found asbestos (e.g., chrysotile) in some samples (see footnote 1). The average tempering (above 50%) is significantly higher than for the southern mode. The resulting wares are more heat-resistant, leading Hulthén (1986: 79) to argue that the type had a different function.

Bucket-shaped pots – the raw material

Bucket-shaped pots do not seem to relate to any known ceramic type before their sudden appearance in the mid-4th century, and they are clearly distinctive from contemporary types. The type normally features straight-walled or slightly convex vessels, typically with a P-shaped rim and a capacity of 1–1.5 litres.

The sequence for bucket-shaped pottery consists of the three broad Phases I-III (Fredriksen *et al.* 2014). In Phase III, the pots often have remains of, or indications of, an iron band below the rim. The production of high-quality vessels of the western mode in Phases II and III is defined by the use of specially carved stamps and a "surface-covering expression" (Fredriksen 2006:130, table 1). This expression was intimately linked to metalworking milieus using Salin's Style I animal art, and imbued in a rich mythological universe (Fredriksen *et al.* 2014:123).

One of the most significant features of bucket-shaped pots is the extraordinarily high proportion of non-plastic inclusions, often up to 80% and possibly even 90%, predominantly asbestos or soapstone, or a mix of the two (Kleppe and Simonsen 1983:18; Rolfsen 1986; Kleppe 1993; Engevik 2008:130–132). In general, asbestos seems to be most popular in western Norway (Vestland), while soapstone dominates in the southwestern parts of Norway, predominantly in Rogaland (Kristoffersen and Magnus 2010:56, see also fig. 1). The reasons for the high proportion of non-plastic material remain unknown. Kristoffersen and Magnus (2010:10) observe, in relation to the bucket-shaped pots, that the clay first and foremost seems to act as a binder for the minerals that are added to the paste.

The thermodynamic qualities of soapstone

Nearly a century ago, Johs. Bøe (1931:170–171, 204–213) argued that the high proportions of asbestos/soapstone in bucket-shaped vessels helped stabilize the ware during drying and firing, and thus helped to maintain the pots' delicate shapes. The identification of crusted proteins in some pots has offered support to the argument that their initial use was for cooking (Kleppe and Simonsen 1983:16; Engevik 2002, 2008; Kristoffersen and Magnus 2010:10, 15; Fredriksen *et al.* 2014), prior to becoming serving vessels (Fredriksen *et al.* 2014).

A brief survey of the available literature on the use of soapstone as temper beyond the study area serves to confirm the relevance of the mineral as a stabilising agent during the firing process. Extensive testing already in the 1920s concluded that talc as a body material may be introduced in considerable quantities without affecting the working properties of the body (Ladoo 1923). Later work confirms that soapstone fired to temperatures between 800 and 1000°C undergoes mineralogical changes that increase its hardness (Rapp 2009:125). In addition, more recent archaeological experiments point out that the partial fusion of the talc led to an increased length of the liquid phase, resulting in an increase in compressive strength and mechanical resistance (Torres *et al.* 2015). Archaeological examples include a recent study of prehistoric pottery from Milla Skerra, Shetland, with frequent use of soapstone as temper. Olivia Lelong (2019:92) argues that the tempering would increase the ability of the pottery to withstand a wider range of temperatures and perhaps also enhance its burnished appearance.

These examples underscore frequent claims that high percentages of asbestos and soapstone provide increased heat resistance (Kleppe and Simonsen 1983:16). However, several commentators (e.g., Magnus 1984; Jørgensen 1988) have cast doubt on the assertion that this feature made vessels more useful for cooking. Recent experiments by Tine Schenk tested the thermodynamic properties of bucket-shaped pottery when fired with mixes of 25%, 50% and 75% soapstone content. She concluded that the soapstone proportions do not seem to be tied to the production process or to stabilising properties. However, the heat treatment seems to be of aesthetic significance, as vessels take on a metallic appearance when fired at temperatures in the 500°C to 750°C range (Schenck 2015). Significantly, this metallic appearance possibly links the pots to metallurgy and gold smithing (Fredriksen *et al.* 2014). It should, however, be noted that many bucket-shaped pots were fired at temperatures below 500 °C (Hulthén 1986). Interestingly, carved soapstone bowls have been used throughout most of the Iron Age and medieval period in Norway[4], and were in use both prior to and after the period of bucket-shaped vessels (AD 350–550). Analyses of food crusts in carved stone vessels show that the contents had occasionally been heated to up to 300°C (Brodshaug and Solli 2006:299–301). This evidence for vessels made of 100% soapstone may also be of relevance for bucket-shaped vessels with soapstone content in the 50-90% range, as it clearly indicates that high contents did not weaken the thermodynamic qualities of cooking vessels.

Importantly, the western mode was present at Augland for a century before ceramic production ceased (Fredriksen *et al.* 2020). While the minerals were mined

regionally in western and southern Norway (see map over known quarries in Hansen and Storemyr 2017:15, fig. 14), there may also have been influences from the continent. The Romans brought Alpine soapstone vessels to their northern limes, and the soapstone vessels may well have been appreciated by northerners with connections to these areas (Rapp 2009:125–128; Storemyr 2015:27–57).

Craft specialisation (technological change) at Augland

Ethnographic work has shown that shaping techniques are a key to understanding changes to ceramic recipes (Gosselain 2008, 2011). Shaping requires learning over time, and is therefore related to group identity more often than other *chaîne opératoire* stages. However, while usually a resilient and stabilising factor, the shaping stage may also reflect conditions for sudden social changes (Gosselain 2011:214–221). When such shifts occur, key factors to consider are relocation of craftspeople, altered social identities, new producers and new identities coming in, and new connections between different learning frameworks (Roddick and Hastorf 2010:164–167 with references).

At Augland, the southern mode had been steadily reproduced for at least 150 years when the western mode appeared. The two modes represent two forms of learning networks (Miller 2012:229–233, fig. 11.1), with either *closed* or *open* abilities (Wallaert-Pêtre 2001:482–485). A relatively closed learning network is characterised by behaviours leading to a strict and faithful reproduction of style, while a more open network has an adaptability to unknown situations and a partiality for trial and error learning (Wallaert-Pêtre 2001:482). While the southern mode of production at Augland fits the description of a closed network well, the first phase of the western mode seems relatively open, without a distinct hierarchy of learning, as the vessels are fairly easy to copy. In another article we argue that this meeting of traditions led to the collapse of the Augland site over time, as the two modes were unable to coexist when the ties to southern Scandinavia were severed by a regional power shift (Fredriksen *et al.* 2020). Importantly, a simple replacement of craftspeople can be ruled out, as both modes of production seem to have continued side by side after the introduction of the western mode. A more plausible possibility is that the knowledge of the novel, easy-to-copy work mode with a flat organisation was brought to Augland by artisans who originated in communities to the northwest, where it seems to emanate from, or at least travelled via connections with these communities (Bøe 1931:166, 170; Kleppe and Simonsen 1983:36; Kleppe 1993:293, but see the discussion in Engevik 2008:16 for other points of view). In the following we discuss two main alternatives for the provenance of soapstone at Augland: namely Rogaland and the Fjære area. However, such a fine-tuned culture-historical discussion requires, first, a clarification of the chronology at Augland.

Chronology

A Bayesian model of the available radiocarbon dates from Augland places the end of the site in the period AD 340–495 (cal., 2-σ) (Fredriksen *et al.* 2020:454, fig. 4). Typologically speaking, the production of pottery with soapstone-tempered wares clearly fits within this frame. However, here we seek to narrow the frame, by relating the radiocarbon chronology and the ceramic typology to other forms of material culture.

According to Bøe (1931:166–172) the origin of the first bucket-shaped pots can be traced to Rogaland, specifically the northern parts of Jæren, in the mid-4th century[5]. These pots are tempered with finely ground sand. He argued that the clay recipes rapidly became tempered with asbestos or soapstone, but did not specify subsequent development, and it is not possible to close in on a more precise date. As indicated with respect to Augland, the following generation might have worked using the results of trial and error, in an open network, until around the turn to the 5th century. Consequently, the production of soapstone–tempered ware of both modes at Augland most probably took place after this time. From a typological point of view (cf. Kristoffersen and Magnus 2010), there are few indications of ceramic production at Augland after c. 450–460 (Fredriksen *et al.* 2020:460). As previously mentioned, production vessels of the western mode were intimately linked to metalworking milieus (Fredriksen 2006:130, table 1). This collaboration with metal crafts artisans would be a potter's way of working – something that s/he had brought from a different learning network where this was already common practice. Indeed, the excavations indicate that metalworking took place alongside potting at Augland (Rolfsen 1980:15, 18). Our macroscopic observations of the metal artefacts recovered at Augland establish that non-ferrous metalworking most likely took place in the period AD 350–450, thus confirming that there were concurrent developments of potting and metalworking during the final century of production at Augland. Four copper alloy fibulas, a cruciform brooch and three small-long brooches define the end phase (fig. 3). These are the only brooches that relate to the activity of the Early Iron Age on site[6]. The cruciform brooch is of Reichstein's (1975:36, abb. 32) type Eine, dated to the first half of the fifth century. The small-long brooches are more difficult to date, as no clear sequence has been established (Rogers 2007:118–119; Røstad 2016:272 with references). Haakon Schetelig (1911:61–68) placed the type mainly in the late Merovingian Period, but two of the three have divided/undivided lozenge-shaped feet (*takfot* and

Figure 3. One cruciform and three small-long brooches from the Augland site. Photo: Christian Løchsen Rødsrud. Assembled by Ingvild Tinglum Bøckman.

planfot) that seem to mirror the larger silver-foil/relief (cross-headed) brooches (Hansen 1970:65–66, Figs. 61–62; Sjøvold 1993:16–17, Group A, type 11 and 12). This indicates that the two brooches date to AD 350–450, most probably the latter half of this time period. Consequently, metalworking at Augland most probably ended not long after AD 450. This resonates well with the radiocarbon evidence, which clearly indicates that activity declined rapidly after AD 450.

A three-stage sequence for paste recipes and knowledge transmission

We have conducted a macroscopic survey of the entire ceramic assemblage, selecting samples that were clearly marked with reference to the spatial distribution grid from the 1974–1975 excavations and following Kristoffersen and Magnus's (2010) updated typological framework. The result is a broad classification of the material into four ware types: black burnished wares (So), table wares (Bo), bucket-shaped pottery (Sp), and miscellaneous cooking wares (M).

In a previous study, we sorted the Augland pastes using a portable X-Ray Fluorescence (pXRF) device. The dataset could be divided into four main clusters of ceramic pastes (fig. 4), of which Clusters 1–3 (tab. 1) contained diagnostic bucket-shaped wares (Fredriksen *et al.* 2020).

For the current analysis, clusters 2 and 3 are of particular relevance (tab. 1). While Cluster 2 comprises all four ware groups and contains several examples of subtle crossovers between the western and the southern mode, Cluster 3 is characterised by very high contents of soapstone temper, clearly visible to the naked eye. Especially striking is the closeness between some bucket-shaped wares of the western mode and specific samples of the southern mode: in at least two instances bucket-shaped vessels and serving vessels (Bo) of the southern mode may well come from the same prepared batch of clay. The black-burnished wares, on the other hand, stand out as a separate group, seemingly linked to a highly specialised set of skills for surface treatment and shaping using N-technique coiling (Hulthén 1986). There is, however, a degree of similarity between recipes made using the simpler roughout technique without black burnishing and those made using the plate/mould technique.

The macroscopic analysis also reveals that several sherds of vessels made in the southern mode are tempered with soapstone. We have examined all available sherds with soapstone temper, and the material is homogenous. The majority of tableware sherds with soapstone temper belongs to Bøe's (1931:156–164) "little cooking pot" (R.364/365) group. Typologically, R.364/365 extends further back in time than the bucket-shaped vessels and is traditionally linked to southern and eastern Norway. This indicates that the earliest experimentation with soapstone within the western mode was primarily with this type. This observation corresponds well with the argument that the invention of the bucket-shaped pots was related to changes in culinary practice (Kleppe and Simonsen 1983).

The main factor in these dynamics is most likely cross-craft collaborations between artisans (Budden and Sofaer 2009; Brysbaert 2011; Rebay-Salisbury *et al.* 2014). However, there is also the possibility that craftspeople at Augland were already well aware of the thermodynamic

Cluster/ Recipe	Stage in Phase I	Recipe definition	Characteristics	ID of likely same-batch examples (ware thickness)
1	Early	Light-coloured, sandy, dry, fine-ground, local materials	Recipe adopted from roughout technique types (Bo, M)	Sp L60, Bo L50, M G30 (5 mm)
2	Middle	Darker, more heterogenous, sand, mica, some imported soapstone but mostly local materials	Transitional recipes merging with roughout technique types (Bo, M) and the N technique type (So)	Sp F60, Bo I60 (5 mm) Bo M60, M K45 (11 mm) Sp G30, Bo I55 (7 mm) Sp M60, So L50 (5 mm)
3	Late	Darker colour, high soapstone content (<50%), mostly imported materials	Distinct pastes with early Phase II characteristics, clearly separate from N technique (So), a few Bo examples of paste use	Sp F60, Sp D45 (3 mm) same ware as Bo M65 (10 mm)

Table 1. Clusters 1–3 as a relative chronology for the terminal century at Augland. Definitions and main characteristics of recipes, and identified matches of samples most likely belonging to same paste batch.

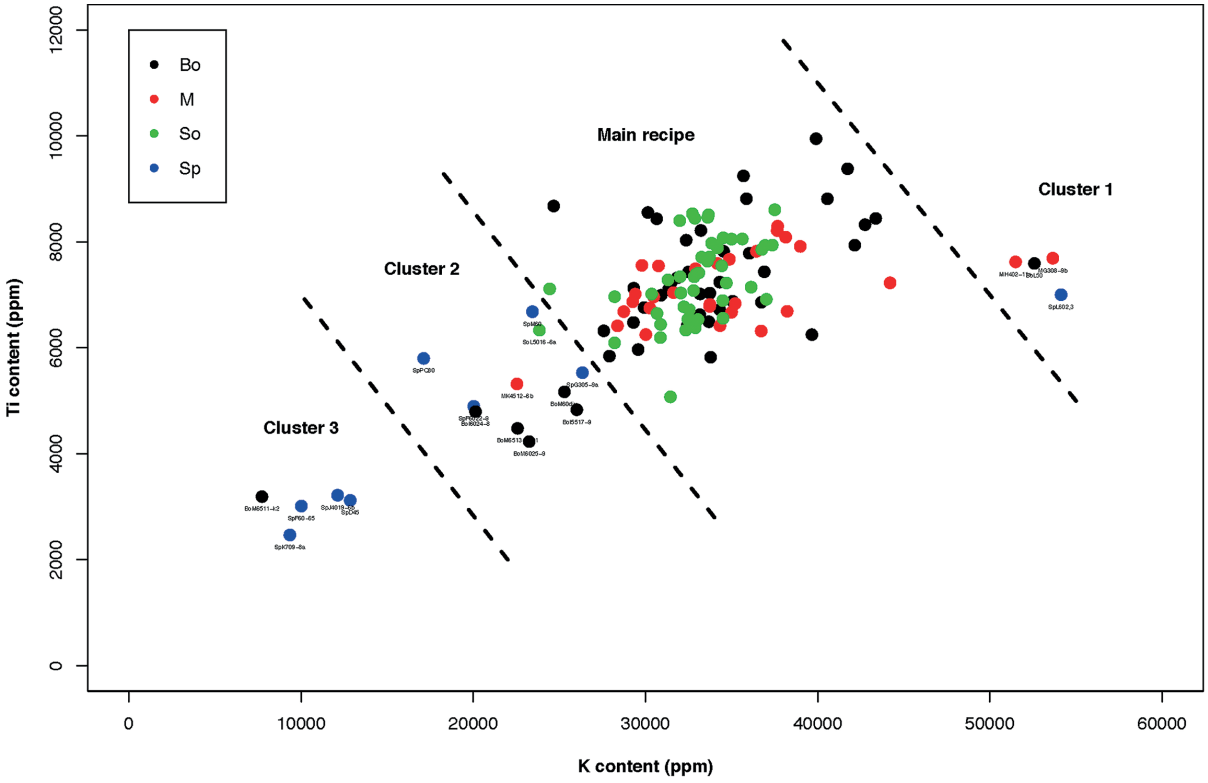

Figure 4. K-Ti plot of the Augland pXRF data. Stippled lines indicate grouping into Main recipe and Clusters 1–3. Illustration: Fransesco Caruso, Schweizerisches Institut für Kunstwissenschaft.

qualities of soapstone, as it was in use for other forms of material culture throughout most of the period of ceramic production at Augland. In other words, while it is likely that the introduction of the newcomer mode and its tempering materials was brought to Augland by new artisans with different skills, the evidence of cross-fertilizing between the two modes in the final phase at Augland indicates that craft learning consisted of experimentation. It is, however, clear that the artisans eventually mastered both the southern and the western mode, being able to use the soapstone-rich western mode recipe in new ways. Evidence for this lies in the ceramic assemblage from Augland, which includes many examples of hybrid forms appearing in the terminal stage of ceramic production there. The collection originally included a complete R.364/365-vessel with a high content of soapstone[7], the only one known of its kind. Numerous sherds (fig. 5) bear evidence of the experimentation with the new recipe.

To sum up briefly so far, we argue that the ceramic production at Augland developed in three stages. The first stage consists of at least 150 years of production of southern mode pottery. This is followed by the introduction of the western mode, and the sequence ends with a stage where artisans experimented with soapstone (and most likely asbestos) as temper within both modes. Significantly, this chronology establishes that the terminal stage at Augland

Figure 5. Left: example of soapstone tempered vessel of southern mode (R.364/365) with arrow pointing to a zoomed photo of the inside. Bottom right: vessel with combination of traditional paste with a second layer of soapstone tempered clay inside. Photo: Christian Løchsen Rødsrud.

took place within a timeframe of around five decades, between AD 400 and 450. This means that it did not extend much beyond a generation or two, perhaps even being within the lifetime of a craftsperson.

Introduction of a new raw material to paste recipes

Ceramic practices normally cite earlier customs and events (Lucas 2012:195–201), and the recipes for making specific forms of material culture were deeply tied to the identity of craftspeople as makers of social memory. Most likely, this means that potters at Augland tested how the new western mode recipe would work within the framework of the well-known cooking pot. The experimentation began before the introduction of soapstone, with the production of bucket-shaped pots using the southern mode technique. Consequently, a feasible explanation is that new potters arriving at Augland from the core areas of the western mode introduced the new mode. This led to an interweaving of two learning networks at Augland, a merging of knowledge from two different *communities of practice*.

The community of practice concept describes a group with a shared history of learning (Crown 2014), in this case the southern mode. The recipes of a specific practice community are defined as repeated patterns common to potters with a shared understanding of the "rules" for making a specific repertoire of socially acceptable vessel types (Wenger 1998). The new and more open mode might have been introduced via visitors from the northwest. During this time period it is not unlikely that there were instances of intermarriage, bringing potters from one area (and ceramic tradition) to another. We have seen that the two modes merged in hybrid forms during the third stage of production at Augland, using a paste recipe typical for bucket-shaped pots. Such hybridity may well suggest the creative merging of firstcomer and newcomer modes of production in the works of a new generation.

The ceramic production at Augland ended around AD 450 or slightly later, which approximately coincides with the transition to Phase II for bucket-shaped pottery in southwestern Norway. Phase II is characterised by a high degree of experimentation, while gradually becoming a more closed network (Fredriksen *et al.* 2014:123). The Augland potters were clearly not part of this process in Phase II (see Fredriksen *et al.* 2020). As we have seen, Augland became increasingly woven into a network that included the western production mode during the workshop's third and final stage. Consequently, understanding the flow of the new materials in use during this stage is a key to understanding the developments in ceramic production in this part of Scandinavia.

Where did the soapstone used at Augland come from?

Bøe's (1931:166–167) observation that the earliest bucket-shaped pots were tempered with sand remains widely accepted (Engevik 2008:132; Fredriksen *et al.* 2014:4). Our previous work indicates that there are crossover-examples without soapstone-temper (tab. 1, cluster 1 and 2).

Precisely how the soapstone came into use as a temper, however, remains unresolved. When recipes containing soapstone appeared at Augland at the very beginning of the 5th century, it seems to be a second pulse of impact from the western mode. The wares that appeared after the second pulse compare well with the thin-walled (<4 mm) vessels that are typical of the fifth century. This new variant of the western mode clearly represents a different *chaîne opératoire* than the southern mode, and cross-craft contacts were probably a key factor.

Soapstone was not locally available for the Augland artisans. In our opinion, the current evidence supports two possible scenarios of how the soapstone was introduced. In the first scenario, soapstone was brought from the north, the Rogaland or southern Vestland counties, via contacts from within this core area for production of bucket-shaped pots. This would have involved transportation of soapstone, along with the knowledge of how to make the new clay recipes. In the second scenario, the invention of soapstone temper occurred through local experimentation. This alternative draws attention to a possible origin to the northeast in Aust-Agder. Even though the production of carved soapstone bowls seemingly came to a halt in southern Norway in the first century AD (Pilø 1990), there is ample evidence for the use of the mineral for a range of other purposes during the lifetime of the Augland workshop, for example for spindle whorls, fishing sinkers and other weights (Rolfsen 1980). This implies that soapstone was still in use in the period and that the material was available at Augland via various cross-craft exchanges.

Given that the core area of production – and most likely the origin – of the western mode was in western Norway, we currently find the first scenario to be the most probable. This scenario implies that both raw material and technological influence came from Rogaland/Vestland, the core area for soapstone-tempered bucket-shaped pots (Engevik 2008:170-171). There are several known quarries in northern Rogaland, mostly in the vicinity of Haugesund (see fig. 1). A small selection of sites has yielded prehistoric finds, such as Årabrotsmarken, Nora Grønevik and Ilibrotet (Skjølsvold 1961; Hansen and Storemyr 2017).

However, the evidence of close contact in the eastward direction may indicate that initial procurement of soapstone was from quarries to the northeast, which were located closer to Augland than those to the northwest were. The closest known quarries are located in Fjære and Landvik, some 50–60 kilometres to the northeast, although these are primarily associated with Viking period activity (Skjølsvold 1961; Schou 2007, 2017). Hypothetically, soapstone could also have been transported to Augland from Hisåsen (Skjølsvold 1961; Schou 2007:47–48) near Lillesand. This second scenario is particularly interesting in light of the concurrent demise of the Fjære and Oddernes elite milieus, where Augland was part of the latter, and of the southern network stretching across the Skagerrak. Most archaeological work on soapstone has focused on locating quarries and on sourcing large objects like bowls, bake stones and the building materials of churches. Such material is mostly dated to the Viking and medieval periods. However, raw material for production of smaller items that were in use throughout the entire Iron Age, such as loom weights, spindle whorls, casting moulds and fish net sinkers, must also have been quarried, although their extraction and ensuing craftwork have received far less attention (Hansen and Storemyr 2017:18). The use of quarries for small-scale production left fewer traces and is more difficult to date. Importantly, regardless of entry route, the soapstone arriving at Augland for production of spindle whorls or other items would have been available for the potters. A recent study provides an excellent departure point for future work. Gitte Hansen *et al.* (2017) have been able to link a high percentage of vessels in Vestland to known quarries. This indicates that it should be possible to trace the sources of soapstone found at Augland.

Concluding remarks

While the potters at Augland had developed a closed learning network (southern mode) with highly specialized skills over many years, a new (western) mode of production entered the site in the late 4th century. The western mode originated in a relatively more open network, and was a markedly different technique that was easy to learn for the skilled Augland potters. Knowledge transmission was enabled by the exchange of ideas with artisans coming from other production areas. The initial introduction of the western mode in the second part of the 4th century is the first pulse of influence. This is demonstrated by crossover examples where local artisans made bucket-shaped pots using southern mode wares. In the second pulse, soapstone was introduced into the recipes. This introduction of a new raw material may be connected to a relocation of artisans that mastered the plate/mould technique and used tempering agents brought to Augland from a neighbouring region. In the third and terminal stage at Augland, the artisans seem to have experimented with, and mixed, the two production modes, since we identify examples of hybrid ceramic technology.

Based on regional mapping of known soapstone quarries we suggest two main directions of import, from the northwest and the northeast. For both options it cannot be overlooked that there are clear links between Augland and Fjære, and that the two milieus seem to end concurrently. Future research should seek to link the soapstone at Augland to a wider regional landscape. Our analyses suggest a fairly homogenous soapstone material, and it is quite likely that the raw material at Augland came from one single source.

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Notes

1. Tempering with levels of soapstone and asbestos comprising above 50% of the ware is a common feature of the western mode pottery (see e.g., Engevik 2008) – a distinct feature of this particular mode. While Birgitta Hulthén (1986:79) found asbestos (e.g., Chrysotile) in some samples, this temper type was not found in our analysis. The most likely reason for this is that all samples with visible asbestos tempering were sent to Hulthén for analysis.
2. Augland was most likely part of the Oddernes milieu.
3. All sample IDs in this study refer to the excavations' original coordinate system, and may therefore be spatially plotted if and when the report is made available.
4. The question of how these stone bowls developed is still unresolved. Their origin is probably to be found in western Norway, where evidence of ancient soapstone mining occurs most frequently (Skjølsvold 1969, see also map in Hansen and Storemyr 2017).
5. Rolfsen (1974) argued that the bucket-shaped type originated around the turn to the 4th century AD, casting doubt on evidence that had been used to support an origin in Jæren. His argument is based on typologically dated burial contexts that seem to pre-date AD 350. However, this argument does not consider the likelihood that the contexts may contain antiquities (cf. Kristoffersen and Magnus 2010).
6. A fragment of a Viking Age brooch has also been recovered, but its relation to the production site remains unclear.
7. Unfortunately, we were not able to retrieve this vessel, known from illustrations and an earlier, preliminary survey of the collection.

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