

Stone Age Pottery in Lithuania: Symbols and Rituals Embedded in Technological Processes

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This article analyses the technological processes involved in the production of Stone Age pottery, aiming to identify the symbols and rituals associated with these techniques and trace their development over time. Furthermore, it examines the influence of the natural, economic, and social environments on the development of symbolic worldviews as reflected in Stone Age pottery, contextualising these findings within a broader cultural framework. The study focuses on two primary cultural traditions of hunter-fisher-gatherer communities in the territory of present-day Lithuania – the Nemunas and Narva Cultures – as well as the early pastoral societies of the Globular Amphora and Corded Ware Cultures. To illustrate these traditions, two widely investigated regions were selected as case studies: Biržulis Lakeland in West Lithuania and the Dubičiai region in Southeast Lithuania. The analysis of pottery-making processes, encompassing ceramic paste preparation, temper selection, vessel shaping and decoration, firing, and use, reveals a system of social and cultural symbols embedded in rituals that facilitated the transmission of significant experiences and the continuity of traditions across generations.

Keywords: Neolithic pottery, hunter-fisher-gatherers, ceramic paste, Biržulis region, Dubičiai region.

Introduction

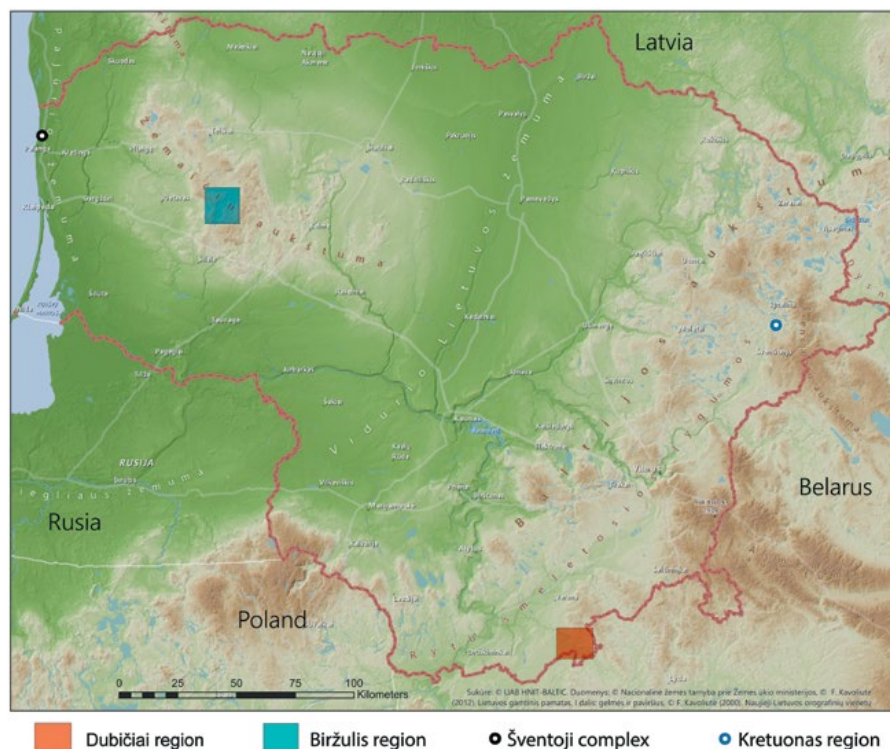
Pottery, emerging during the Late Stone Age in the East Baltic region, offers a profound reflection of the cultural traditions and symbolic practices of ancient societies. In addition to its functional purpose, pottery became a form of artistic expression for individual potters, who incorporated the dominant stylistic and symbolic elements of their communities into their work. As Professor Adomas Butrimas, the editor of the publication “Prehistoric Art in the Baltic Region,” aptly noted: “If we wish to understand levels of art and thought, we should analyse pottery decoration.”¹

This concept is exemplified by studies of Narva Culture pottery from the Daktariškė 5 settlement (Telšiai District, West Lithuania),² the Šventoji complex (Palanga City Municipality, West Lithuania),³ and the Kretuonas region (Švenčionys District, East Lithuania)⁴ [Fig. 1]. These studies have examined decoration, composition, and vessel shape to uncover their symbolic meanings. While previous research has primarily focused on the stylistic and decorative aspects of pottery, less attention has been given to the symbolic dimensions embedded within the entire pottery production sequence. The thoughts, beliefs, symbols, and rituals of the creators may have been expressed not only in design elements but also throughout the technological process itself.

The creation of pottery was inextricably linked with rituals that symbolised the synergy of the four principal natural elements: earth, water, air, and fire. The transformation of soil into a mouldable substance was enabled by the presence of water, while air facilitated the hardening of clay. Finally, fire played a pivotal role in completing this process, sealing the cycle and ensuring the permanence of the pottery, preventing it from returning to its original state as part of the earth.

Recently, the integration of advanced analytical techniques has provided valuable insights into the entire pottery-making process, enabling its reconstruction through data from ethnoarchaeology, experimental

- 1 Adomas Butrimas, “Human Figurines in Eastern–Baltic Prehistoric Art,” *Acta Academiae Artium Vilnensis* 20 (2000): 7.
- 2 Marius Iršėnas and Adomas Butrimas, “Daktariškės 5-osios gyvenvietės keramikos su organinės kilmės priemaišomis ornamentika,” *Lietuvos archeologija* 19 (2000): 125–138.
- 3 Rimutė Rimantienė, *Die Steinzeitfischer an der Ostseelagune in Litauen: Forschungen in Šventoji und Būtingė* (Vilnius: National Museum of Lithuania, 2005), 48–51.
- 4 Algirdas Girininkas, *Baltų kultūros ištakos* (Vilnius: Savastis, 1994).



1. Locations analysed in this study: the Dubičiai region (including the Dubičiai, Margiai, Barzdīs, Katra, Lynupis, and Šakės settlements), the Biržulis region (Daktariškė 1 and 5 settlements), as well as the Šventoji complex and the Kretuonas region, compiled by Eglė Šatavičė, 2024

Straipsnyje analizuojamos vietovės: Dubičių regionas (su Dubičių, Margių, Barzdžio, Katos, Lynupio ir Šakių gyvenvietėmis), Biržulio regionas (Daktariškės 1 ir 5 gyvenvietės), taip pat Šventosios kompleksas ir Kretuono regionas.

archaeology, and material science. These insights inspire a deeper exploration of potential meanings, rituals, and symbols embedded within the technological processes of Stone Age pottery production.

To achieve this, the most thoroughly investigated pottery assemblages from the Dubičiai region in Southeast Lithuania⁵ and the Biržulis

⁵ The results of the geochemical and mineralogical analysis, as well as the technological insights pertaining to Dubičiai region pottery, have been published in the following publications: Eglė Šatavičė et al. "Cord Ware and Contemporary Hunter-Gatherer Pottery from Southeast Lithuania: Technological Insights through Geochemical and Mineralogical Approaches," *Minerals* 12, no. 1006 (2022), <https://doi.org/10.3390/min12081006> and Eglė Šatavičė „Neolito bendruomenės ir jų keramika Pietryčių Lietuvoje“ (PhD diss., Vilnius University, 2023).

region in West Lithuania⁶ were selected, representing all characteristic cultural traditions of the Stone Age in present-day Lithuania. Material from previous studies was compared and supplemented with new data to evaluate pottery technologies across these traditions and uncover potential rituals and symbols embedded in the pottery production process. The objective of this study is to integrate data from the disciplines of material science, ethnoarchaeology, and experimental archaeology in order to provide a more comprehensive understanding of pottery as a medium of cultural and spiritual identity.

Materials and Cultural Background

Pottery fragments are among the most frequently discovered artefacts in Late Stone Age settlements. During the early Neolithic period, which began in the mid-6th millennium BC, two distinct cultural traditions emerged among hunter-fisher-gatherer communities in the territory of present-day Lithuania: the Nemunas and Narva Cultures.

The heritage of the Nemunas Culture is most prominently represented in the Dubičiai region [Fig. 1]. This region, located in the Varėna District, lies on a glaciolacustrine plain covered by fine sand and is the most thoroughly investigated area in Southeast Lithuania. Archaeological research has identified 80 multiperiod Late Stone Age sites within a 168 km² area along the shores of former lakes Dūba, Pelesa, Ūla, Katra, and Matarai⁷. These sites have yielded a diverse array of Neolithic pottery representing different cultural phases, including Early Nemunas Dubičiai-type pottery (6th–5th millennium BC), Classic Nemunas (4th–3rd millennium BC), Globular Amphora (transition from the 4th to the 3rd millennium BC), and Corded Ware (3rd millennium BC). Excavations led by Rimutė Rimantienė at multiperiod settlements such as Dubičiai, Margiai, Barzdis,

6 The results of the microstructural analysis and some technological insights pertaining to Biržulis region pottery, have been published in: Eglė Šatavičė et al. "Biržulio regiono keramika: technologijų analizė taikant mikrostruktūros tyrimus," in *Biržulis. Medžiotojai, žvejai ir senieji žemdirbiai X–II tūkst. pr. Kr. T. III: Keramika ir titnago dirbiniai*, ed. Adomas Butrimas et al. (Vilnius: Vilniaus dailės akademijos leidykla, 2024).

7 For more information on the landscape and location of Neolithic sites in the Dubičiai region, see: Eglė Marcinkevičiūtė, "A New Perspective on Neolithic Sites in the Dubičiai Microregion Using a GIS Spatial Analysis," *Archaeologia Lituana* 17 (2016): 58–61, <https://doi.org/10.15388/ArchLit.2016.17.10682>

Lynupis, and Šakės⁸ have yielded crucial insights into these cultural traditions, which are examined in this study.

In contrast, the Narva Culture extended across almost the entire territory of present-day Lithuania. However, its most significant archaeological complexes have been identified in two key regions: East Lithuania, particularly around Kretuonas Lake,⁹ and West Lithuania, including the coastal Šventoji sites¹⁰ and the Biržulis region [Fig. 1]. The latter was chosen for this study as it is the most intensively investigated area, preserving long-standing hunter-fisher-gatherer cultural traditions and clearly illustrating interactions with the first farmers.

Biržulis Lake, located in the Telšiai District within the Žemaičiai (Samogitia) Upland, has yielded evidence of approximately 50 settlements spread across an area of 115 km². Among them, the Daktariškė 1 and 5 settlements, excavated by Adomas Butrimas,¹¹ have yielded a rich assemblage of pottery spanning the entire Neolithic period from the 6th to the 2nd millennium BC. These finds are associated with the hunter-fisher-gatherer communities of various phases of the Narva Culture and also reflect traditions of the Globular Amphora and Corded Ware Cultures.¹²

In both areas, Neolithic settlements were located on the shores of large lakes, which would have naturally encouraged the exploitation of water resources. However, an analysis of the organic residue found in the pottery indicates a more intricate correlation between environmental accessibility and cultural traditions. The pottery from the Dubičiai region, which is associated with the Nemunas Culture, predominantly contained residues from non-ruminant terrestrial animals. In contrast, the pottery from the Narva Culture, particularly from the Biržulis region, demonstrates a strong

8 Rimutė Rimantienė, “Šakės – neolito gyvenvietė,” *Lietuvos archeologija* 8 (1992): 16–34; Rimutė Rimantienė, “Margių 1-oji gyvenvietė,” *Lietuvos archeologija* 16 (1999): 109–70; Rimutė Rimantienė, “Barzdžio miško gyvenvietė,” *Lietuvos archeologija* 16 (1999): 171–208.

9 Girininkas, *Baltų kultūros ištakos*; Džiugas Brazaitis, “Narviškos keramikos stiliai Rytų Lietuvoje,” *Lietuvos archeologija* 23 (2002): 51–72.

10 Rimantienė, *Die Steinzeitfischer*.

11 Adomas Butrimas, *Akmens amžius Žemaičių aukštumoje. Daktariškės neolito gyvenvietė: Katalogas* (Vilnius: LTSR istorijos ir etnografijos muziejus, 1982); Iršėnas and Butrimas, “Daktariškės 5-osios gyvenvietės keramikos.”

12 Adomas Butrimas, *Biržulis. Medžiotojai, žvejai ir senieji žemdirbiai X–II tūkst. pr. Kr. T. I: Paminklų tyrinėjimai* (Vilnius: Vilniaus dailės akademijos leidykla, 2019), 165–190.

reliance on freshwater resources, supplemented by fats and oils derived from terrestrial foods.¹³

At the beginning of the 3rd millennium BC, with the transition to the Late Neolithic period, these hunter-fisher-gatherer settlements were occupied by newly arrived communities associated with the Globular Amphora and Corded Ware Cultures. The incoming groups exhibited notable differences from the local populations in terms of ethnicity, social structure, genetic ancestry, and subsistence strategies, with a particular emphasis on animal husbandry. The introduction of new technologies led to changes in the shape of vessels and increased the diversity of food consumed.

Although the earliest evidence of milk was identified within Corded Ware beakers, no substantial evidence exists to suggest that dairy products played a significant role in the diet of the inhabitants. Analysis of food residues on pottery from Southeast Lithuania indicates that the Globular Amphora and Corded Ware Cultures obtained most of their protein from terrestrial animals, particularly ruminants. Meanwhile, in West Lithuania, the Corded Ware and the so-called Hybrid pottery, which combines traits of both the Narva and Corded Ware Cultures, indicate a continued reliance on water resources.¹⁴

The diversity of ceramic vessels and the foodstuffs prepared in them reflects the dynamic relationship between these communities' cultural identities, subsistence economies, and the ecological resources they accessed. This diversity offers valuable insight into the lifestyles of different communities, allowing for the identification of the symbols and rituals that may have been of particular significance to them.

Technological and Cultural Choices

The creation of ceramic vessels is a complex process involving the manipulation of raw materials and tools within the framework of local cultural perceptions of appropriate working practices. The technological choice chain encompasses the initial selection of raw materials, the preparation of the ceramic paste according to a specific recipe, the shaping and decoration

13 Blandine Courel et al., "Organic Residue Analysis Shows Sub-Regional Patterns in the Use of Pottery by Northern European Hunter-gatherers," *Royal Society Open Science* 7, no. 4 (2020), <https://doi.org/10.1098/rsos.192016>

14 Harry K. Robson et al., "Diet, Cuisine and Consumption Practices of the First Farmers in the Southeastern Baltic," *Archaeological and Anthropological Science* 11 (2019): 4011–4024, <https://doi.org/10.1007/s12520-019-00804-9>

of the vessel, the firing process, and, finally, the preparation and use of the completed product with its distinctive properties.¹⁵ Each phase requires the application of specific skills and the acquisition of specialised knowledge, shaped by the cultural contexts in which they are embedded.

Furthermore, this process can be conceptualised as a sequence of cultural or individual choices concerning raw materials, tools, energy sources, and techniques. These elements are deeply embedded within, and potentially dependent on, broader cultural values and ideological concepts. Every technological activity represents a balance between practical possibilities and cultural criteria. Consequently, drawing a clear boundary between the functional and symbolic aspects of technology is challenging, as this distinction may reflect our own cultural biases.¹⁶

Ethnographic studies of African communities have identified symbolic meanings that metaphorically link pots and pottery techniques to transitional states, fertility, human gestation, and death. In this metaphorical representation, a pot (or foetus) is seen as the product of the union between clay (female) and water (male) elements, which is hardened in a fire (uterus) and brought to life by the potter (acting as a midwife).¹⁷ Although these analogies may appear geographically and temporally distant, similar allegories comparing human life to pottery can also be found in ancient Lithuanian riddles.¹⁸

Vessels, whether created for specific purposes or everyday use, frequently served as receptacles for the spirits of the deceased. A similar concept is evident in the use of graves as pots in various forms. For instance, there are records of burials in jars or graves shaped like large vessels.¹⁹ In Lithuania, as in the wider Eastern Baltic region, pottery also took on a symbolic role as a

- 15 Olivier P. Gosselain, "Social and Technical Identity in a Clay Crystal Ball," in *The Archaeology of Social Boundaries*, ed. Miriam T. Stark (Washington: Smithsonian Institution Press, 1998), 78–100.
- 16 Bill Sillar and Michael Tite, "The Challenge of 'Technological Choices' for Materials Science Approaches in Archaeology," *Archaeometry* 42, no. 1 (2000): 5–9, <https://doi.org/10.1111/j.1475-4754.2000.tb00863.x>
- 17 Olivier P. Gosselain, "Technology," in *Oxford Handbook of the Archaeology of Ritual and Religion*, ed. Timothy Insoll (Oxford: Oxford University Press, 2011), 247.
- 18 Aelita Kensminienė, "Lietuvių mįslės apie puodą – žmogaus gyvenimo alegorijos," *Tautosakos darbai* 61 (June 2021): 173–194, <https://doi.org/10.51554/TD.21.61.08>
- 19 Olivier P. Gosselain, "In Pots We Trust: the Processing of Clay and Symbols in Sub-Saharan Africa," *Journal of Material Culture* 4, no. 2 (1999): 214, <https://doi.org/10.1177/135918359900400205>

grave at certain times. Urns containing the cremated remains of individuals were common in Early Metal Period (1st millennium BC) cemeteries.²⁰

Clay Raw Materials: Human–Environment–Culture

From a techno-functional perspective, potters selected clay based on its availability and physical properties, such as plasticity, impurities, shrinkage during drying, and the hardness of the final ceramic product²¹. Ethnographic studies suggest that the selection of clay sources was based on considerations of time, distance, and energy efficiency. Potters generally obtained clay from fields within an hour's walking radius of their workplace, typically 3–5 km away.²² However, in mobile or semi-sedentary societies, these distances could vary, with temporary settlements occasionally being situated in close proximity to resources.

Beyond functional considerations, the selection of ceramic raw materials often carried symbolic significance. For example, clay might be obtained from sacred locations, such as forests, lakes, or other sites associated with cultural or spiritual meaning. Access to these sacred sites occasionally required the performance of rituals or the offering of sacrifices,²³ reinforcing the notion that the material itself held symbolic and cultural value.

Both studied regions, like the entire contemporary territory of Lithuania, are characterised by Quaternary glacial sediments.²⁴ The base layer of the Dubičiai region (Southeast Lithuania) was formed during the Saalian (Medininkai) glacial period and was later overprinted by the last Weichselian (Nemunas) glaciation. The entire region is covered by sandy-gravelly layers deposited by glacial meltwater,²⁵ while clay deposits

20 Algimantas Merkevičius, *Ankstyvojo metalų laikotarpio laidojimo paminklai Lietuvoje* (Vilnius: Vilniaus universiteto leidykla, 2014).

21 Prudence M. Rice, *Pottery Analysis* (Chicago and London: The University of Chicago Press, 1987), 54.

22 Dean E. Arnold, *Ceramic Theory and Cultural Process* (Cambridge: Cambridge University Press, 1985), 34.

23 Dean E. Arnold, "Does the Standardization of Ceramic Pastes Really Mean Specialization?" *Journal of Archaeological Method and Theory* 7, no. 4 (2000): 344–345.

24 Rimantė Guobytė, "Quaternary Geological Map of Lithuania, Scale 1: 200 000" (Lithuanian Geological Survey, 2019), accessed on October 10, 2024, <https://www.lgt.lt/epaslaugos/elpaslauga.xhtml>

25 Miglė Stančikaitė et al., "Environment and Man around Lakes Dūba and Pelesa, SE Lithuania, during the Late Glacial and Holocene," *Geological Quarterly* 46 (2002): 391–409.

lie buried beneath thick glaciolacustrine, glaciofluvial, and aeolian sand layers. Clayey till and silt layers appear on the surface only in a few locations, primarily near rivers or former lakes.

Conversely, the base layer of the Biržulis region (West Lithuania) was formed during the final Weichselian glaciation. As the glacier retreated from the central Samogitian Highlands, meltwater flows transported and re-deposited fluvioglacial sands, silts, and clay sediments.²⁶ The prevalence of till and silt layers on the surface in this region suggests the potential for local accessibility to ceramic raw materials.

Despite these environmental differences, potsherds from the Dubičiai region²⁷ and the Biržulis region²⁸ show remarkably similar microstructures and textures in the non-calcareous silty clays used. While raw materials were likely locally accessible in both regions, the mixed Quaternary sediments deposited by different glaciation processes complicate provenance studies. The silty clay, characterised by layering, organic inclusions, fine particles, and rounded sand grains, indicates that the material was sourced from shallow water environments, such as lake and river shores.²⁹ This naturally occurring silty clay was probably used without additional tempering agents in the earliest pottery-making traditions. However, its characteristics are evident in pottery from various Stone Age cultural traditions in both regions.³⁰ Shallow water environments were likely among the preferred sources for harvesting clay over a long period, despite variations in the tempering agents used.

Harvested clay often required treatment to make it suitable for pottery production. Ethnographic records describe various techniques for improving clay workability, such as crushing, sieving, levigation (washing to remove impurities), souring, and the addition of organic acids or bacteria to increase plasticity. Conversely, non-plastic materials, or temper, were added to control shrinkage, firing properties, and vessel durability.³¹ This particular

26 Rimantė Guobytė, "Žemaičių aukštumos šiaurinės dalies paviršiaus geologija ir geomorfologija," *Acta Academiae Artium Vilnensis* 34 (2004): 11.

27 Šatavičė et al. "Cord Ware and Contemporary Hunter-Gatherer Pottery."

28 Šatavičė et al. "Biržulio regiono keramika."

29 Alexander A. Bobrinsky and Irina N. Vasilyeva, "Plastic Raw Materials in Neolithic Pottery Production," *Documenta Praehistorica* 39 (2012): 67–74.

30 Šatavičė et al. "Biržulio regiono keramika," 219, 225, fig. 2, 8; Šatavičė et al. "Cord Ware and Contemporary Hunter-Gatherer Pottery," fig. 2d, g–l.

31 Owen S. Rye, *Pottery Technology. Principles and Reconstructions* (Washington: Taraxacum, 1981), 31.

knowledge of how to make a good pot was passed down through generations through symbols and specific rituals, even if the original meanings of these practices had been forgotten.

The evolution of ceramics illustrates how ancient traditions persist, influencing new practices while maintaining symbolic elements associated with raw materials. Ethnographic evidence indicates that when potters relocated to regions lacking familiar materials, they sought to replicate the texture and properties of their customary pottery. By removing undesirable impurities and adding organic or mineral materials, they symbolically reasserted continuity with their past, ensuring that new vessels retained traditional aesthetic and functional characteristics.³²

Ceramic paste recipes passed down through generations within specific social groups reflected symbolic and cultural systems. Communities with strong social cohesion often displayed cognitive biases and inherited traditions in their technological choices. These choices reinforced long-standing social boundaries³³, evident in the Neolithic hunter-fisher-gatherer pottery of Southeast and West Lithuania, where symbols of cultural and social identity are encoded in the vessels themselves.

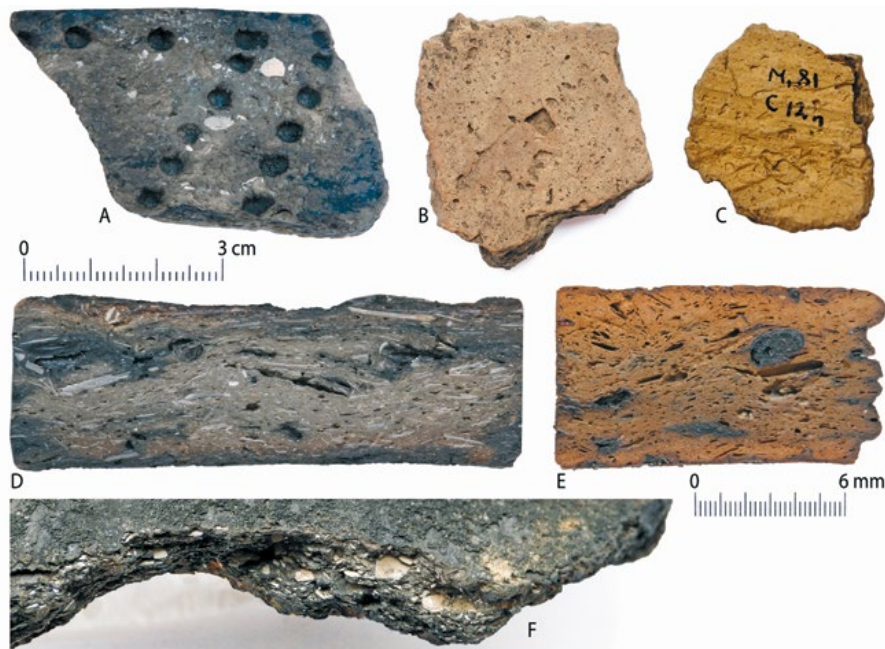
The symbolic resonance of clay and its preparation illustrates how material culture served not only functional needs but also as a medium for expressing identity, continuity, and connection to the environment and cultural heritage.

Ceramic Paste Recipes: Technological Adaptations and Symbolic Implications

The formation of ceramic traditions, shaped by cultural practices, can be traced back to the late 6th millennium BC. In East and West Lithuania, the Narva Culture has been established, characterised by the production of shell-tempered pottery. The well-preserved pottery from the Daktariškė 5 settlement in the Biržulis region exhibits large pieces of crushed shell that resemble pearlescent incrustations [Fig. 2A, D, F]. However, the pottery from the nearby sandy Daktariškė 1 settlement, due to harsh preservation

32 Bobrinsky and Vasilyeva, "Plastic Raw Materials," 73.

33 Valentine Roux et al., "Persisting Technological Boundaries: Social Interactions, Cognitive Correlation and Polarization," *Journal of Anthropological Archaeology* 48 (2017): 320–335, <https://doi.org/10.1016/j.jaa.2017.09.004>



2. Shell-tempered pottery. External surface of potsherds with inclusions or evidence of decayed shell fragments, from settlements: A – Daktariškė 5; B – Daktariškė 1; C – Margiai 1. Cross-sections: D – Daktariškė 5; E – Daktariškė 1. F – break of a Hybrid-type potsherd from the Daktariškė 5 settlement showing about 40% of the shell temper, photos by Eglė Šatavičė, 2024

Kriauklėmis liesinta keramika. Šukių išoriniai paviršiai su kriauklių tarpais ar jiems išnykus likusiomis duobutėmis, iš gyvenviečių: A – Daktariškės 5; B – Daktariškės 1; C – Margių 1. Šukių pjūviai iš: D – Daktariškės 5; E – Daktariškės 1. F – Daktariškės 5 gyvenvietės hibridinės keramikos šukės lūžis su matomu maždaug 40 % kriauklių liesiklio kiekiu.

conditions, has only flat pits on the surface and long, narrow, rectangular voids [Fig. 2B, E]. An analysis of the shape of these voids, left by decayed shell fragments, suggests that communities producing shell-tempered pottery similar to the Narva tradition also inhabited Southeast Lithuania, as seen at sites such as Margiai 1, [Fig. 2C] Barzdis, and Dubičiai.³⁴

Shell temper. The functional advantages of crushed shell temper are similar to those of other coarse organic tempers. The use of dry, coarse fragments enabled the construction of larger vessels with thin walls, making them lighter in weight. Reduced permeability increased cooking

34 Eglė Šatavičė, "Neolithic Societies and their Pottery in Southeastern Lithuania," *Lietuvos archeologija* 46 (2020): 121, <https://doi.org/10.33918/25386514-046004>

efficiency, while enhanced thermal shock resistance was another notable benefit.³⁵ While the use of crushed shell temper appears to be a relatively straightforward process, experimental evidence has revealed several potential drawbacks associated with this technique. The addition of shell to the clay reduces its plasticity, making it challenging to work when the shell content exceeds 20%. Furthermore, the firing process may pose certain risks related to the potential breakage of the pottery. During the firing of pottery between 650 and 750°C, the formation of calcium oxide from calcium carbonate-containing shell fragments results in the absorption of moisture after cooling, leading to an expansion in size and the subsequent spalling of the pottery. However, pre-fired shells have a tendency to crumble easily and remain unchanged in size, ensuring the optimal properties of the temper.³⁶

The analysis of shell-tempered pottery from the Daktariškė 5 settlement reveals the persistence of traditions from the early Narva Culture in the 6th millennium BC until the end of the Hybrid pottery period in the 2nd millennium BC, spanning several millennia. Cross-sections of the potsherds show layered shell fragments, indicating previous burning [Fig. 1D, F]. The role of fire in preparing shell temper was crucial, but the exact processes – potentially involving specialised fireplaces or rituals – remain speculative. It is intriguing how this knowledge about the connection between shell and fire was gathered and transferred worldwide, but only among distinct groups.

In addition to crushed shells, burnt bone fragments, fish scales and voids – probably caused by the decomposition of very small faunal remains – were identified in the cross-section of early Narva pottery from Daktariškė 5.³⁷ These animal and plant fragments may have entered the ceramic paste together with burnt shells from the fireplace. However, the layered texture of the silty clay suggests that these particles may have been naturally present in the raw clay material, probably collected from shallow water environments.

35 Robert F. Boszhardt, "Shell-tempered Pottery from the Upper Mississippi River Valley," *Southeastern Archaeology* 27, no. 2 (2008): 193–201, <http://www.jstor.org/stable/40713450>

36 Gordon Bronitsky and Robert Hamer, "Experiments in Ceramic Technology. The Effects of Various Tempering Materials on Impact and Thermal-Shock Resistance," *American Antiquity* 51, no. 1 (1986): 89–101, <https://doi.org/10.2307/280396>

37 Šatavičė et al., "Biržulio regiono keramika," 220, fig. 3.

Experimental archaeology has shown that using more than 20% shell temper dramatically reduces the plasticity of the ceramic paste, causing it to crumble.³⁸ Optical microscopy of the Daktariškė 5 pottery revealed that some vessels contained nearly 40% shell temper [Fig. 1F]. While early Narva pottery often contained not only shells but also voids likely left by accidentally incorporated organic materials, the thin-walled, compact Hybrid pottery predominantly features only large shell fragments. This phenomenon may represent a distinct expression of ancient Narva traditions and symbols in response to the foreign Corded Ware culture, as evidenced by the use of shell temper in the ceramic paste, along with specific decorative motifs and vessel shapes.

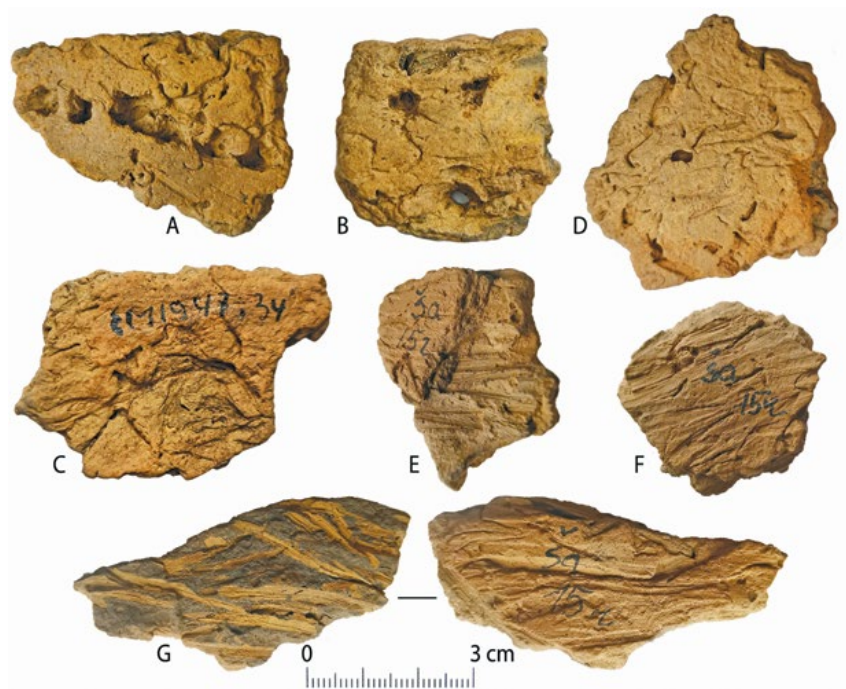
The oldest known evidence of shell-tempered pottery dates back to the 11th millennium BC in China,³⁹ and the tradition persisted in various parts of the world, including the Upper Mississippi River Valley in the USA until 1700 AD.⁴⁰ The long-lasting global tradition of shell-tempered pottery is strongly correlated with subsistence strategies based on fishing and hunting. The prevalence of water sources and the location of settlements along lake shores, with the potential for waterways to facilitate transport and trade, suggest that these communities were heavily reliant on their aquatic environment. This shared relationship with water constituted a pivotal element that shaped their technological practices, cultural knowledge and symbols.

While the long-lasting Narva pottery traditions in West Lithuania represent tightly knit, socially bounded communities, Southeast Lithuania shows a diversity of pottery technological choices, reflecting its social and cultural dynamics. In the early Nemunas Culture, a type of pottery known as Dubičiai-type (named after the excavation sites) incorporated coarse plant fragments into the ceramic paste. The potsherds display large, irregular voids visible in cross-sections, along with surface imprints resembling long leaves [Fig. 3].

38 Boszhardt, "Shell-tempered Pottery," 197.

39 Pauline Sebillaud, Pauline A. Duval and Xiaoxi Liu, "Shell-tempered Pottery: Opportunism OR/AND Technical Choice? On the Use of a Common Resource by Northeast China Hunter-gatherers," *Journal of Archaeological Science: Reports* 51 (2023): 1–16, <https://doi.org/10.1016/j.jasrep.2023.104161>

40 Boszhardt, "Shell-tempered Pottery," 196.



3. Coarse plant fragments in Nemunas Culture pottery from settlements: A–C – Dubičiai 3; D – Dubičiai 2; E–G – Šakės, photos by Eglė Šatavičė, 2022

Stambūs augalų fragmentai Nemuno kultūros keramikoje iš gyvenviečių: A–C – Dubičių 3; D – Dubičių 2; E–G – Šakių

Coarse plant temper. The analysis of pottery from the Dubičiai 2 and 3 settlements indicates that water plants, such as filamentous algae,⁴¹ may have been used as a tempering agent. In contrast, pottery from the Šakės settlement appears to incorporate coarse dry plant matter, with some imprints resembling leaves of the common reed (*Phragmites*) or other grasses from the Poaceae family. These two types of plant temper served distinct technical purposes. Filamentous algae enhanced the plasticity of the clay, improving its workability in its wet state. Conversely, coarse fragments of *Phragmites* aided in drying and strengthening the ceramic paste. The use of plant temper, along with crushed shell inclusions, appears to have superseded earlier materials like lacustrine silt, reflecting the practices of societies that exploited water resources.⁴²

41 Such water plants, indicated by similar voids, have been noted in Neolithic pottery, as discussed in Bobrinsky and Vasilyeva, “Plastic Raw Materials,” 68.

42 Bobrinsky and Vasilyeva, “Plastic Raw Materials,” 73.

However, the use of plant temper was not a phenomenon unique to hunter-gatherer communities. Early agrarian societies also employed similar techniques. For instance, the Linear Pottery Culture in Southern Poland used silty clay mixed with plant temper, although they opted for domestic cereals such as wheat (*Triticum*) and barley (*Hordeum vulgare*), particularly their chaff⁴³. The choice of plant temper reflects the subsistence economy of these communities, which integrated agricultural by-products into ceramic production.

Ethnographic studies provide further insights into the interplay between pottery production and agricultural cycles. There is evidence that pottery was often produced and fired after the harvest, during the dry season, when communities were more sedentary.⁴⁴ Ian Hodder's analysis of early agrarian societies in South and Central Europe highlights the symbolic links between pottery making and domestic life. He associates the activity with women, the home, and the oven area – key symbols of *domus* (Latin for 'home') – in contrast to *agrios* (Greek for 'wild' or 'savage'). Hodder proposes that the Neolithic period represented a cultural transition from the *agrios* to the *domus*, reflecting the phenomenon of 'agri-culturation', or the 'culturing of the *agrios*' – the domestication of the wild, both socially and culturally.⁴⁵

In the context of the Neolithic East Baltic region, the characteristics of the *agrios* way of life, including mobility, adaptability, and a reliance on wild resources, remained prominent features. Nevertheless, the emergence of pottery indicated a gradual transition towards a *domus* lifestyle. While agrarian societies may have attributed symbolic meanings to pottery tempered with domestic plants, it is unlikely that early hunter-fisher-gatherer societies did so with their ceramic practices. Instead, their choice of raw materials likely reflected practical adaptations to their environment, with any symbolic meanings remaining closely tied to the wild resources they relied upon.

Fine plant temper represents another type of organic material that produces very fine pores and a distinctive black core in the cross-section of potsherds. Neolithic pottery containing this fine organic temper is typically

43 Magdalena Moskal-del Hoyo et al., "Plant Materials Used as Temper in the Oldest Neolithic Pottery from South-eastern Poland," *Vegetation History and Archaeobotany* 26 (2017): 329–344, <https://doi.org/10.1007/s00334-016-0595-6>

44 Arnold, *Ceramic Theory and Cultural Process*, 79–108.

45 Ian Hodder, *The Domestication of Europe* (Oxford: Blackwell, 1990), 65.

associated with the Narva Culture but has been discovered at various sites across Lithuania.

The earliest pottery in Southeast Lithuania is often characterised by a ceramic paste with small, irregular voids, resembling the composition of silt from shallow water sources such as rivers and lakes⁴⁶. This silt typically contains decomposed plant particles, bird manure, feathers, occasional shell fragments, and fish scales.⁴⁷ Such a composition suggests that a naturally occurring, glutinous mass may have been used in early ceramic production.

Furthermore, even the cross-sections of later Nemunas Culture ceramics, which contain coarse-ground granite, sometimes exhibit a structure similar to clay from shallow water, with voids characteristic of decomposed floral or animal particles.⁴⁸ However, it remains challenging to identify the type of organic material and ascertain whether these inclusions occurred in the ceramic paste inadvertently or were intended as deliberate temper.

At the Daktariškė 1 and 5 settlements, fine plant-tempered pottery was discovered, which, based on the vessel profiles and decorations, can be dated to the Narva Culture period following the use of shell-tempered pottery. It has distinctive features – cross-sections show small, rounded pores, while surfaces display narrow incisions resembling bristle or decayed plant fibre imprints [Fig. 4]. Some of the pores in the pottery from Daktariškė 5 contained burnt organic material. Infrared spectroscopy identified needle-shaped plant fibres that closely resemble nettle species⁴⁹. The size and shape of the plant remains suggest that they may have taken this form after consumption by herbivores.

The use of herbivore dung as temper or fuel in pottery production has been documented in ethnographic studies worldwide.⁵⁰ Experimental archaeology has confirmed the beneficial properties of this material for pottery production.⁵¹ Organic-tempered pottery was particularly advantageous

46 Štavičė, “Neolito bendruomenė ir jų keramika,” 100, 174, fig. 33, 76.

47 Bobrinsky and Vasilyeva, “Plastic Raw Materials,” 70.

48 Štavičė et al., “Corded Ware and Contemporary Hunter-Gatherer Pottery,” fig. 17.

49 Štavičė et al., “Biržulio regiono keramika,” 233, fig. 14.

50 Arnold, *Ceramic Theory and Cultural Process*, 30; Alexandre Livingstone Smith, “Processing Clay for Pottery in Northern Cameroon: Social and Technical Requirements,” *Archaeometry* 42, no. 1 (2000): 21–42, <https://doi.org/10.1111/j.1475-4754.2000.tb00864.x>; Rye, *Pottery Technology*, 31.

51 Silvia Amicone, Lionello Morandi and Shira Gur-Arieh, “‘Seeing Shit’: Assessing the Visibility of Dung Tempering in Ancient Pottery Using an Experimental Approach,” *Envi-*

for mobile communities due to its light weight, portability and high impact resistance – qualities ideal for transport. In contrast, sedentary communities often adapted their pottery to seasonal needs and preferred materials with different properties.⁵²

Dung-tempered ceramic paste offers several advantages, as demonstrated by experimental archaeology. It produces lightweight, durable and thermally conductive pottery while reducing permeability. The addition of dung increases the clay's plasticity during moulding and improves its resistance to thermal shock. Ceramist Dainius Strazdas reconstructed pottery from the Narva culture using ceramic paste containing up to 80% horse dung. The high proportion permitted firing without a drying stage, thereby ensuring high thermal shock resistance due to an equal loss on ignition. The resulting pottery was found to be lightweight, robust, heat-conductive and exhibited a potsherd break closely resembling that of Narva-type pottery.⁵³

The use of cattle dung as a temper in pottery dates back to the earliest agrarian communities in the Mediterranean.⁵⁴ Similarly, horse dung was used by Bronze Age pastoralists⁵⁵ for pottery production. Beyond its practical applications, the incorporation of domesticated plant material or animal dung may have held symbolic significance, potentially representing fertility.

In the East Baltic region, Neolithic hunter-gatherer societies maintained deep-rooted beliefs and rituals associated with wild herbivores such as deer and elk.⁵⁶ Experimental results using elk dung as a temper were promising, demonstrating improved plasticity and firing properties

ronmental Archaeology 26, no. 4 (2020): 423–438, <https://doi.org/10.1080/14614103.2020.1852758>; Andreja Kudelić, "Preparation and Composition of Clay Paste in Bronze Age Pottery from North-Western Croatia: The Role of Experiments," *The Old Potter's Almanack* 22, no. 1 (2017): 2–14, <https://doi.org/10.11588/opa.2017.1.43844>; Sigita Mikšaitė, "Production of Ceramics of Narva Culture (Reconstructions based on Experimental Archaeology)," *Estonian Journal of Archaeology* 9, no. 1 (2005): 60–72, <https://doi.org/10.3176/arch.2005.1.03>

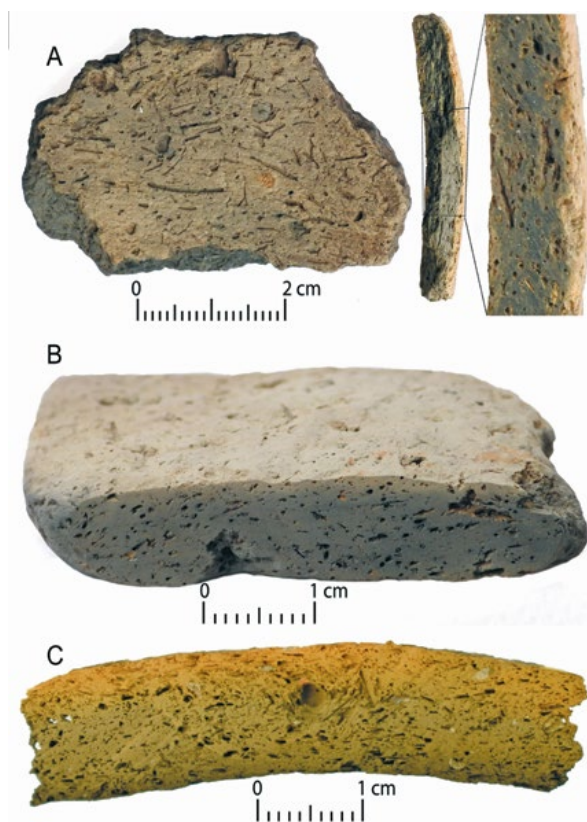
52 James M. Skibo and Michael Brian Schiffer, "Organic-Tempered Pottery: An Experimental Study," *American Antiquity* 54, no. 1 (1989): 123–124.

53 Mikšaitė, "Production of Ceramics of Narva Culture," 64, fig. 2.

54 Amicone et al., "Seeing Shit"; Tanya Dzhanfezova, "'Organic Temper' and the Early Neolithic Pottery Production: Interpretational Challenges," *Acta Archaeologica* 91, no. 2 (2020): 61–87, <https://doi.org/10.1111/j.1600-0390.2020.12228.x>

55 Kudelić, "Preparation and Composition of Clay Paste."

56 Marius Iršėnas, "Elk Figurines in the Stone Age Art of the Baltic Area," *Acta Academiae Artium Vilnensis* 20 (2000): 99.



4. Pottery with fine plant temper: A – potsherd from the Daktariškė 1 settlement, its break and cross-section; B – cross-section of a potsherd from the Daktariškė 5 settlement; C – cross-section of an experimental potsherd with elk dung temper, photos by Eglė Šatavičė, 2024

Keramika su smulkiomis augalinėmis priemaišomis: A – Daktariškės 1 gyvenvietės šukė, jos lūžis ir pjūvis; B – Daktariškės 5 gyvenvietės šukės pjūvis; C – eksperimentinė šukė su briedžio mėšlo priemaišomis

[Fig. 4C]. However, there is a lack of symbolic and cultural context for the idea that hunter-gatherers could have collected dung from wild herbivores.

Archaeological discoveries in the Biržulis region, including red elk (*Alces alces*) and deer (*Cervus elaphus*) teeth found in Mesolithic–Neolithic graves, highlight the significance of these animals in local belief systems. A. Butrimas, who studied these graves, observed that while the Biržulis society primarily depended on freshwater resources, their symbolic practices reflected a hunter’s worldview. Teeth pendants, for instance, were believed to transfer the qualities of wild animals to their wearers. This intimate connection between humans and animals in everyday life likely contributed to the selection of certain animals as totems.⁵⁷

57 Adomas Butrimas, *Donkalnio ir Spigino mezolito-neolito kapinytai: seniausi laidojimo paminklai Lietuvoje* (Vilnius: Vilniaus dailės akademijos leidykla, 2012), 113.

The symbolic domestication of wild animals is a ritual practice observed in both hunter-gatherer and agrarian societies. A notable example is a ritual dagger crafted from the leg bone of a red deer or elk, unearthed at an agrarian Funnel Beaker Culture settlement in Poland and dated to the 4th millennium BC. This discovery was accompanied by pottery fragments containing burnt cervid bones, indicating the presence of ritualistic practices.⁵⁸

Seasonal patterns in pottery production may also connect hunter-gatherer and agrarian groups. Ethnographic material shows that, in agrarian societies, pottery-making often took place after the harvest, when communities had returned to their settlements.⁵⁹ A similar pattern may have been followed by hunter-gatherers after successful hunts. Pottery with fine organic material frequently exhibits high phosphorus levels, possibly related to the addition of animal matter during its production. Charles A. Bollong and colleagues documented Bushman potters anointing unfired vessels with fat and later boiling springbok blood in them after firing, followed by meat and marrow bones.⁶⁰ Building on these findings, experiments were conducted to assess the impact of adding animal matter to lean silty clay. In the present study, roe deer blood and wild boar fat were examined as potential additives to the ceramic paste. However, these substances were found to have no substantial impact on the workability or plasticity of the paste. By contrast, the use of fresh roe deer stomach content yielded notable results. The acids and glutinous mass from the stomach contents transformed the clay's properties within hours, significantly enhancing its workability.

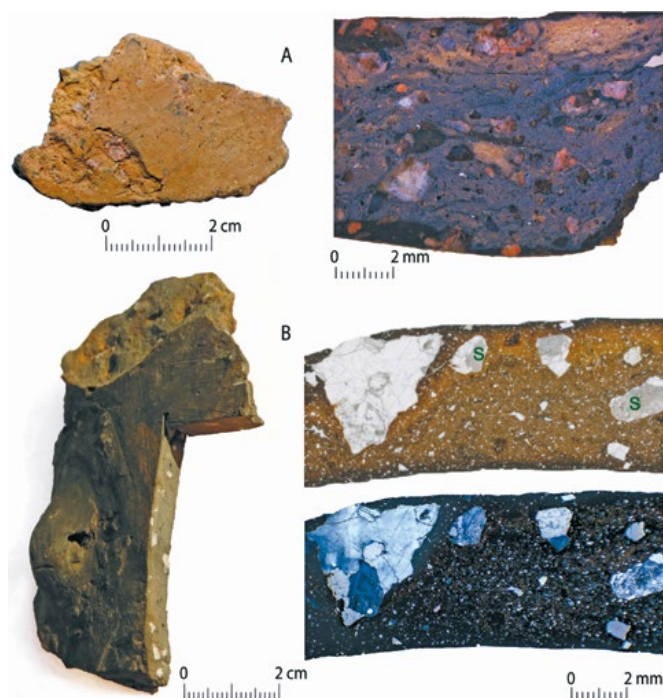
It is noteworthy that the morphology of the organic matter in this ceramic paste exhibited a resemblance to that observed in the plant-tempered Narva pottery. The incorporation of wild herbivore stomach content by hunter-gatherer societies may have served both practical and symbolic purposes, aligning with their cultural practices and beliefs.

Rock temper in the ceramic paste of Southeast Lithuania began to be used over a thousand years earlier than in West Lithuania, reflecting

58 Kamil Adamczak et al., "New evidence for deer valorisation by the TRB farmers from Poland using ZooMS and micro-CT scanning," *Journal of Archaeological Science: Reports* 40 (2021): 103230, <https://doi.org/10.1016/j.jasrep.2021.103230>

59 Arnold, *Ceramic Theory and Cultural Process*, 80–108.

60 Charles A. Bollong et al., "Direct Dating and Identity of Fibre Temper in Pre-Contact Bushman (Basarwa) Pottery," *Journal of Archaeological Science* 20, no. 1 (1993): 52–53.



5. Pottery with granitic rock fragments: A – a potsherd from the Nemunas Culture, with a cross-section showing red K-feldspar, from the Margiai 1 settlement; B – a Globular Amphora Culture lugged pot belly, with a thin section under plane-polarised light and crossed polars, primarily showing white minerals of quartz and sericitised plagioclase (marked as green S), from the Daktariškė 5 settlement, photos by Eglė Šatavičė, 2024

Keramika su granito trupiniais: A – Nemuno kultūros šukė ir jos pjūvis su matomais raudonais kalio feldšpatais, iš Margių 1 gyvenvietės; B – Rutulinių amforų kultūros puodo su ašelėmis pilvelis iš Daktariškės 5 gyvenvietės ir jo šlifas nesukryžiuotų ir sukryžiuotų nikolių šviesoje, rodantis vyraujančius baltus kvarco bei sericitizuoto plagioklazo (pažymėtus žalio mis S) mineralus.

variations in cultural practices and influences. In Southeast Lithuania, the hunter-gatherers of the Nemunas Culture began using ground granite temper in their pottery as early as the beginning of the 4th millennium BC. In contrast, communities associated with the Narva Culture continued to use organic temper during this period, despite some influence from Comb Ware (limited to Northeast Lithuania and coastal sites) and Globular Amphora Cultures. It was not until the 3rd millennium BC that small quantities of

Globular Amphora Culture pottery with ground granite temper appeared at sites previously (and later) occupied by the Narva Culture.

The ceramic paste used by the Nemunas Culture was uniformly mixed and contained moderately sized ground granite particles. This granite consisted mainly of quartz and feldspar, with occasional inclusions of mica and amphibole [Fig. 5A]. Early hypotheses suggested that the granite was crushed by heating it to high temperatures in a fire, followed by sudden immersion in cold water to induce fracturing under mechanical pressure.⁶¹ However, recent analyses of thin sections of pottery from the Nemunas and Globular Amphora Cultures have revealed the presence of feldspars with sericite alteration – a characteristic feature of naturally weathered granite [Fig. 5B].⁶² These findings suggest that a specific type of granite known as Rapakivi (Finnish for ‘eroded rock’) was used. This granite easily crumbles with minimal mechanical effort, suggesting that early potters possessed good knowledge of the characteristics of locally available materials.

The adoption of granite temper may have had symbolic as well as practical significance. It is suggested that the mineral inclusions in the ceramic paste symbolically replicated the textures and structures of mountain silt or till. This practice may reflect the cultural memory or traditions of potters from mountainous regions. Settled in flat landscapes that lacked clay naturally enriched with mineral tempers, these communities may have sought to recreate the ceramic textures they were familiar with by adding sand or gravel-sized rock fragments to the clay.⁶³

In addition to functional advantages, such as improved thermal resistance and the ability of vessels to withstand temperature fluctuations, mineral inclusions most likely held symbolic significance. The potters of the Nemunas Culture carefully selected specific minerals, often choosing red or pink stones, such as potassium feldspar. It is possible that these minerals carried symbolic meaning in addition to their functional benefits. Dark mafic minerals and shiny micas were also deemed acceptable, while white rocks seem to have been avoided. This may indicate taboos or practical knowledge

61 Šatavičė, “Neolithic Societies and their Pottery,” 123.

62 Šatavičė et al., “Cord Ware and Contemporary Hunter-Gatherer Pottery,” fig. 12; Šatavičė et al., “Biržulio regiono keramika,” 225, fig. 8.

63 Yuri Boris Tsetlin, “The Origin of Ancient Pottery Production,” *Journal of Historical Archaeology & Anthropological Sciences* 3, no. 2 (2018): 196.

about minerals that posed a risk to pottery, such as calcite, which can cause explosions during firing. These insights were likely passed down through generations, reflecting a sophisticated understanding of material properties within the community.

While organic tempering techniques originated in early agrarian communities of Southern Europe, the use of ground granite as a temper is associated with the first Nordic agrarian Funnel Beaker and Globular Amphora Cultures. The adoption of ground granite temper by Nemunas Culture potters may reflect cultural exchanges with these societies, despite the continued practice of a hunter-gatherer lifestyle.

In the context of the Neolithic period, the temper of ceramic paste served as a symbol of cultural identity. For the Nemunas Culture, the combination of practical and symbolic considerations in pottery production underscores a selective approach to adopting innovations from agrarian communities. This subsistence strategy reflects a nuanced balance between maintaining traditional lifeways and incorporating external influences.

By contrast, the Narva Culture in West Lithuania followed a different course. The pottery [Fig. 5B] and amber discs from the Daktariškė 5 settlement provide clear evidence of Globular Amphora Culture influence in the Biržulis region.⁶⁴ Nevertheless, the potters of the Late Narva Culture, throughout the 3rd millennium BC in this settlement, persisted in their use of organic temper. This divergence suggests different approaches to interaction with agrarian communities.

The contrasting strategies of the Nemunas and Narva Cultures demonstrate the complexities of coexistence and cultural exchange during the Neolithic period. While the Nemunas Culture engaged in selective innovation adoption, the Narva Culture adhered more closely to traditional practices. These dynamics illustrate how new symbols and rituals can cross social boundaries, contingent on the willingness of one group to share and another to accept such knowledge.

Grog temper refers to fragments of crushed, previously fired pottery that potters incorporate into new ceramic vessels. These fragments typically come from older vessels made with grog-tempered ceramic paste as

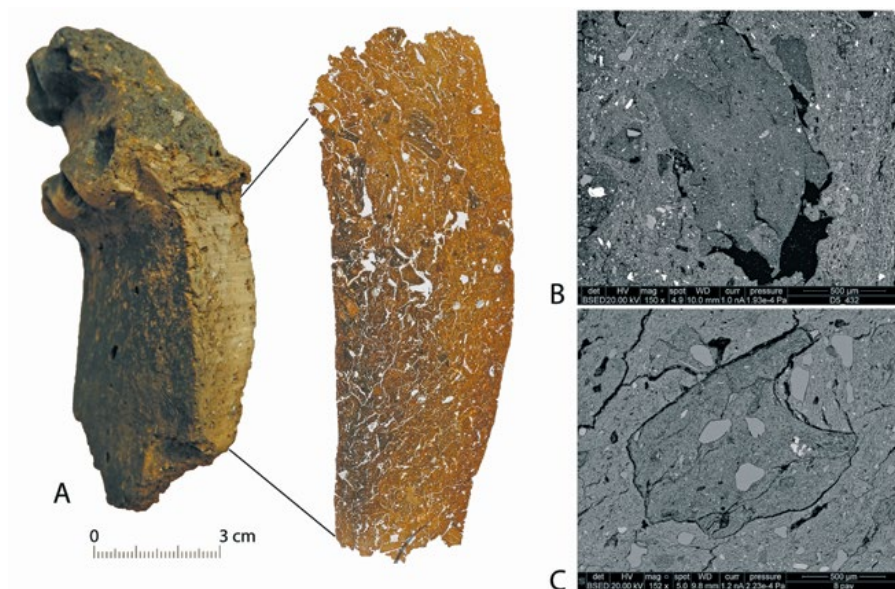
64 Adomas Butrimas, *Amber Discs with Cross Decoration in the South Eastern Baltic* (Vilnius: Vilnius Academy of Arts Press, 2018), 38–39.

well. As pre-fired material, grog helps to reduce the risk of cracking during drying or firing, functioning similarly to ground rock or sand as a tempering agent. However, the choice to use grog temper may have been motivated not only by its functional benefits but also by aesthetic and symbolic considerations deeply embedded in cultural traditions.

Grog-tempered paste allows potters to craft thin-walled forms, such as beakers, amphoras, and short-wave moulding pots. The use of grog temper appears in Central Europe as early as 5000 BC, particularly in the pottery of the Lengyel Culture in North Hungary⁶⁵ and the Linear Pottery Culture in Poland.⁶⁶ However, grog-tempered pottery is most famously associated with the Corded Ware Culture, which spread widely across Europe, especially around the Baltic Sea.⁶⁷ In Lithuania, remarkable examples of Corded Ware vessels have been uncovered in the Biržulis region. Additional, though less extensive, sites with grog-tempered pottery from the same culture have been found in Southeast Lithuania, including the Dubičiai region settlements of Dubičiai 1 and 2, Margiai 1, Karaviškės, and Lynupis [Fig. 6]. The presence of grog in pottery from various cultural traditions is sometimes overestimated, as naturally occurring iron-rich nodules [Fig. 2E] or dry clay lumps, which may initially resemble grog, are often present in the clay matrix.

The choice of Neolithic potters to use grog temper has inspired academic discussion about its possible symbolic meanings. One basic explanation is that grog temper served a practical purpose in recycling ceramic waste, especially in resource-scarce regions. Ethnoarchaeological research has shown that cooking pots tend to break within months to a little over a year,⁶⁸ making broken ceramics readily available for reuse. For potters who migrated to unfamiliar territories, using potsherds from their own

- 65 Attila Kreiter et al., “Entangled Traditions: Lengyel and Tisza Ceramic Technology in a Late Neolithic Settlement in Northern Hungary,” *Journal of Archaeological Science: Reports* 16 (2017): 589–603, <https://doi.org/10.1016/j.jasrep.2017.03.021>
- 66 Sławomir Kadrow, and Anna Rauba-Bukowska, “The Selection of Ceramic Raw Material: Convenience or a Technological Idea? A Case Study of the Danubian Cultures North of the Carpathians,” *Archeologické rozhledy* LXIX (2017): 261–280, <https://doi.org/10.35686/AR.2017.16>
- 67 Elisabeth Holmqvist et al., “Tracing Grog and Pots to Reveal Neolithic Corded Ware Culture Contacts in the Baltic Sea Region (SEM-EDS, PIXE),” *Journal of Archaeological Science* 91 (2018): 77–91, <https://doi.org/10.1016/j.jas.2017.12.009>
- 68 James M. Skibo, *Understanding Pottery Function* (New York: Springer, 2013), 3.



6. Corded Ware with grog temper: A – upper part of a pot from the Daktariškė 5 settlement and its thin section; scanning electron microscopy images of ceramic paste with grog particles observed in potsherds from: B – Daktariškė 5, C – Margiai 1 settlements, photos by Lukas Gaižauskas, 2019; Eglė Šatavičė, 2022

Virvelinė keramika su šamotu: A – puodo iš Daktariškės 5 gyvenvietės viršutinė dalis ir šlifas; keramikos masės su šamoto trupinėliais skenuojančių elektronų mikroskopijos vaizdai, stebėti šukėse iš: B – Daktariškės 5, C – Margių 1 gyvenviečių

pots might have provided a familiar material when local clay sources were unknown.

Nevertheless, the symbolic meaning of grog appears to extend beyond its practical application. Variations in grog quantity across different contexts suggest that it may have been used in some cases for ritual or symbolic reasons. For instance, in some Sudanese communities, women bring a potsherd from their old, broken pot to the potter to incorporate into a new vessel, symbolically granting it ‘continued life.’⁶⁹ Similarly, in Sub-Saharan Africa, potters describe grog as a way of linking new vessels to ancestral knowledge and traditions, believing that past generations ‘knew how to make strong pots.’⁷⁰ Ethnoarchaeological studies reveal deeper associations,

69 Brigitta Hulthén, “Temper Variations in Ancient Ceramics – Technological or Cultural Origin?” *Iskos* 5 (1985): 335.

70 Olivier P. Gosselain and Alexandre Livingstone Smith, “The Source. Clay Selection and Processing Practices in Sub-Saharan Africa,” in *Pottery Manufacturing Processes: Reconstitu-*

with grog often symbolising continuity, eternity, unity, and rebirth. Among the Gurensi people of Ghana, potters use grog made from the eating bowls of deceased women, while the Kapsiki of Cameroon incorporate grog from broken ritual vessels, allowing the new pot to carry the memory and spirit of its predecessors.⁷¹

Pottery-making, as a craft often passed down within family circles, holds special significance for many communities. In cultures with exogamous marital systems, women often bring their pottery as part of their bridal dowries, imbuing these vessels with memories and social meanings, especially when they move far from their family homes. In this context, grog-tempered vessels might serve as tangible links to their origins and family traditions, reinforcing a potter's sense of identity and connection to her past.⁷²

The Corded Ware Culture, which extended across much of Europe, is associated with significant migrations. The prevalence of grog temper in Corded Ware pottery likely carried powerful symbolic meanings for these mobile communities. For potters and their families moving over long distances, incorporating grog temper may have represented their enduring connection to family, home, and ancestry. Thus, while grog temper was functionally useful, it likely carried a deeper, symbolic meaning, embodying continuity, identity, and resilience amid the migrations and upheavals of the Neolithic period. Through its use, the pot itself became a vessel of cultural memory, shaping and preserving identity across generations and geographies.

Shaped by Culture: Vessel Shapes and Decorations as Expressions of Identity

Vessel shapes and decorations are often interpreted as significant indicators of societal and cultural changes. All the Stone Age pottery found in the territory of present-day Lithuania is associated with settlements, suggesting that their shapes and decorations were linked to rituals for the

tion and Interpretation, ed. Alexandre Livingstone Smith, Dominique Bosquet and Rémi Martineau. BAR International Series 1359 (Oxford: Archaeopress, 2005): 43.

⁷¹ Gosselain, "In pots we trust," 218.

⁷² Elisabeth Holmqvist-Sipilä, "Why Not Let Them Rest in Pieces? Grog-temper, Its Provenance, and Social Meanings of Recycled Ceramics in the Baltic Sea Region (2900–2300 BCE)," *Archaeometry* 64, no. S1, 12727 (2021): 13, <https://doi.org/10.1111/arcm.12727>

living. Pottery and symbols potentially associated with burial monuments remain undiscovered, leaving open the possibility that such practices existed but have not yet been unearthed.

Pottery has held a deep symbolic connection with food since its origins. Scientists still debate whether the first vessels were used for cooking, feasting or storage, but most agree that the first clay pots copied the shape of previously used vessels made of another material.⁷³ The shape of the first vessels in Lithuania is poorly known. They were likely round or pointed at the bottom, imitating animal skin bags or bark baskets. These shapes were not purely functional but symbolised the transition from perishable organic materials to durable ceramics. Evidence from Early Neolithic sites in Southeast Lithuania, including Katra 1, Margiai, Barzdis, and Šakės, indicates the existence of a wide range of pottery-making strategies, which may have included elements resembling basketry. However, most pots were primarily constructed using coiling techniques. This diversity suggests that early potters in Southeast Lithuania around the 6th millennium BC experimented with clay as a novel material, embedding it with symbolic meanings tied to innovation and creativity.

In contrast, pottery from the Biržulis region in West Lithuania may reflect an already established cultural tradition where technological choices were passed down through generations. Narva Culture pottery, like most Stone Age ceramics, was primarily made using the coiling technique. However, it is distinguished by its specific U-joints, which are structurally weak, often leading to spalling along these junctions.

Meanwhile, in Southeast Lithuania, evidence from the Early Neolithic suggests a preference for a more advanced N-coiling technique. Analysis of pottery from the Daktariškė 5 settlement frequently reveals the development of N-U joints,⁷⁴ possibly emerging as a response to the adoption of N-coiling knowledge. The N-U coiling technique appears to combine elements of the ancient Narva Culture traditions, particularly U-coiling, with the advantages of the more stable N-joints, which enhance the clay joining surface.

In this context, it is worth mentioning the contemporary Ertebølle Culture, which employed a coiling technique with H-joints – structurally

73 Prudence M. Rice, "On the Origins of Pottery," *Journal of Archaeological Method and Theory* 6, no. 1 (1999): 6–9, <https://doi.org/10.1023/A:1022924709609>

74 Štavičė et al., "Biržulio regiono keramika," 221, fig. 4, 237.

and procedurally similar to U-joints. Latvian and Swedish archaeologists have proposed an intriguing hypothesis: while Ertebølle potters may have acquired knowledge of ceramic paste preparation, shaping, and firing from established craft traditions, they might not have inherited effective coil-joining techniques. As a result, they could have independently developed their own H-coiling method.⁷⁵ This coiling technique, alongside U-coiling, persisted in Ertebølle Culture settlements in various parts of Jutland even after the adoption of N-coiling.⁷⁶

The Cedmar Culture settlements in Poland exhibit even greater diversity. Pottery from the Dąbki settlement features both U- and N-joints,⁷⁷ while the Szczepanki settlement contains pottery with H-joints.⁷⁸ This suggests that the Dąbki settlement may have been more influenced by the Narva Culture, whereas the inhabitants of Szczepanki were likely in contact with the Ertebølle Culture. The limited research on ceramic moulding technologies across the Baltic makes it difficult to determine the process and timing of the transition from H- or U- to N- or N-U coiling.

Patterns in pottery-making reflect social networks, the transmission of knowledge, and the formation of communal identities. A distinct social boundary between the Nemunas and Narva Cultures in the centre of the present-day Lithuania can be traced back to the 5th–3rd millennium BC. These differences are evident not only in ceramic paste recipes and pottery-making techniques but also in vessel design, symbolising distinct cultural ideologies.

Both cultures, consisting of hunter-fisher-gatherer societies, produced large, pointed-bottom pots that seem to symbolise the collective

- 75 Baiba Dumpe et al., “A Dialogue across the Baltic on Narva and Ertebølle Pottery,” in *Early Pottery in the Baltic – Dating, Origin and Social Context*, ed. Sönke Hartz, Friedrich Lüth, and Thomas Terberger. Bericht der Römisch-Germanische Kommission 89 (Frankfurt: Philipp von Zabern 2008): 434–436.
- 76 Karen Povlsen, “The Introduction of Ceramics in the Ertebølle Culture,” *Danish Journal of Archaeology* 2, no. 2 (2013): 150, <https://doi.org/10.1080/21662282.2013.904127>
- 77 Andreas Kotula, “Contact and Adaptation – the Early Local Pottery at Dąbki and its Relations to Neighbouring Hunter-Gatherer Ceramics,” in *The Dąbki Site in Pomerania and the Neolithisation of the North European Lowlands (c. 5000–3000 calBC)*, ed. Jacek Kabaciński, Sönke Hartz, Daan C. M. Raemaekers, and Thomas Terberger. Archäologie und Geschichte im Ostseeraum 8 (Leidorf: Rahden/ Westfälische, 2015): 175–202.
- 78 Witold Gumiński, “The Oldest Pottery of the Para-Neolithic Zedmar Culture at the Site Szczepanki, Masuria, NE-Poland,” *Documenta Praehistorica* 47 (2020): 126–154, <https://doi.org/10.4312/dp.47.8>



7. Typical shapes of hunter-gatherer-fisher point-bottomed pots: A – a rim of a Nemunas Culture pot from the Šakės settlement; B – a reconstruction of the same pot, created by Jurgita Radžiūnaitė; C – a rim of a Narva Culture pot from the Daktariškė 5 settlement, photos by Eglė Šatavičė, 2022, 2024

Būdingos medžiotojų-rinkėjų-žvejų smailia-dugnių puodų formos: A – Nemuno kultūros puodo pakraštėlis iš Šakių gyvenvietės; B – to paties indo rekonstrukcija, sukurta Jurgitos Radžiūnaitės; C – Narvos kultūros puodo pakraštėlis iš Daktariškės 5 gyvenvietės

identity of the entire community rather than individual identity. The most significant stylistic differences in vessel design are found in their upper sections. The symbolic emphasis on the top of the vessels as the ‘head’ aligns with ethnographic analogies, in which pots are often compared to human bodies, using terms such as ‘body,’ ‘belly,’ ‘shoulders,’ ‘neck,’ ‘mouth,’ and ‘lips.’⁷⁹ Thus, particular attention is given to the rim. Its design and decoration may have served as a marker of community identity, but it could also have played a protective role for the vessel’s contents or been associated with ensuring prosperity.

79 Nicholas David, Judy Sterner and Kodzo Gavua, “Why Pots are Decorated,” *Current Anthropology* 29, no. 3 (1988): 365–389, <https://doi.org/10.1086/203649>

Classic Nemunas Culture pottery is distinguished by highly profiled rims, formed by impressing deep pits into the clay from both the interior and exterior [Fig. 7A]. Rows of decorative impressions, varying in depth, produce a three-dimensional effect that transforms dramatically under flickering firelight, akin to a hologram [Fig. 7B]. This visual dynamism was likely intentional, serving as both a distinguishing cultural marker and a ritual element. Organic residue analysis shows these vessels were used for cooking, but their decorated surfaces provided limited functional advantage, reinforcing their symbolic purpose.

The Narva Culture exhibits a markedly distinct style, characterised by specific rim forms⁸⁰: slanting inward in the early stage and protruding inside in the late stage. These rims are decorated with comb-like, winding impressions or long incisions [Fig. 7C]. While similar slanting inward rims are found in Comb Ware, this similarity is unlikely to be solely due to direct influence; rather, it may reflect shared ideas. The adoption of Comb Ware was found to be associated with the increasing utilisation and storage of aquatic resources.⁸¹

Archaeologist R. Rimantienė, who studied the abundant Narva pottery at the Šventoji complex, noted similarities between these rims and the edges of wooden boats, some of which were found at the same site.⁸² A. Girininkas also emphasises the deep symbolic importance of boats in Narva Culture, drawing analogies to mythology, where boats serve as essential instruments for accessing the afterlife.⁸³ His excavations at the Kretuonas Lake settlement uncovered specific boat-shaped or elongated bowl-lamps, which are characteristic of coastal Narva Culture sites (including Dąbki)⁸⁴ and even the Ertebølle Culture⁸⁵. However, such vessel types are absent from inland sites such as the Biržulis region and Szczepanki. These design choices

80 A detailed typological analysis of Narva Culture vessel shapes has been provided in various publications, including Rimantienė, *Die Steinzeitfischer*, 45–47; 253–257, 362–377; Girininkas, *Baltų kultūros ištakos*, 19–157; Brazaitis, “Narviškos keramikos”; Adomas Butrimas et al. *Biržulis. Medžiotojai, žvejai ir senieji žemdirbiai X–II tūkst. pr. Kr. III: Keramikos ir titnago dirbiniai* (Vilnius: Vilniaus dailės akademijos leidykla, 2024), 74–81.

81 Kerkko Nordqvist, *The Stone Age of north-eastern Europe 5500–1800 calBC. Bridging the gap between the East and the West* (Oulu: University of Oulu, 2018), 93.

82 Rimantienė, *Die Steinzeitfischer*, 47.

83 Girininkas, *Baltų kultūros ištakos*, 235.

84 Kotula, “Contact and Adaptation,” 185.

85 Povlsen, “The Introduction of Ceramics,” 147.



8. Anthropomorphic motifs on a Narva Culture pot from the Daktariškė 5 settlement, photo by Jogailė Butrimaitė, 2024

Antropomorfiniai motyvai ant Narvos kultūros puodo iš Daktariškės 5 gyvenvietės

suggest that Narva pottery not only had practical functions but also symbolised the significance of water in the worldview of fisher communities.

The symbolic focus on water is evident not only in the rim design but also in the decorative compositions employed. While the Nemunas Culture demonstrated a clear preference for linear horizontal translation, with the serial repetition of imprints, Narva pottery often includes patterns that shift direction or exhibit multiple rotation symmetries⁸⁶ on the pointed bottoms.⁸⁷ This resembles the motion of whirlpools or flowing currents.

Narva pottery occasionally features anthropomorphic and zoomorphic motifs, adding another layer of symbolic meaning. At the Daktariškė 5 settlement, stylised human figures are depicted in geometrical compositions, created through incisions or comb-like impressions. The rhombic shape of the heads on these anthropomorphic representations [Fig. 8] is reminiscent of the engraved Mesolithic figures found on bones.⁸⁸ However, the elementary linear depiction of the body with upward-turned hands is analogous to the images on pottery from the Narva and Bay Coast

86 Rice, *Pottery Analysis*, 260–264.

87 Butrimas et al. *Biržulis. T. III*, fig. 52.

88 Butrimas, “Human Figurines,” 8, fig. 1; Grahame Clark, *The Earliest Stone Age Settlement of Scandinavia* (Cambridge: Cambridge University Press, 1975), 155, fig. 35.

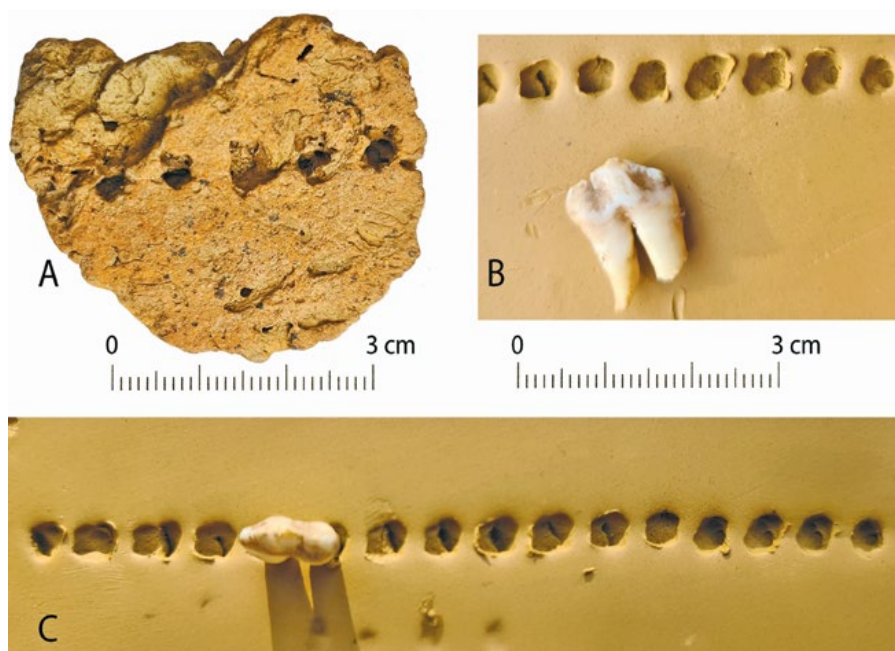
(*Haffküstenkultur, Rzućewo*) Cultures at other sites (Šventoji, Nida, Zvidze, Asavets, Juravichi III, etc.).⁸⁹ Such decorations are frequently associated with notions of fertility, sacrificial rituals, and a cosmological interpretation of the natural world.

One unique pot from the Daktariškė 5 settlement challenges traditional interpretations. The surviving potsherds depict human figures in both upright and upside-down positions, separated by diagonal lines of elongated impressions [Fig. 8]. This unusual composition may represent a three-dimensional worldview, integrating elements of air, earth, and the underworld or water. Alternatively, it might symbolise human reflections on the water's surface, blurring the boundaries between the physical and spiritual realms.

The main decorative element for both Narva and Nemunas hunter-fisher-gatherer cultures is the simple impression. While scientists often focus on the shape of the impressions, it has been observed that the direction and method of impressing significantly alter their appearance.⁹⁰ Beyond the appearance and composition of these impressions, the entire process of creating them – along with the tools used – may have held significant symbolic meaning for ancient potters. To study the tools used for decoration, an attempt was made to replicate early Nemunas pottery. These pots often feature small pits resembling the flowers of the cat's-foot plant (*Antennaria*). An experiment was conducted in which the double root of a wild boar tooth was used to reproduce impressions of a similar size and shape [Fig. 9]. Furthermore, by varying the use of different sides of the tooth, it was possible to replicate other ornaments characteristic of the Nemunas Culture. This suggests that wild boar teeth may have been used as decoration tools, potentially conveying symbolic associations with hunting and prey within the context of pottery. Rather than relying on figurative decoration, these impressions may have ritualised the crafting process, transforming the vessels into symbolic artefacts that reflected the potter's connection to their environment and its resources.

89 Butrimas, "Human Figurines," 18–20, fig. 17–21; Rimantienė, *Die Steinzeitfischer*, 114, fig. 51; Rimutė Rimantienė, *Nida. Senujų baltų gyvenvietė* (Vilnius: Mokslas, 1989), figs. XXIII, XXIV; Ilze Loze, *Akmens Laikmeta Māksla Austrumbaltijā* (Rīga: Zinātne, 1983), p. 129; Mikhail Charniauskii, "Vobraz chalaveka u naistarazhytnym mastarstve," *Pomniki gistory i kultury Belarusi* 4 (1973): 26.

90 Iršėnas and Butrimas, "Daktariškės 5-osios gyvenvietės keramikos," 126.



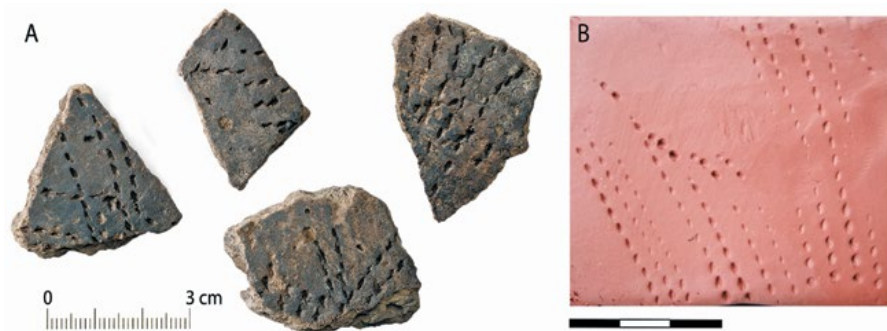
9. Examples of decoration created with wild boar tooth impressions: A – ‘Antennaria’ impressions on Early Nemunas Culture pottery from the Dubičiai 3 settlement; B, C – reconstructed ‘Antennaria’ impressions using a wild boar tooth, photos by Eglė Šatavičė, 2022

Ornamentavimo šerno dantų įspaudais pavyzdžiai: A – vadinamasis *katpėdėlės* įspaudas ant ankstyvosios Nemuno kultūros keramikos iš Dubičių 3 gyvenvietės; B, C – *katpėdėlės* įspaudo rekonstrukcija šerno dantimi

The presence of elk idols or teeth used as grave goods in the Narva Culture territory provides evidence that symbols associated with religion, or a worldview inherited from Mesolithic societies played a pivotal role, with the elk as a central figure. Given the high symbolic value attributed to elk and deer, it was anticipated that impressions of their teeth would be discovered, and thus a meticulous search was conducted. However, an analysis of the pottery from the Daktariškė 5 settlement revealed the absence of such impressions. Instead, some impressions may resemble those made by beaver incisors.⁹¹

The creation of thin, slightly carved impressions may have employed the edges of shells or fish bones. This hypothesis is supported by

91 Šatavičė et al., “Biržulio regiono keramika,” fig. 4.



10. Decoration examples created with porpoise teeth: A – impressions on a Narva Culture pot from the Daktariškė 5 settlement, photo by Jogailė Butrimaitė, 2024; B – impressions produced experimentally using porpoise teeth, photo by Valdis Bērziņš, 2023.

Ornamentavimo jūrų kiaulės dantimis pavyzdžiai: A – įspaudai ant Narvos kultūros puodo iš Daktariškės 5 gyvenvietės; B – įspaudai, padaryti jūrų kiaulės dantimis.

the discovery of fish bone fragments within the shell-tempered ceramic paste.⁹² One notable characteristic of Narva Culture pottery is the comb-like impressions, which were traditionally thought to have been made using a comb tool. Recent discoveries, however, have revealed that these impressions were actually created with a row of porpoise (*Phocoena phocoena*) teeth.⁹³ Harbour porpoise bones were discovered at the coastal Šventoji Neolithic sites.⁹⁴ Despite the distance of approximately 85 km between the Biržulis region and the Baltic Sea, the pottery from the Daktariškė 5 settlement exhibited analogous characteristics [Fig. 10].⁹⁵ Impressions made with porpoise teeth have also been identified on pottery from Narva Culture settlements in East Latvia, a considerable distance from the sea.⁹⁶ This lends support to the hypothesis that porpoise teeth may have been used for pottery decoration in the Biržulis region as well.

⁹² Ibid., fig. 3.

⁹³ Lembi Lōugas and Valdis Bērziņš, “Natural History and Exploitation of the Harbor Porpoise (*Phocoena phocoena* Linnaeus, 1758) during the Neolithic (ca. 4000–2000 cal. BC) in the Eastern Baltic Region,” *Animals* 13, no. 5 (2023): 909, <https://doi.org/10.3390/ani13050909>

⁹⁴ Linas Daugnora, “Fish and seal archaeological data at Šventoji sites,” *Lietuvos archeologija* 19 (2000): 96.

⁹⁵ Butrimas et al. *Biržulis. T. III*, fig. 102, 103.

⁹⁶ Lōugas and Bērziņš, “Natural History,” 6.

The varying shapes and sizes of the comb-like impressions suggest that tools such as pike (*Esox lucius*) jaws with teeth, or the spiky cheeks and opercles of percids, may also have been used. A ritual hearth discovered at the Donkalis cemetery in the Biržulis region, containing elk teeth, fish bones, and a pike jaw,⁹⁷ points to the symbolic importance of water creatures in burial practices. This evidence suggests that the water world played a meaningful role in the rituals and beliefs of ancient societies, reflecting a worldview, in which the natural and spiritual worlds were closely intertwined.

The decoration of pottery with cord impressions is a practice associated with the earliest animal herders in Lithuania, namely the Globular Amphora and Corded Ware Cultures. However, the use of winding impressions, created by wound cord on shell or stick, can be traced back to hunter-fisher-gatherer cultures of the East Baltic region as early as the 5th millennium BC.⁹⁸ In West Lithuania, winding impressions are a hallmark of Late Narva pottery, with examples from the Daktariškė 1 settlement dated to the 3rd millennium BC and from Daktariškė 5 as early as the 4th millennium BC.⁹⁹ The manipulation of cord – whether through winding, plaiting, braiding, binding, knotting or weaving – held profound symbolic significance in the context of pottery-making. These early techniques appear to have been based on textile-making processes, suggesting a symbolic link between the two crafts. In many Indo-European languages, the terminology used to describe pottery often reflects connections to carpentry and weaving. In his hypothesis, archaeologist Andrzej Piotr Kowalski posits that the practice of decorating vessels with cord, knot, or textile impressions may have been rooted in magical-mythical beliefs. Over time, these motifs came to be regarded as symbolising a range of metaphorical meanings, including strength, stability, protection (apotropaic power), and the continuity of existence. The cord motif thus became a central element in a broader cultural valorisation process, significant not only in mythological thinking but also in the art of incantation and ritual.¹⁰⁰

97 Butrimas, *Donkalis ir Spigino mezolito-neolito kapinynai*, 155.

98 Valdis Bērziņš, “A Closer Look at Wound Cord: Technical Analysis of Neolithic Pottery Decoration from Latvia,” *Documenta Praehistorica* 50 (2023): 375, <https://doi.org/10.4312/dp.50.16>

99 Butrimas et al. *Biržulis. T. III*, 114–115.

100 Andrzej Piotr Kowalski, “Neolithic Pottery Ornamented with ‘Cord’ Impressions: an Anthropological – Semiotic Interpretation,” *Baltic-Pontic Studies* 15 (2010): 66–67, 73.



11. Examples of corded (A) and herringbone (B, C) decorations on Corded Ware from the Daktariškė 5 settlement, photos by Jogailė Butrimaitė, 2019

Ornamentavimo virvele (A) ir žuvų ašakomis (B, C) pavyzdžiai ant virvelinės keramikos iš Daktariškės 5 gyvenvietės

In addition to the characteristic cord impressions, [Fig. 11A] the Corded Ware Culture is distinguished by the presence of long incisions arranged in a herringbone or parquet pattern [Fig. 11B, C]. In comparison to the decorative style observed in the Narva Culture, there is a notable divergence. Nevertheless, the techniques employed to create these design elements, such as the use of fish bones, appear to be analogous. The first animal herders in Lithuania were found to have settled in the same environments as the hunter-gatherers. Isotopic and biomolecular analyses indicate that Corded Ware vessels were primarily used for processing foods analogous to those associated with the Narva Culture, notably freshwater products and plants.¹⁰¹ This may indicate that the ancient beliefs and symbols associated with the world of water were incorporated into the evolving worldview of the newly arriving societies. Despite similarities in subsistence strategies, the Corded Ware Culture introduced radical changes in pottery design, including the emergence of flat-bottomed vessels in a variety of sizes. These vessels served as markers of individual or family identity rather than symbols of collective identity as in earlier traditions.

101 Robson et al., "Diet, Cuisine and Consumption Practices," 4020.

Colours of Transformation: Ochre and Fire

Fire plays a vital role in the ceramic creation process, often representing the final stage. Only after undergoing fire does clay transform into permanent pottery. This process is highly sensitive and can result in the pottery cracking, deforming, or even exploding. Consequently, it is always performed with great care and attention, accompanied by various rituals and taboos. In addition to its practical significance, fire has many symbolic meanings in mythology, including sacrifice, purification, burial and rebirth.¹⁰²

The analysis of the origins of ceramic technology at Dolní Věstonice indicates that the Venus figurine was deliberately thrown into fire while still undried. This suggests that the intention may have been to cause the figurine to explode. It seems reasonable to suggest that the primary ritualistic function of ceramics was the production, firing, and, on occasion, exploding of figurines, rather than the creation of permanent portable art objects.¹⁰³ Another of the oldest known Venus figurines, from Willendorf, was crafted from oolite and coated entirely in ochre.¹⁰⁴ A comparable ritual involving the deposition of a clay figurine coated in ochre into a fireplace has been identified in the East Baltic region during the Neolithic period, particularly at the Ģipka A settlement in West Latvia.¹⁰⁵ This intensely red soil, rich in iron oxide, is interpreted as a symbol of blood and life. The practice of covering figurines with ochre may have symbolised the act of animating or enlivening them.¹⁰⁶ Ochre, frequently found in Stone Age hunter-gatherer graves, is often interpreted as a ritualistic material connected to fire and the fireplace.¹⁰⁷ As a symbol of fire, red ochre might have been sprinkled over a cold, dead body to symbolically warm it and restore life.¹⁰⁸

102 Gintaras Beresnevičius, *Lietuvių religija ir mitologija* (Vilnius: Tyto alba, 2004), 386.

103 Pamela B. Vandiver et al., "The Origins of Ceramic Technology at Dolni Věstonice, Czechoslovakia," *Science* 246 (1989): 1002–1008, <https://doi.org/10.1126/science.246.4933.1002>

104 Gerhard W. Weber et al., "The Microstructure and the Origin of the Venus from Willendorf," *Scientific Reports* 12 (2022): 2926, <https://doi.org/10.1038/s41598-022-06799-z>

105 Ilze Biruta Loze, "Small Anthropomorphic Figurines in Clay at Ģipka Neolithic Settlements," *Documenta Praehistorica* 32 (2005): 158, <https://doi.org/10.4312/dp.32.11>

106 *Ibid.*, 162.

107 Butrimas, *Donkarnio ir Spigino mezolito–neolito kapinynai*, 87.

108 Simona Petru, "Red, Black or White? The Dawn of Colour Symbolism," *Documenta Praehistorica* 33 (2006): 206, <https://doi.org/10.4312/dp.33.18>

The use of painted pottery is a common feature of the Neolithic period in South and Central Europe.¹⁰⁹ However, in the East Baltic region, until recently, only impressed, incised, and occasional plastic decorations were recorded on Neolithic pottery. Nevertheless, recent research has focused on ochre layers or red iron-rich paintings on Neolithic vessels from Rīņukalns in North Latvia.¹¹⁰ The discovery of iron oxide as a potentially used pigment has prompted a more detailed re-examination of ceramic materials.

Most Nemunas Culture pottery potsherds are characterised by a reddish-brown or orange hue. The geochemical analysis of Nemunas Culture pottery from the Šakės and Barzdis settlements has revealed a high iron content on both the outer and inner surfaces of the potsherds. This may be attributed to post-depositional conditions in iron-rich soil. However, the exceptionally smooth surface indicates that the pots were burnished intentionally, probably with dry ochre, during the pre-firing stage. Microstructural analysis suggests that the pottery was well fired at moderate temperatures of around 800°C in open fires.¹¹¹

The pottery from the Narva and Globular Amphora Cultures, excavated at the Daktariškė 5 settlement, displays a surface layer of a very dark colour, which is not attributable to soot [Fig. 5B]. Microchemical analysis revealed the presence of iron oxide, which may have been applied as a black pigment. It is possible that entire vessels were coated with a wet ochre or an iron-rich clay slip layer prior to firing. The application of iron oxide-rich clay slips on pottery surfaces was likely not only an aesthetic choice but also served functional purposes, such as reducing permeability.¹¹² The vessels were fired at temperatures below 550°C in an atmosphere with insufficient oxygen.¹¹³ This effect may have been achieved by sealing the fireplace with a layer of soil during the cooling process. The oxidation of iron-rich

109 Roy King and Peter A. Underhill, "Congruent Distribution of Neolithic Painted Pottery and Ceramic Figurines with Y-Chromosome Lineages," *Antiquity* 76, no. 293 (2002): 707–714, <https://doi.org/10.1017/S0003598X00091158>

110 Michela Spataro et al., "Hunter-Fisher-Gatherer Pottery Production and Use at the Neolithic Shell-Midden of Rīņukalns, Latvia," *Antiquity* 95, no. 384 (2021): 1454, <https://doi.org/10.15184/aqy.2021.127>

111 Šatavičė et al. "Corded Ware and Contemporary Hunter-Gatherer Pottery."

112 Rice, *Pottery Analysis*, 231.

113 Šatavičė et al. "Biržulio regiono keramika," 231.

clay results in a reddish hue when exposed to open air, whereas a closed, reducing atmosphere causes the clay to take on a black colouration.¹¹⁴

Efforts to control the atmosphere during the firing process are evident in Corded Ware pottery. Frequently, the exterior surface of the potsherds is yellowish-brown or grey, [Fig. 11] while the core is markedly black. This phenomenon is sometimes regarded as a distinctive attribute of this culture, created by exposing the still-hot vessels, which had been fired in a reducing atmosphere, to the open air.¹¹⁵ It is possible that potters deliberately controlled the firing environment by sealing the fireplace with soil to produce black pottery, which may have held symbolic significance or served specific ritualistic purposes.

The colours red and black were the most common in early prehistoric art and served as important agents for transmitting information and evoking emotions in the first artists. Together, these colours likely conveyed narratives of life's cyclical nature, uniting themes of birth, death, and renewal. They carry deep symbolic meaning, with black and red representing transformation, life, and death¹¹⁶. Moreover, very red ochre and black pigments are both created through the transformative power of fire. Thus, rituals involving fire were essential not only for the creation of pottery but also for the symbolic significance of colours.

Conclusions

Since its adoption in the East Baltic, Stone Age pottery has served as a significant cultural marker, allowing us to identify distinct traditions through potsherds over millennia. The primary indicators of these cultural traditions are vessel shapes and decorations, particularly the design of pot rims. However, pottery itself embodies a far broader range of symbols, intertwined with all aspects of human life – feasting, nursing, fertility, storage, funeral rituals, and more. Considering symbols and rituals revealed through ethnographic material, this study evaluated ceramic vessel creation

¹¹⁴ Rye, *Pottery Technology*, 118.

¹¹⁵ Åsa Maria Larsson and Gunlög Graner, "More than Meets the Eye. Pottery Craft in Transition at the End of the Middle Neolithic in Eastern Sweden," in *Uniting Sea II. Stone Age Societies in the Baltic Sea Region*, eds Åsa M. Larsson and Ludvig Papmehl-Dufay, OPIA 51 (Uppsala: Uppsala University, 2010): 223.

¹¹⁶ Petru, "Red, black or white?" 207.

not merely as a sequence of technological choices but also as a series of rituals through which accumulated knowledge and beliefs were passed down through generations. The pottery-making process has been reconstructed through the integration of ethnoarchaeology, experimental archaeology and material science, with the aim of demonstrating how it reflects the transformation or transmission of symbols and rituals.

The diversity in ceramic paste and the design of the earliest pottery in Southeast Lithuania suggest that the ideas behind this innovation originated from multiple sources and required time to master. In the studied Dubičiai region, [Fig. 1] suitable clay raw material was scarce. The microstructure of what appears to be natural ceramic paste with no added temper, containing voids left by water-related organic matter, [Fig. 3A–D] and random rock fragments, suggests that the silty clay was sourced from shallow water environments – likely near settlements. Deformed rims or defects in decoration elements, such as impressions on pots, [Fig. 9A] may indicate that the clay matrix was applied while still too wet. Over time, the ceramic paste of Dubičiai-type pottery was improved by incorporating dry, coarse plant fragments. [Fig. 3E–G] It remains unclear whether this knowledge developed locally or was introduced from elsewhere, but it cannot be directly linked to the symbolic traditions of early agrarian societies.

The shared mindset and subsistence strategies of hunter-gatherer communities are reflected not only in the organic residues inside the pots, but also in the tools used for ornamentation. It appears that decorations on both Dubičiai-type (early) and Classic-type pottery of the Nemunas Culture were often created using animal parts, such as wild boar teeth. [Fig. 9B, C] Early Nemunas Culture hunter-gatherers initially used plant temper in their ceramics, but during the Middle Neolithic period, this was replaced with ground granitic rock fragments. [Fig. 5A] This shift in tradition may reflect the influence of symbols and ideas introduced by incoming populations from the southeast. In an unfamiliar environment, ceramic paste recipes were adapted to align with techniques already familiar to these newcomers. However, the continued use of similar clay sources, the same coiling technique, the persistence of decorative elements, and certain

similarities in the shape of large pots [Fig. 7A, B] suggest a continuity of shared Nemunas Culture symbols and traditions.

The Narva Culture territory in West Lithuania contains abundant sources of suitable clay raw materials. In the studied Biržulis region, [Fig. 1] clay was likely accessible locally. The impurities and layered texture of the ceramic paste suggest the use of silty clay from shallow water environments, presumably lake shores. However, the choice of raw materials for ceramic paste was likely influenced not only by the surrounding environment but also by subsistence strategies. Narva Culture pottery is distinguished by its unique tradition of using crushed shell temper, [Fig. 2] a practice that cannot be explained solely by functional properties. This temper required specific knowledge and likely held symbolic significance for communities reliant on freshwater resources. Notable examples of shell-tempered Narva pottery have been discovered at the Daktariškė 5 settlement.

Symbolism also played a role in decoration techniques. Impressions on Narva Culture pottery resemble marks made by sea pig teeth, [Fig. 10] pike and other fish bones, or shells, further reflecting a hunter-fisher-gatherer worldview. Additionally, the reliance on freshwater environments may be symbolised in vessel shapes, such as those with slanting inward rims, [Fig. 7C] which resemble the edges of wooden boats. Furthermore, in many Narva Culture sites – especially in coastal areas – distinctive elongated, boat-shaped bowls have been found, although they are absent in the Biržulis region.

Determining the precise timing of technological changes remains challenging, but the late Narva period is marked by a transition to ceramic paste with fine plant temper [Fig. 4] and decorations featuring wound cord or textile impressions. Fine plant temper is typically associated with early pastoral communities, where materials such as herbivore dung were commonly used as temper. However, in the East Baltic region, this practice may reflect hunter traditions rather than agricultural influences.

In agrarian societies, pottery production often took place after the harvest, whereas among hunter-gatherers, it may have aligned with post-hunting activities. Given the symbolic importance of elk and deer, it is plausible that the fresh stomach contents of these herbivores were used in

pottery production, serving both a practical and symbolic role in the crafting process. Considering that crushed shell temper dominates in Narva Culture pottery, it was likely used throughout the entire existence of the Narva Culture. Meanwhile, fine plant temper appears to have been used occasionally, possibly in connection with specific rituals or customs.

The ceramic paste recipes, pottery-making techniques, decorations, and even the higher firing temperatures of Nemunas Culture pottery in Southeast Lithuania suggest attempts to imitate or adopt certain traditions from the Globular Amphora Culture. Meanwhile, Narva Culture pottery, despite the discovery of distinct Globular Amphora Culture potsherds [Fig. 5B] at the Daktariškė 5 settlement – indicating contact with early farming communities – shows no evidence of incorporating symbols or pottery-making techniques from the Globular Amphora Culture.

The pottery of the Corded Ware Culture, usually associated with long-distance migration, features grog tempered ceramic paste, [Fig. 6] which is likely to carry deep symbolic connections to ancestry, birthplace, memory, or social identity. The diversity in ceramic paste does not allow for a definitive assessment of whether this pottery is of local or non-local origin. While relatively rare in Southeast Lithuania, grog-tempered pottery is well represented in West Lithuanian sites, such as the Daktariškė 5 settlement. The emergence of Corded Ware marks a shift in social identity – from the communal, shared traditions of Narva and Nemunas hunter-fisher-gatherer communities, characterised by large, point-bottomed vessels, to a more individualistic, family-oriented identity, reflected in different-sized, flat-bottomed vessels.

However, these changes in symbols and traditions were neither sudden nor absolute. Corded Ware decoration combines cord impressions with fishbone-incised designs, blending old and new symbols. [Fig. 11] Despite their origins in animal herding, Corded Ware communities in West Lithuania continued to rely on subsistence strategies deeply rooted in freshwater resources. Furthermore, in Southeast and East Lithuania, traces of continuity – or even a revival – of Nemunas and Narva Culture hunter-fisher-gatherer symbols are evident in ceramic paste recipes and in flat-bottomed vessels with rim designs reflecting ancient traditions.

Meanwhile, in West Lithuania, where Corded Ware influences were stronger, a new Hybrid-type pottery emerged. These vessels adopted the thin-walled shapes and decorations typical of Corded Ware but retained Narva Culture elements in their ceramic paste recipes. The persistence of Narva traditions is particularly evident in the use of crushed shell temper and low firing temperatures, which produced characteristic black-coloured pottery. [Fig. 2F]

Given the sensitivity of the firing process, in all cultural traditions it would have been carried out with great care, probably in the context of various rituals and taboos. The diversity of firing techniques among Neolithic cultures reflects their symbolic significance, associated with transformation, sacrifice, purification, and other rituals. The main colours of pottery, which probably carried symbolic meanings, were black and red. These colours were determined by the iron oxide in the clay and the firing conditions, suggesting the possibility of deliberate manipulation by the potter to achieve specific effects.

This study of Stone Age pottery from Lithuania attempted to uncover artistic traditions alongside the spiritual and ritual dimensions of human creativity. Pottery makers and users conveyed their knowledge, experiences, and beliefs through various rituals and life-bearing taboos. While the meanings and symbols embedded in Neolithic pottery remain difficult to interpret from a modern perspective, these vessels can be seen as mediums of interplay between culture, identity, and the material expressions of the past.

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Stone Age Pottery in Lithuania: Symbols and Rituals Embedded in Technological Processes

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Akmens amžiaus keramika Lietuvoje: technologiniuose procesuose užkoduoti simboliai ir ritualai

Eglė Šatavičė

Reikšminiai žodžiai: neolitinė keramika, medžiotojai-žvejai-rankiotojai, keraminė masė, Biržulio regionas, Dubičių regionas.

Akmens amžiaus keramika nuo pat jos atsiradimo VI tūkstantmetyje pr. Kr. Rytų Baltijos regione tapo svarbiu reprezentaciniu elementu, leidžiančiu praėjus keliems tūkstantmečiams pagal indų formas ir puošybą identifikuoti skirtingas kultūrinės tradicijas. Tiesa, keramika įkūnija kur kas platesnį simbolių ir ritualų spektrą, susipynusį su visais žmogaus gyvenimo aspektais – maistu, vaišingumu, skalsumu, atsargų saugojimu, šermenų ir kitais ritualais. Šiame straipsnyje mėginama integruojant etnografijos, eksperimentinės archeologijos ir medžiagotyros duomenis rekonstruoti keramikos gamybos procesą kaip simbolių ir ritualų perdavimo ar kaitos atspindį.

Siekiant perteikti visą Lietuvos teritorijoje neolito laikotarpiu egzistavusių kultūrinių tradicijų panoramą, pasirinkti du regionai – Dubičių (Pietryčių Lietuvoje) ir Biržulio (Vakarų Lietuvoje). Ankstyviausios Pietryčių Lietuvos keramikos įvairovė leidžia spėti, keramikos idėja plito iš įvairių šaltinių ir šiai naujai materijai įvaldyti reikėjo laiko. Dubičių regione vyrauja smėlynai, o lipdymui tinkama molio žaliava galėjo būti aptinkama upių ar ežerų pakrantėse. Molio masės pasirinkimą lėmė ne tik supanti aplinka, bet ir gyvenimo būdas. Ankstyvojoje Nemuno kultūros keramikoje naudoti stambūs augalų liesikliai, o viduriniame neolite juos pakeitė granito trupiniai. Šie pokyčiai sietini su įtaka iš pietryčių, kuomet atvykėliai naujoje aplinkoje pritaikydavo molio receptūrą prie jiems pažįstamos natūralios masės, iš kurios jie pratę lipdyti. Nepaisant pasikeitusių liesiklių toliau naudoti panašūs molio šaltiniai, ta pati lipdymo technika, ornamento elementai ir didelių puodų formos, kurių panašumas leidžia teigti apie simbolių ir kultūrinių tradicijų tęstinumą.

Vakarų Lietuvoje Narvos kultūros keramika pasižymi savita tradicija – trupintų kriauklių liesikliais, kurių naudojimą sunku paaiškinti vien praktinėmis savybėmis.

Tai reikalavo specifinių žinių ir turbūt simbolizavo žvejų pasaulėžiūrą. Tokios narviškos keramikos su kriauklėmis gausu Biržulio regione Daktariškės 5 gyvenvietėje. Čia aptikta ir šukių su smulkiomis augalinėmis priemaišomis. Tokia keraminė masė paprastai sietina su ankstyvosiomis gyvulių augintojų bendruomenėmis, kuriose žolėdžių mėšlas naudotas kaip molio liesiklis. Tiesa, Rytų Baltijos regione ši tradicija sietina su medžiotų simboliais. Briedžiai ir elniai medžiotų bendruomenėse turėjo ypatingą simboliinę reikšmę, todėl neatmestina hipotezė, kad po medžioklės šių žolėdžių gyvūnų šviežias skrandžio turinys galėjo būti naudojamas keramikos gamybai.

Simbolinę prasmę galėjo turėti ir indų dekoravimo priemonės. Nemuno kultūros puodai ornamentuoti įspaudais, kurie galėjo būti padaryti sausumos gyvūnų, pavyzdžiui, šernų dantimis. Įspaudai Narvos kultūros keramikoje primena jūrų kiaulių dantų, lydekų ir kitų žuvų kaulų žymes, kurios dar labiau atspindi žvejų pasaulėžiūrą. Be to, simboliškai su vandens pasauliu gali būti sietinos ir indų formos, pavyzdžiui, pajūryje Narvos kultūros gyvenvietėse aptinkami laivelio pavidalo dubenėliai-lempos arba puodai nusklembtais pakraščeliais, primenančiais medinių luotų kraštus.

Klajokliams būdinga Virvelinės keramikos kultūra išsiskiria šamoto naudojimu, kuris galėjo turėti simbolinių sąsajų su protėviais, gimtaine, atmintimi ar socialiniu statusu. Pietryčių Lietuvoje šamotinė keramika reta, tačiau Vakarų Lietuvos gyvenvietėse ji paplitusi ir atspindi socialinio tapatumo pokyčius – nuo Narvos ir Nemuno kultūrų medžiotų-rinkėjų-žvejų bendruomeninių patirčių, kurias reprezentuoja stambūs smailiadugniai puodai, pereinama prie individualios šeimos identiteto, išreikšto įvairaus dydžio plokščiadugnių indų įvairove. Virvelinės keramikos kultūra siejama su gyvulių augintojais, tačiau ornamentikoje derinti virvelių įspaudai su žuvų ašakų įraižomis, kurios gali atspindėti kilmę iš vandens resursus puoselėjusių bendruomenių.

Visas keramikos gamybos procesas nuo lipdymo medžiagų pasirinkimo iki jos išdegimo ir indo panaudojimo atskleidžia socialinių ir kultūrinių simbolių sistemą, kai per įvairius ritualus ar nusistovėjusius tabu buvo perduodama iš kartos į kartą sukaupta patirtis ir užtikrinamas tradicijų tęstinumas.