https://doi.org/10.35686/PA2023.1 5–35

Neolithic as a Historical Period and its Eurasian Variants

Neolit jako historické období a jeho podoby v Eurasii

Ivan Pavlů – Petr Čechák

Redakci předloženo v prosinci 2022, upravená verze v březnu 2023

The authors dedicate this study to the significant jubilee of Milan Zápotocký
Autoři věnují tuto studii významnému životnímu jubileu Milana Zápotockého

It has become evident that the term Neolithic needs to be expanded to encompass the historical period during which human societies began, in various ways, to break away from a dependence on the products of natural evolution. This change was without doubt due to climatic oscillations which, over several centuries, disrupted the steady life of Palaeolithic hunters. New findings have shattered the unified notion of what was previously termed the Neolithic into a series of regionally and chronologically specific complexes. The first step is to redefine the terms 'western' and 'eastern' Neolithic according to the different developments that led to the emergence of pottery.

Neolithic – Mesolithic – Paraneolithic – ceramics – Eurasia

Je zřejmé, že pojem „neolit" by měl být rozšířen tak, aby pojal tu část minulosti, během níž se lidská společenství začala různými způsoby odklánět od závislosti na produktech přirozeného vývoje. Tato změna nepochybně nastala díky klimatickým oscilacím, které v průběhu několika staletí narušovaly ustálený život paleolitických lovců. Nové nálezy otřásly jednotným pohledem na termín „neolit" a rozbily jej na řadu specifických regionálních a chronologických komplexů. Prvním krokem je nové vymezení pojmů „západní" a „východní" neolit na základě odlišných mechanismů, které vedly ke vzniku keramiky.

neolit – mezolit – paraneolit – keramika – Eurasie

1. Introduction

The current term Neolithic has been established for near one hundred years. It owes its inception to V. G. Childe who defined it in connection with his new approach to archaeological culture which he described as a mosaic of demarcated archaeological groups (*Childe 1949*, 80). It reflects the interests of the individual researchers of their time and the universities they represented. The Neolithic was described by British anthropologist G. E. Smith as an assemblage of finds connected to the establishment of agriculture (*Trigger 1989*, 153; *Harris 1992*, 381). This approach employed a diffusionist interpretation that remained throughout the twentieth century by which it was possible to name fundamental landmarks in a simplified way by the order in which they followed each other: the Neolithic revolution and the establishment of a new society, agriculture based on the domestication of plants and animals, the extent of this way of life from the Near East to Europe, and the characteristic assemblage of new archaeological mobile and immobile artefacts (*Binford 1968*). During the last century each of these large chapters in the Neolithic was subjected to detailed study – represented by increase in data, information, hypotheses and theories – and contained in many monographs (e.g., *Harris /ed./ 1996*).

Agriculture, as one of the main characteristics of the traditional concept of the Neolithic, originated independently in isolated, geographically distant centers, in different conditions and in different time sequences (*Bar-Yosef 2017*). People from different traditional archaeological periods – the Palaeolithic, Mesolithic and Neolithic – often lived side by side in traditional communities for a long time before merging into a new social unity (*Kozłowski – Nowak 2019*). The archaeological materialized world was created by people in various causal and intentional contexts. We want to observe this period which took place during a period of great climatic changes from the point of view of the origin and earliest development of ceramic technology on selected examples.

The emergence of agriculture corresponds with a long period associated with the lengthy process of domesticating plants and animals (*Boivin et al. 2016*). Nevertheless, its onset is widely considered to be a relatively sudden change in livelihoods and lifestyles. These changes, which occurred in a relatively limited area, subsequently spread to many larger neighboring areas. We believe that the whole process, which culminated in the advent of agriculture and the Neolithic, and which was associated with significant climate change after the advent of the Holocene, has much deeper roots.

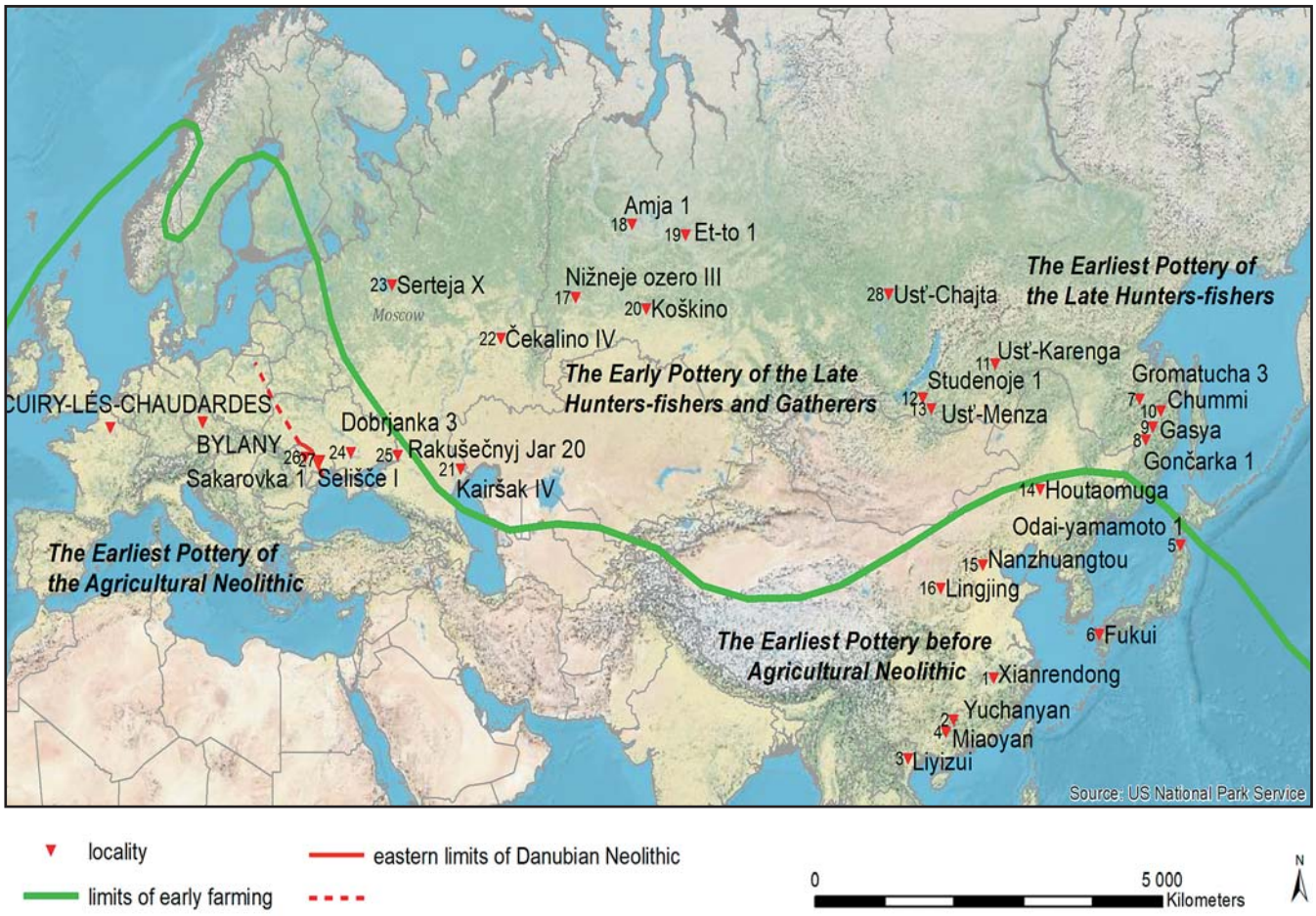

Fig. 1. *Central part of Eurasia with the finds of the earliest pottery. Green line – potential geographical boundary of early farming (after Bellwood 2005, F2.5). List of sites see Tab. 1. Map: I. Pavlů, P. Čechák and M. Končelová.* — ***Obr. 1.*** *Střední Eurasie s nálezy nejstarší keramiky. Zelená linie – potenciální geografická hranice západního evropského neolitu (podle Bellwood 2005, F2.5). Lokality viz tab. 1. Mapové podklady: I. Pavlů, P. Čechák a M. Končelová.*

In some areas, a continuous development since the last maximum of the Ice Age, which lasted more than 10,000 years, can be documented. In the Levant area, it is possible to observe a long-term process, during which the manifestations of social complexity increased gradually and not unambiguously, that depended on changes in environmental conditions. Cultural changes, such as long-term settlements, burial grounds or artistic expressions, gradually grew and required a substantial period of time. Similarly, cultural change and the process of change in livelihood, which led to the domestication of food sources, required a very long period of modification (*Maher – Richter – Stock 2012*, 79). The Neolithic then manifests itself only as a period of the culmination of previous development lasting a thousand years.

The changes that led to the Neolithic must be considered in a much broader temporal and geographical dimension. The conclusion of the Pleistocene as the last phase of the geological ice age represents several millennia associated with large fluctuations in climatic conditions (*Kutílek 2012*). The comparison of archaeological characteristics can be utilized when assessing the beginnings of ceramic technology, which has proven today to be a very long and a very diverse period in its formal manifestations if followed on a continental scale.

Each chapter of this process took place separately and independently, in terms of both time and space. The apparent change of lifestyle from the first times remains only in the sphere of developing human societal psychology (*Barker 2006*, 412). The second period that concerns the question of where and how agriculture began has today sufficiently resolved (for example *Bellwood 2005*). On the contrary, in many places (often those with less suitable conditions) the life of hunters and gatherers must also have changed but the mode of their subsistence remained. Agriculture was at its beginning a selective subsistence strategy. The question of why this happened has created many more new questions than it has clear solutions (*Price – Bar-Yosef 2011*, 166–168). On the Eurasian continent we have two early epicenters. The first is the Near East with domesticated cereals (wheat and barley, after 10,000 BP) and the second is northeast China (*Price – Bar-Yosef 2011*, 171).

As a methodological framework for this article, we have considered the evolution of the period from about 20,000 BP to 6000 BP and focused on the territory of the central zone of the Eurasian continent that includes the eastern territories of present-day China. It seems that the beginnings of ceramics in various temporally and spatially remote areas remain an indicator of changes in the world of artefacts, which the world

of people materialized in a comparable way through its activities. It also seems that the few thousand years of development of human society in climatically and geographically very difficult conditions are visibly connected at the highest level of historical abstraction by an event of a very long duration (*Rice 2015*, 3–23). That is why we have chosen such a methodological path, the causal line of which, of course, remains hidden from us.

2. Climatic circumstances

The present geological era began in the Holocene (*Pokorný 2011*). The human agent, though, had (through the acquiring of enhanced sources of food) started to influence natural conditions on a limited scale from the Neolithic onwards. The domestication of plants and animals can be considered one of the first results of human activities on global genetic changes which had until then been entirely due to the results of natural evolution. It is therefore possible to ask if the Neolithic was an overture to the new era, with its influence on the beginnings of cultural landscape creation and genetic changes in the domesticated populations.

The accumulation of changes in archaeological development accepted the traditional separation of historical epochs, such as the Palaeolithic and Neolithic, from the beginnings of research (*Binford 1968*, 317). Inserting one period – the Mesolithic – does not solve this problem. The entirety of human development can be seen to take place against the background of the natural environment, which is now stratified in detail within geological times. In archaeology, this trend of continuous study has already appeared extensively. In the Near East, for example, it is the study of the origins of Natufian (*Maher – Richter – Stock 2012*). On the European continent, this is most recently confirmed by a monograph showing the parallel existence of both Mesolithic and Neolithic in the northeastern region (*Kozłowski – Nowak 2019*). The boundaries between the Mesolithic and the Neolithic were traditionally recognized by the identification of the origins and spread of agriculture, together with the context of confirmatory archaeological finds and objects. Today, however, this period no longer represents a 'revolutionary' moment in history but proves to be a very variable stage in terms of formal content in different territories and at different times (*Bar-Yosef 2017*). A new view of the Neolithic is clearly given by long-term and continuous development in previous times.

More recent work includes the environmental background: the very detailed development of geological periods includes comprehensive data from the field of geomorphology, biotics, climatology and astronomy, and many other physical and chemical disciplines. This comparative study allows for the specification of content and the dating of individual epochs of the Neogene, which is the youngest systemic period of geological development and ends with the present era of the Holocene (from the Greek '*completely recent*'; *Head 2019*, 40). According to boreholes in the Greenland Glacier, it begins with a precisely dated period of 11,700 BP (*Walker et al. 2009*). The onset of a warmer climate after the end of the last glaciation has been hitherto considered the climatic condition necessary for a new archaeological development that culminated in the Neolithic. Geologically, the Holocene is preceded by the Pleistocene epoch, which has been dated in detail on the basis of geological boreholes, marine tectonics and the refinement of astronomical numerical calculations (*Gradstein et al. 2004*, 99). More recently, another geological substandard, Gelasian, was added to the beginning of the Pleistocene, shifting its origin to 2,58 Ma BP (*Gibbard et al. 2009*, 101; *Head 2019*, 33–34).

The natural background of the historical development that led to the Neolithic can be extended by more than 15,000 years before the beginning of the Holocene. The results of geological studies, particularly a relatively detailed reconstruction of climate change that occurred during the last glaciation, can be seen as important for archaeology.[1] This period of climatic chaos (*Pokorný 2011*, 107) is characterized by large and frequent temperature fluctuations, which created shorter climatic periods at the beginning of the Pleistocene and mostly bearing the names of Danish localities, such as the Older Dryas, Bölling, Alleröd and the Younger Dryas. A significant manifestation of temperature fluctuations was the repeated rise and fall of sea levels, which began after 20,000 ka BP (*Gornitz 2012*, Fig. 1).

The entire Pleistocene is characterized by large temperature fluctuations, during which warmer interstadials and colder stages alternated (*Hemming 2004*). These 'Heinrich' events (H) are evidenced, among other things, by changes in microscopic sediments on the seabed (IRD – ice draft detritus). Two of them, H1 (14,330–13,630 BC) and H2 (20,990–20,570 BC), were found in the Late Pleistocene, H1 occurring before the last cold fluctuation of the Younger Dryas. Followed by the beginning of the Holocene (11,700 BP), these events lasted for several hundred years, manifesting in very cold periods suddenly followed by great warming (*Hemming 2004*, 85). Similar cold fluctuations in temperature development, but relatively shorter ones, are documented at the beginning of the Holocene (*Walker et al. 2018*, 4) in the years 8236 BP (8136 cal BP) and 4207 BP (4303–3888 cal BP). Both fluctuations had a global impact and became a milestone in the Holocene chronostratigraphy. The younger stage represented a significant reorganization in marine and atmospheric circulation (*Walker et al. 2018*, 5). These events in the palaeoclimatology of the Holocene have attracted a great deal of attention in archaeology as these are the possible climatic causes of change in the development of archaeological cultures as well as the cause of possible changes in the development of prehistoric communities.

The 8.2 ka BP event of the great cooling and drought, that took place within a short period of about 100 years, is explained by temperature fluctuations in the waters of the North Atlantic, which caused the ice sheet on the North American continent to melt (*Barber et al.*

[1] Within recent ecological terminology Anthropocene begins at ca 7000 cal BC according to the minimum appearance of methane (*Gemenne – Rankovic 2019*, 24).

1999, Fig. 1). This event had a global impact and meant a different seasonal deterioration of the climate (*Rohling – Pälike 2005*). The effect of this strong climatic fluctuation on settlement and the course of cultural development has been closely studied, especially in various localities in the Eastern Mediterranean (*Weninger et al. 2006*). For a number of Neolithic sites in the wider Aegean region, it was noted that many were based in places where previous settlements were missing. The period of transition from monochrome ceramics to painted ceramics was observed, which in many places is characterized by a short break of about 50 years in the settlement. According to calibrated radiocarbon data, hiatus falls very well to 8.2 ka BP. The reason for this disruption of the Neolithic settlement may have been the great dry period, which lasted about 200 years in the Near East (*Weninger et al. 2005*, 104).

However, a detailed study of some well-documented sites in the Middle East has shown that this climate event did not necessarily result in cultural change. The relocation of settlement between strata A1 and B8 in the part of the outcrop marked as Operation III, which is dated to the years 8335–8105 cal BP, is documented at Tell Sabi Abyad (*Nieuwenhuyse et al. 2016*, 72). The authors observed further developmental changes after the major climatic event, especially the intensification of sheep breeding and meat production as well as developments in the use of ceramics. During the event, the amount of the vessels increased, including painted ceramics. They appeared already in the layer A1, and probably had ritual significance. This painted pottery is even more frequent in later layers A2–A4 (*Nieuwenhuyse et al. 2016*, 80–85). The authors evaluated the whole situation at the time of the climatic event as a manifestation of transformation without evidence of abandonment or a break in the cultural tradition (*Nieuwenhuyse et al. 2016*, 86). Climatic events are also cited as a possible cause in the broader context of neolithization in Eurasia, the dynamics of demography and the possible impact on the relationship between the Mesolithic and Neolithic populations in Europe. Archaeological data cannot yet shed light on these hypotheses. The beginnings of agriculture in the Aegean and the Balkans precede the event of 8.2 ka BP, and the spread of the Neolithic to the Danube probably took place only after this event (*Budja 2007*, 198). During the 6th millennium BC, there were numerous temperature fluctuations, which were accompanied by changes in the intensity of precipitation.

Random climate fluctuations created destabilizing elements in the environmental background of cultural development, which can be associated with changes in cultural development (*Gronenborn et al. 2014*, 80). The emergence of the Linear pottery culture (LBK) on the border with the Starchevo culture in Transdanubia could be due to climatic fluctuations, which bears a similarity to the later development of this culture in the Rhineland, where it is well documented (*Strien – Gronenborn 2005*, 138). The destabilizing role of climate is made manifest in cultural development, and it is one factor (together with other stressful conditions) that elicits an adaptive response. The theory of resilience, which monitors society's ability to adapt to such conditions (*Carlson et al. 2012*), allows us to model certain cycles in the development of the LBK. The most well-known periods of Neolithic development are from the Würtenberg area – the earliest LBK, Flomborn phase and Late LBK represent shorter sections of about 200 years of archaeological development. The ascending and descending phases of development in each cycle can be documented according to a number of archaeological indicators. In addition to other archaeological features, they can be linked to irregular temperature and precipitation fluctuations in Central and Western Europe (*Fig. 4*; *Gronenborn et al. 2014*, 80). Nevertheless, the authors state that there is no reason to derive cultural change solely from climate fluctuations (*Strien – Gronenborn 2005*, 143; *Gronenborn 2012*), because these adaptation cycles can have a number of economic, social and cultural causes.

In contrast to the previous formally typological division of Neolithic development in Europe is the analysis of the long-term development of Neolithic settlement in Bylany (Kutná Hora, the Czech Republic). This classification is made by evaluating the effort and skill (skill: *Ingold 2007*, 352–354) demonstrated in the production of the artefacts. It appears that this development occurred irregularly in different ceramic phases of the settlement. It can be divided into six intervals, within which the consistent and often parallel development of the quality of different types of artefacts is observed. In that initial analysis, however, climate is not considered a necessary causal condition. On the contrary, the individual intervals are interpreted as natural consequences of the rise and fall of settlement activity due to fluctuations in normal socio-economic and cultural conditions, including Neolithic settlement mobility, demographic changes and possible external interventions in the life of a Neolithic settlement (*Pavlů 2000*, 268–272, Fig. 8.2.a).

Overall assessments of archaeological developments in the Eastern Mediterranean and the Middle East from the end of the Pleistocene and the Holocene to 8.2 ka BP agree that the direct impact of climate on cultural change was very rare (*Maher – Richter – Stock 2012*, 70). In many cases, cultural change took place before climate change. For example, the onset of PPNA (Pre-Pottery Neolithic A) was in the order of one to three centuries earlier than the onset of the Holocene warming, and there are similarities in other cases. Here, too, cyclical adaptation to climate change is a consideration rather than a direct cause (*Beneš 2018*, 146–147). At that time, people had to face significant changes in the natural environment, especially gradual drought and deforestation. The changes were also conditioned mainly by irregular sea level fluctuations. However, the 8.2 ka BP event did not manifest itself in time and space in that area (*Zubrow 2016*, 287). Its effect on cultural development was somewhere negative but elsewhere positive, and therefore although its use as a universal correlation cannot be ruled out, it must be re-verified (*Zubrow 2016*, 290).

However, in some areas, such as the Far East, major changes in the palaeoclimate and palaeoenvironment appear to have started much earlier than 25,000 BP, at the end of the Pleistocene. Due to large and dramatic

changes in the climate, changes in people's behavior from mobile to sedentary can be observed after this time (*Robinson et al. 2006*, 1518).

The first warming happened over a short period of about 500 years during the Bölling oscillation (14,500–14,000 BP) and then over another 700 years in the Alleröd oscillation, before the last cooling at the time of Younger Dryas. Only then does the warm Holocene commence. This period of about 3000 years of temperature fluctuations which preceded global warming (*Stuiver – Grootes – Braziunas 1995*, Fig. 11) did not manifest homogeneously over the Eurasian continent and is demonstrative of large oscillations in natural conditions. For example, in the late Sartan 4 there was a warm period in Siberia while simultaneously a cold climate occurred in Europe (*Levi et al. 2015*, Tab. 1). In the north Baikal region fundamental changes in the movement of the Barguzin glacier occurred, which correspond with the '*Period of Water Catastrophes*' (*Levi et al. 2015*, 66). Further east on the lower Amur an immense continental lake grew (*Shewkomud – Yanshina 2012*, Fig. 29).

3. Neolithic components

From an archaeological point of view, the Neolithic is represented by new forms of subsistence, settlement, burial and communication. It is possible to speak about a sort of uniformly connected group of Neolithic finds, which represent one fundamental period in the social development from exploitative to productive subsistence.

Gradually, the belief developed that this term should refer to a '*coherent entity*', which is determined by one historical process (*Thomas 1999*, 13). The originally comprehensive archaeological content has also become an integral part of the interpretation of the transfer to the Neolithic in the original Mesolithic areas (*Tichý 2014*, 312). However, it soon became clear that its content was very diverse, not only in remote places, but also during its long-term constitution in the classical region of the Eastern Mediterranean (*Çilingiroğlu 2005*, 3, Tab. 3).

In Czech lands, it was accompanied for at least one millennium by high population mobility and new forms of social organization. It also shows up as an assemblage of well recognized archaeological artefacts, including vessels of fired clay, polished tools and the development of tools made from traditional materials (bone and stone) or less verifiable organic materials (textiles and wooden objects). These objects are found within archaeological contexts which include the remains of buildings organized into groups or, more rarely, the burials of individuals in crouched positions. The Czech Neolithic was at first occasionally thought to have derived from the neighboring western Elbe region, but soon it was reassessed as being from the regions in southeast Europe and even further in the Near East (*Gamba 2016*). The concept of Czech archaeology was gradually incorporated in connections with other European countries (*Stocký 1926*) and shortly afterwards, from the 1930s on, into an overall concept of European Neolithic origins being in the Near East and of its spread up the Danube basin (*Childe 1957*).

At the turn of the 21st century, many works have shown that individual components of the alleged '*Neolithic Package*' were developed and used in different contexts much earlier than the Neolithic. At the very beginning of the formulation of the Neolithic as a developmental stage in prehistory, the main criterion was 'a new style of stone artefacts' (*Buchtela – Niederle 1910*, 16). These were compared to earlier stone tools, both from a technological point of view and also on the basis of materials and shapes. Since then, new characteristics of the Neolithic have been added, even though their development, chronology or other contexts were not as well-known as they are today. Apart from using new products and tools, the parallel developments of epipalaeolithic groups also headed towards changes in the patterns of settlement and subsistence (*Vencl /ed./ – Fridrich 2007*). During this development, the main classification criterion became the invention of vessels from fired clay, sedentary settlements and the domestication of plants and animals leading to agriculture. It has since been shown that the majority of Neolithic inventions emerged several millennia earlier in the environments of Late and Epipalaeolithic hunter-gatherers. Thus, the original hypothesis on the unity of Neolithic finds has proved to be untenable with regards to both time and space. The causes of these changes are searched for mostly in social aspects rather than in direct reaction to natural conditions or climatic changes (*Pavlů /ed./ – Zápotocká 2007*, 9).

This change was chiefly characterized by the domestication of cereals and animals as the main sources of livelihood. It took place mainly in the Near East, where the ancestors of gradually domesticated species grew and lived. Only later did it spread to Europe (*Pavlů 2008*, 7). However, this long-term process did not proceed linearly, but had its peculiarities since the Epipalaeolithic (*Boyd 2006*). Humans first actively sought to domesticate according to their needs. The consequences of this domestication necessarily manifested themselves in changes in social life, settlement, technology, shifts of communication, etc., and also in new ideology and symbolism. According to one study, this change of symbolism was one of the causes of neolithization in the Near East (*Cauvin 1994*). According to another more recent analysis, the change was the result of new symbolism that came about from domestication in Europe (*Hodder 1990*, cf. *Rainbird 2014*). The subject of symbolism in Neolithic settlements has become the interpretation of living and working space in long houses of the LBK. The individual spaces of the inhabited house and settlements were perceived in a completely new way (*Hodder 1990*, 83). However, this form of domestication was more passive than the previous one. Undoubtedly, the sharing of resources and activities increased, but it was hardly without problems. Therefore, the designation of this society as a *society with inconsistent commonality* was created (*Bickle – Whittle /eds./ 2013*, 385).

The period during which this change occurred in the Near Eastern origin of the Neolithic is usually postulated as being of several millennia (9000–7000 cal BP),

depending on the elements of change that are included as formative. However, these changes were neither homogeneous nor synchronous and this geographically limited view has started to be seen in the last twenty years as insufficient and needs to be assessed on a much wider continental scale. Such a view is already seen as absolutely natural and self-evident for the Late Palaeolithic.

Under the impact of new information, the entire current concept of the Neolithic shatters into regionally and chronologically specific complexes (*Pavlů – Machová – Pchálková-Bártová 2019*). The first step is to define a 'western' and 'eastern' Neolithic according to the differing developments that led to the emergence of pottery and the occurrence of settled agriculture (*Berdnikova 2017*). On the one hand we can designate the developments in the Near East and later in Central Europe as the **'western Neolithic'** which led to agricultural societies with pottery (approximately the centuries following the tenth millennium BP). On the other hand, within the larger space of the Eurasian continent, mobile hunter-fisherman and gatherer societies evolved specific forms that can be identified as the **'eastern Neolithic'**. In these places pottery emerged several millennia earlier than in the west (exceptionally already in the twentieth millennium BP).

A characteristic of the Palaeolithic and Early Neolithic communities was their mobility. Just as the mode of settlement and subsistence was not entirely uniform from the inception of the Neolithic, nor was the population always permanently settled. The Palaeolithic hunter-gatherer society was necessarily very mobile and transient, given its chief means of subsistence. The Neolithic shift to farming significantly changed this characteristic, but this still involved a large degree of mobility. Breeding domesticated animals required seasonal pastures for cattle, although animals such as sheep, goats and pigs tended to be kept within the settlement (*Knipper 2011*). New means of studying aspects of animal husbandry and utilization are now available thanks to methods such as isotope analysis of animal bones and organic residues on vessels.

The question of the neolithization of Europe and Central Europe (*Pavlů 2005*) in particular has long been understood in terms of the relationship between the new Neolithic population and the original Mesolithic settlement (*Zvelebil – Lukes – Pettitt 2010*). Three archaeological interpretations were gradually rejected – the mass arrival of migrants ('*demic diffusion*') into empty and suitable areas close to the vicinity of Mesolithic communities, the gradual penetration of well-known areas in the territory of hunter-gatherers ('*leapfrog colonization*'), or the rapid and mass movement of new settlers ('*folk migration*'). None of these can be archaeologically confirmed (*Kind 2010*, 450). Therefore, it is now widely considered that the most likely and typical form of acculturation was mediated by small groups accompanied by their families. There is consensus on the idea that social contact between Southeastern and Central Europe has existed since the Late Mesolithic, as evidenced by the archaeological picture of the LBK in Western Europe (*Kind 2010*, 451).

Based on the analysis of metric data from available anthropological documents, similarities between Mesolithic and Neolithic populations in Europe have been processed. In accordance with archaeological evidence, the original neolithization model, the '*wave of advance*' model, and the '*delayed Neolithic*' model (*Pinhasi 2003*, 35–38) have been rejected. The anthropological situation is best matched by the model of continuous penetration of new forms of farming from the center of Anatolia in two main waves since the beginning of the 8th millennium BP, which resulted in a mixed genetic model of domestic European Palaeolithic and Anatolian farmers. The first wave reached Southeastern and Central Europe largely without population mixing, the second wave, that arrived in Italy, France and Atlantic Europe (*Gronenborn 2009b*; *van Willingen 2006*), was accompanied by population mixing (*Pinhasi 2003*, 42). Archaeologically, it is important that the first wave of neolithization created the earliest Neolithic settlement in a large area of Southeastern Europe, which is characterized by impression pottery in various regional variants (*Pinhasi 2003*, Fig. 33).

A detailed palaeoenvironmental study led to the definition of a '*Central European – Balkan Agroecological Barrier*' (CEB-AEB) across the Carpathian Basin. This boundary, defined by palaeoclimatological, botanical, pedological and geomorphological features, demonstrated the first human influences, such as burning and soil erosion, on natural vegetation as early as the 8th millennium BP. Later, from the 7th millennium, this border separated the local Mesolithic settlement from the Early Neolithic settlement of the Körös culture (*Whittle 2010*). The Mesolithic cultures south of this border were acculturated to the Balkan-type Neolithic, those further north being acculturated only later in the 6th millennium BP by populations of the LBK (*Sümegi – Kertész – Hertelendi 2002*, 175).

Recent research in southeastern Transdanubia has revealed several settlements with agglomerations of large Neolithic houses. At the Szederkény locality, three groups of houses accompanied by ceramics of the earliest phase of the Vinča A culture, the Ražište group, and sporadic findings of the earlier phase of the LBK, have been examined (*Jakucs et al. 2016*, 272). The onset of this phase of the LBK was later, 7400–7300 cal BP (ca 5400–5300 cal BC), than its formative phase, which is documented in western Transdanubia as early as ca 7600–7400 cal BP (5600–5400 cal BC; *Jakucs et al. 2016*, 323; *Oross – Bánffy 2009*, 181). The significance of this locality lies in the evidence of cultural hybridization of decoration techniques, which in various forms contributed to the creation of the older LBK (*Jakucs et al. 2016*, 325). Ražište ware is characterized by incised decoration made by stabbed incisions, which is typical in the Bohemian area of the LBK (*Pavlů 2000*, 155) and elsewhere further in the Elbe area. It occurs only rarely in Moravia and further north in Poland, where the LBK probably spread from western Transdanubia with linear ceramics only in the later phase of the formative period, which had to cross the Austro-Moravian Danube, which was inhabited at the end of the formative period in the Milanovce phase (*Pavúk 2014*, 206; *Oross – Bánffy 2009*, 181). It can now be shown that for a long time the new

Neolithic populations only inhabited limited regions along all the rivers of the vast Polish area from before the Neolithic until the Late Neolithic (*Kozłowski – Nowak 2019*, 259). This is a situation comparable with the Early Neolithic period in the Carpathian Basin, where also only green corridors along flowing rivers were inhabited (*Sümegi – Kertész – Hertelendi 2002*, 175).

It can be argued that the earliest ideas about the distribution of prehistoric society were distorted by our deep-rooted projections of modern political maps. However, this concept reflects the very limited knowledge of the prehistoric era prevalent in the first half of the 20th century and is now absolutely unacceptable. Archaeological discourse about the first Neolithic settlements in Central Europe started in the 1960s (*Quitta 1960*), but despite a number of new findings (*Lenneis – Lüning 2001*; *Cladders 2001*; *Zvelebil – Lukes – Pettitt 2010*; *Pavúk 2014*), overall progress in the study of the period is limited, particularly because of the lack of new archaeological sources. Long-term discussion among archaeologists concerning the model of Neolithic settlement has not led to an unequivocal confirmation of different theories (*Gronenbron 2009a*; *Budja 2013*). Some evidence has been offered that supports the formulation of a completely contradictory interpretation, which states that an earlier population was not replaced by a new one either suddenly or on a mass scale.

4. Regional particulars

4.1. Eastern Neolithic

According to new data, sometime after 20,000 BP in the caves of southeast China, rough pottery started to appear, and after 11,500 BP it also appeared in other areas of northeast China (*Wu et al. 2012*; *Shelach-Lavi – Tu 2017*; *Yanshina – Sobolev 2018*). This phenomenon preceded by several millennia the first signs of plant domestication in this region and can therefore be said to be independent on the establishment of agriculture. At the same time, it cannot simply be correlated to climatic changes. The whole process of the introduction of pottery technology is explained by social conditions that manifested within the context of the Late Palaeolithic population.

The occupation of caves together with evidence of ceramic technology shows the beginnings of a more sedentary hunter-gatherer society (*Cohen et al. 2017*). The earliest pottery appeared in northeast China in large-scale settlements with rectangular houses and sunken features in the Xiaohexi region in the 9th millennium BP. The settlement structures manifest a transfer to fully sedentary settlement forms. The development of ceramic technology dated from at least 12th millennium BP and played a part in the relatively fast transition to large sedentary settlements in northern China (*Chen – Yu 2017*). The lengthy beginning of pottery vessel production brings up many questions about the causes and use of these new artefacts. The use of ceramics began in many places, which imply a communication of some form similar to the exchange of information about stone tool making. From the beginning, vessels were used for various purposes, mostly for processing food from water sources. At first, they were not necessarily used in the plant domestication process but they were certainly a part of the changing forms of mobility and sedentarism (*Shelach-Lavi – Tu 2017*, 8–9).

Ceramic technology spread during the last millennia of the Pleistocene to isolated sites of Eastern Siberia and the Amur River (*Medvedev 2010*). By around 13,000 BP, knowledge of pottery had reached Zabaikalye, the site of Ust'-Karenga that lies at the confluence of the rivers Karenga and Vitim (*Vetrov 2011*), and other sites to the southeast of Baikal (Studenoye, Ust'-Menza; *Razgildeeva – Kunikita – Yanshina 2013*) and northeast of Baikal (*Ulanov – Berdnikov 2015*) or along the Tunka river (*Berdnikov et al. 2017*). Pottery from this region consists of thick-wall cauldron-like vessels with ovoid bottoms, occasionally decorated with stamps (*Berdnikov et al. 2014*; *2015*).

The earliest pottery in China and South Siberia is not connected to the domestication of cattle or cereal growing. Much of it is found beyond the limits of prehistoric agriculture. The introduction of ceramic technology, which is dated to the end of the Pleistocene, can be connected to changes in subsistence, a transition to a more sedentary way of life compared to the original Late Palaeolithic and Mesolithic lifestyles (*Pavlů – Machová – Pchálková-Bártová 2019*). In this way the appearance of pottery can be considered as the beginning of the Neolithic within the environment of hunter-fisher-gatherer communities (*McKenzie 2010*; *Budja 2016*). Part of these changes are big storage vessels, often sunk into the ground, which served to preserve food supplies in temporarily occupied places that were visited during the mobile life of the communities (*Oshibkina /ed./ 1996*, 6).

The extensive area east of the Urals and the West Siberian Plain is divided into a number of regions, usually along river basins (*Pavlů – Machová – Pchálková-Bártová 2019*). To the east of the Urals those are the regions on Upper Tobol and along the Konga, further to the east there is the large Irtysh basin and even further east single areas in the Ob basin, from the Upper to Lower Ob (*Kosarev 1996*, 254). From the beginning of the 7th millennium BP, in the whole area there were sporadic sites separated by hundreds of kilometers with pottery typically of ovoid shape with pointed bottoms, decorated by stamps (*Kosinskaya 2014*). The system of settlements followed earlier Mesolithic sites.

The wider region of the Middle Ob contains the Ob's tributaries. From the south on the left side of Irtysh there are the Tobol and Ishim tributaries, and also several tributaries of the Tobol which originate on the eastern side of the Urals (*Kosintsev – Bobkovskaya – Besprozvanny 2004*). In this territory, a number of Neolithic sites containing many ovoid vessels with round bottoms are dating from the 7th millennium BP. Some have been radiocarbon dated to the end of the 8th millennium BP. These sites, often isolated, have from the beginning been described as epicenters of later pottery types and cultures, similar to some sites on the western side of the southern Urals (*Vybornov 2016*). The regions of an area of about 2,000 kilometers along the eastern side of the Urals have not been similarly surveyed. Large areas further east, around 60° of northern latitude between the Ob and Lena Rivers, are mostly unexplored

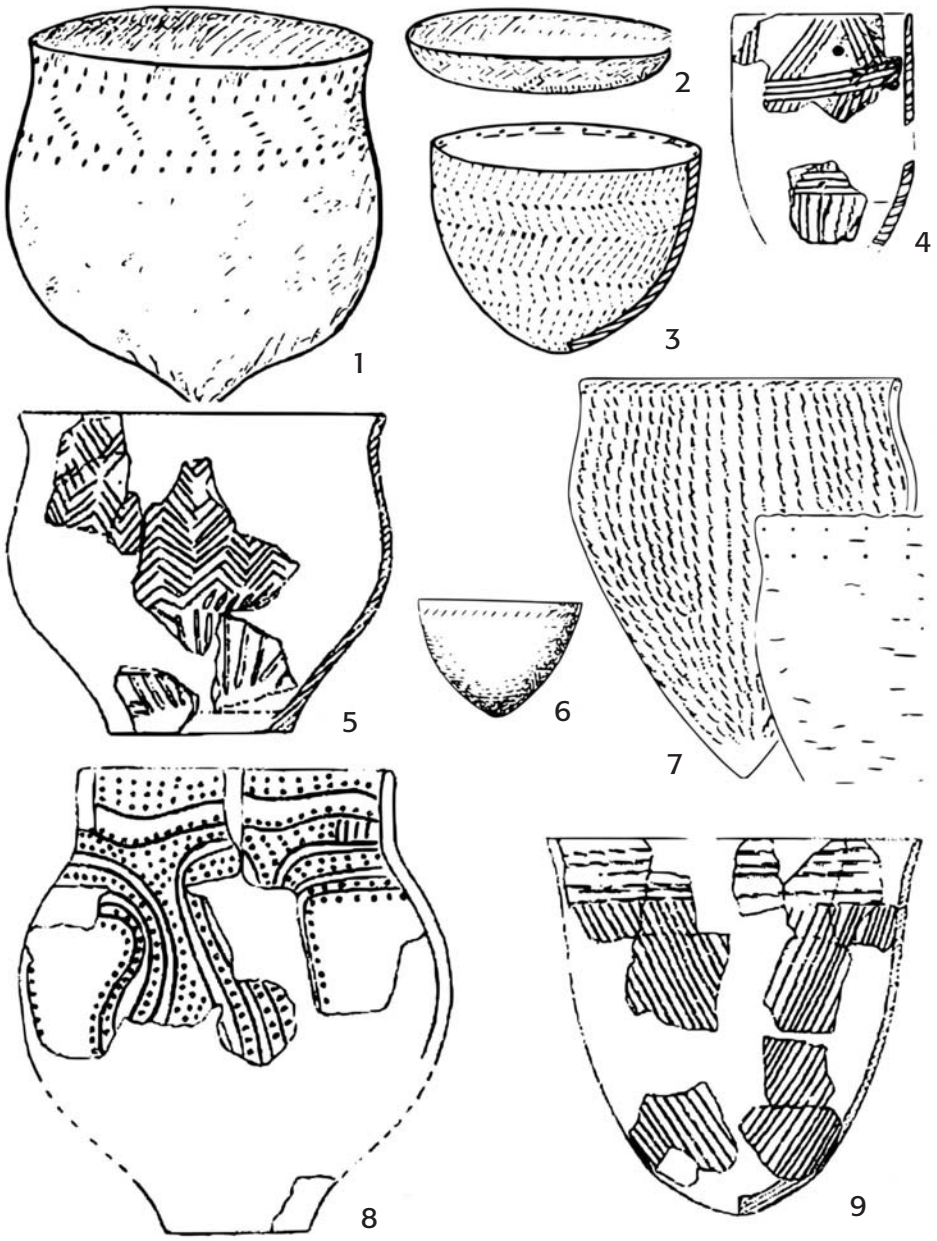

Fig. 2. *Pottery from the western border of the eastern European Neolithic.* ***1–3, 6*** *– Narva (after Kriiska et al. 2017);* ***4*** *– Serteya (after Piezonka 2015a);* ***5, 8*** *– Bug-Dniester: Sokolcov (after Kotova 2015);* ***7*** *– Dubičiai (after Tkachou 2018);* ***9*** *– Pugach 2 (after Kotova 2015). Without scale. —* ***Obr. 2.*** *Keramika na západní hranici východního evropského neolitu.* ***1–3, 6*** *– Narva (podle Kriiska et al. 2017);* ***4*** *– Serteja (podle Piezonka 2015a);* ***5, 8*** *– Bug-Dněstr: Sokolcov (podle Kotova 2015);* ***7*** *– Dubičiai (podle Tkachou 2018);* ***9*** *– Pugač 2 (podle Kotova 2015). Bez měřítka.*

(*Kosinskaya 2014*, 38) and therefore any hypothesis about an East Siberian origin of the earliest Pit-Comb ware is not credible. There are speculations about a dual origin of pottery of the two main groups, characterized by flat or round bottoms. The first has its origin in the south from Central Asia and the Caspian region, the second is presumed to be a result of local development (*Chairkina – Kosinskaya 2010*, 211).

One of the earliest dates (SPB-891: 7566 ± 100 uncal BP; *Tab. 1*) for the Early Neolithic comes from feature 5 on Et-to 1 site (in the Tyumen region). A part of a settlement with rectangular sunken buildings was excavated there. The buildings are interpreted as workshops for the stone industry. The pottery has ovoid shapes with round, pointy bottoms, it is relatively thick walled, and mostly decorated with the impression of comb-like stamps. Similar pottery was found on the Amnya 1 and Varga 2 sites that belong within the group of Early Pit-Comb culture (*Kosinskaya 2014*).

The Nizhneye Ozero 3 site, which lies in the western part of the Sverdlovsk region in the territory of the '*North Ural town circle*' is similarly dated. The dates come from building no 3 (SOAN 6199: 7120 ± 140 uncal BP; *Tab. 1*). The pottery is of an elliptic shape, has a mildly pointed bottom and is decorated with various stamps. Decoration using alternating impressions by comb-like tools is less numerous while the imprints are more often organized into horizontal bands (*Chairkina – Dubovtseva 2014*).

The earliest pottery in the Lower Volga basin appeared in its delta from Kairshak 3, ca 8000–7900 uncal BP (6230–5890 cal BC), to the north of there to Varfolomeyevskaya, ca 8200–7900 uncal BP (6250–5890 cal BC). In the first stage of ceramic occupation, ca 8500–7500 uncal BP (6500–5500 cal BC), there are no traces of farming. The evidence of pottery use makes it possible to describe this period as Neolithic (*Vybornov 2016*, 162). The settlements continue to the north along

the Kama River (*Vybornov 2008*; *Timoshchenko 2014*). This occupation is chronologically comparable to other isolated sites in the steppe zone of southern European Russia, for example Rakushetchnyi Yar in the Don delta and Soroka on the Dniester River. The first one is a multilayer but rare site, connected to a rich source of food, represented by places with river mussels. The pottery is exceptional in being mostly flat bottomed. The second site is one of many others, which are classified as the Bug-Dniester culture which maintained a characteristic hunter-fisherman lifestyle. The Early Neolithic occupation in the steppe zone of Eastern Russia is described as the first form of neolithization by a standard form of adopting a whole assembly of Neolithic innovations including productive subsistence (*Mazurkevich – Dolbunova /eds./ 2015*, 31).

The surprisingly early date of the first pottery in the northwestern part of Eastern Russia comes from samples of several sites in the Serteya area of the Dniester–Dvina region (ca 7300 BP). The pottery differs from the beginning of the 8th millennium by its technology, but it is characterized by the specific cauldron-like shapes with imprinted or incised decoration. It is attributed to the second earliest Neolithic form in the north of Eastern Russia. It contains the earlier Mesolithic occupation of the wood-steppe zone which adopted Neolithic artefacts and used them within the context of their lifestyle (*Mazurkevich – Dolbunova /eds./ 2015*, 28).

On the southwestern border of Eastern Europe that today borders Ukraine and Moldova, there was a territory of a 7th millennium BP Neolithic culture with pottery called Bug-Dniester after the two rivers in the region. The main sites lie on both banks of the rivers South Bug and Dniester. They follow on from earlier Mesolithic occupation dating to the mid-8th millennium BP. These sites along the rivers were short-term settlements of gatherers and fishermen who accepted agricultural production only in the later middle phase (Soroki 3). Pottery is of an ovoid shape with pointed bottoms, partially influenced by the shapes of the Criș culture which lies further west in Moldova (*Dergachev – Larina 2015*). Pottery decoration includes various imprints and incised motifs of meanders or zigzags. Trapezoid points are an important part of the silex industry. The culture presents a very important border on the Dniester, which divides the east European Neolithic world of hunter-fisher-gatherers of local tradition from the Central European agricultural Neolithic with its Near East tradition.

4.2. Western Neolithic

The most significant changes of the earliest Neolithic in Europe can be seen archaeologically in the forms of settlement pattern and mode of subsistence. To date, several thousand Neolithic houses have been studied; clustered in villages or in other groupings in small regions (*Coudart 2015*; *Gomart et al. 2015*; *Stäuble 2005*; *van de Velde 2007*). Regarding detailed study of the mode of subsistence based on cereal production and breeding of domestic animals, not only do we have increasingly more data, but they are more varied. This data show that neither the settlement pattern nor mode of subsistence was uniform across large areas of Central Europe, on the contrary they show that there were notable differences (*Modderman 1988*). The ever-growing number of archaeological datasets allows us to turn our attention to the detailed characteristics of the Neolithic society that replaced the Palaeolithic communities, especially in terms of structure and organization. New means of subsistence provided Neolithic societies with a higher energy supply and led to the gradual formation of more complex organization of communities living within settlements. Archaeological sources allow us to study the forms of relational as well as situational identity (*Eriksen 2007*) by comparing the concordances and differences between artefacts originating from within one settlement, and between different localities.

Neolithic occupation of Central Europe is characterized by a cultural unity, which was defined in the 1930s as the Danubian culture (*Childe 1957*). For nearly eighty years the theoretical interpretation of this archaeological cultural area has evolved, the stages of which reflected the then-prevailing trends of archaeological theory. Within this context, in which theoretical constructs were preferred to archaeological reality, the absence of a comprehensive interpretation of the Neolithic from an overall European point of view is not surprising. In the last decades, European syntheses by researchers from neighboring countries have appeared (*Bickle – Whittle 2013*; *Mazurié de Keroualin 2003*; *Bogucki 1988*; *Milisauskas 1978*) alongside a number of specialized monographs and proceedings from conferences, which have dealt with single problems (*Saile et al. 2016*). At the same time, partial (and not always new) solutions of some of the questions connected to European Neolithic began asserting. From the Czech point of view, these have been mostly analytical works dealing with a deeper study of archaeological artefacts from settlements (*Zápotocká 1998*) and furthering the conception of development in the Late Neolithic.

In Europe, the process of settlement gradually progressed from northern Transdanubia to the Wetterau in central Mainz. This territory is considered to be the nucleus of the earliest LBK; in following periods it expanded considerably to the west as well as to the east. At the peak of the expansion the territory became known as '*Bandkeramia*' (*van de Velde 2007*, 237) and its inhabitants as '*Bandkeramiks*', regardless of the particular differences in the pottery that they made (*van de Velde 1979*, 1). The territory of the first large expansion is evidenced in the changed style of pottery which is also called '*Flombornia*' after the eponymous burial ground in Flomborn in Rhineland. These denominations do not take into account the justifiability of the term '*Linear Pottery culture*'; they are, however, a new specification of the originally Europe-wide term '*Danubian*' and have also led to a revision of terms in the spatial category.

Previous interpretations of the Neolithic evolution worked with the sequentiality of changing pottery styles that might have differed only within regions (*Price – Bentley 2005*). Nevertheless, the regionalization of the evolution, not particularly evident in the earliest period, may have already started around this time (*Cladders 2001*,

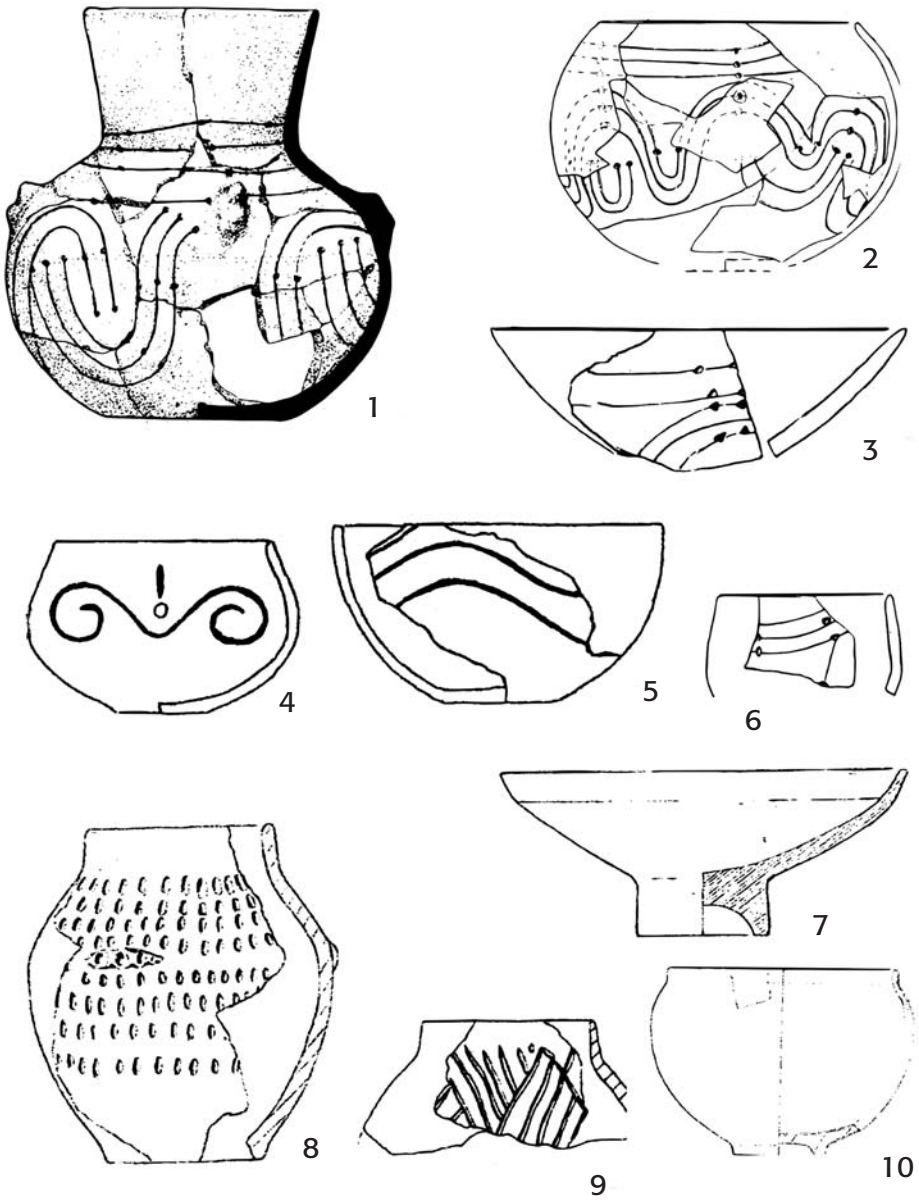

Fig. 3. *Pottery from the eastern border of the western European Neolithic.* ***1–3, 6*** *– Denchen I (after Dergachev – Larina 2015);* ***4, 5*** *– Rovno (after Kotova 2015);* ***7–10*** *– Sakarovka I (after Dergachev – Larina 2015). Without scale. —* ***Obr. 3.*** *Keramika na východní hranici západního evropského neolitu.* ***1–3, 6*** *– Denčeny I (podle Dergachev – Larina 2015);* ***4, 5*** *– Rovno (podle Kotova 2015);* ***7–10*** *– Sakarovka I (podle Dergachev – Larina 2015). Bez měřítka.*

116), especially when the unevenness of settlements in different regions is taken into consideration. Complete regionalization becomes evident in the Late Neolithic. The latest big project of the Goethe University Frankfurt derived especially surprising results in the categorization of time (*Stäuble 2005*). Systematic research at twelve localities of the Early LBK produced evidence of the unexpectedly small, stylistic changeability of these archaeological goods (*Cladders 2001*) as well as their relatively late dating (*Lüning 2005*). Radiocarbon dating was carried out on a number of samples and only one of the examined localities, Schwanfeld (Schweinfurt district), was dated before ca 7300 BP. This led to the hypothesis that there were two parallel evolutions in which the late period of the earliest stage overlapped with the beginning period of the Middle Flomborn phase.

In Bohemia, we can distinguish several stylistic periods in the evolution of pottery. The internal chronology of the LBK is based on the analysis of artefacts (*Pavlů 2000*) from the Neolithic site at Bylany (7520–7270 cal BP). These periods can be synchronized with the evolution that occurred further to the west. Apart from the earliest LBK (*Pavlů – Vokolek 1992*) denominated as Period 1 (*Quitta 1960*), there are three more phases of middle and late stages. The proceeding evolution of the Stroked Pottery culture (STK) can be divided into a traditional early and late stage, the latest stage continuing in a Moravian evolution. The relation between the earliest and the classical period of the LBK will have to be revised with regards to sequentiality, because a certain degree of simultaneity between the two periods cannot be ruled out, which does not occur in older findings. In Moravia, the line between the earliest and the classical periods in the stylistic of Linear ornamentation is almost imperceptible, as evidenced in the most recent chronology of the Vedrovice burial ground (*Podborský 2002*; *Čižmář 2002*).

The clustering of settlements in specific regions of a given area can be considered the most important indication of selective occupation of the landscape by

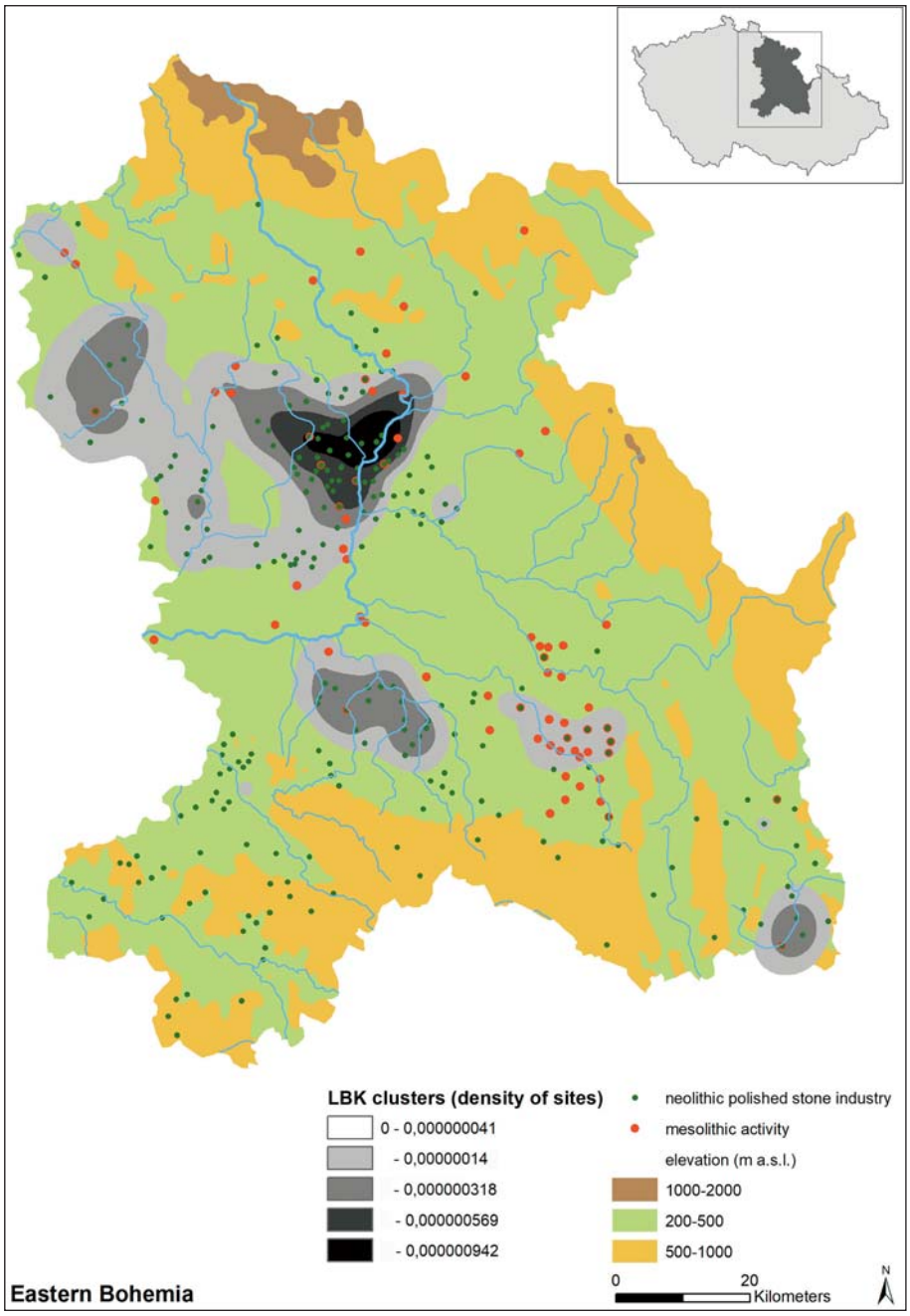

Fig. 4. *Eastern Bohemia (Central Europe). Mesolithic activities and random finds of polished stone industry on the background of LBK population density. Map: M. Končelová. —* ***Obr. 4.*** *Východní Čechy (střední Evropa). Mezolitické aktivity a ojedinělé nálezy broušené industrie na pozadí výpočtu hustoty osídlení kultury s lineární keramikou. Mapové podklady: M. Končelová.*

a new type of agricultural population (*Fig. 4*). We know about the concentrations of the earliest settlements in the region of Hořovice (*Stolz 2009*), in eastern Bohemia (*Pavlů – Vokolek 1992*; *1996*), and in the area between Kutná Hora and Kolín (*Pavlů /ed./ – Zápotocká 2007*). The prevalent theory is that this kind of settlement originated from the occupation of areas geographically suited for growing cereals and breeding cattle, the main means of subsistence in Neolithic society. Publications of recent findings are not numerous (*Braun – Sokol 2004*; *Lička 2011*; *Šumberová 2012*) and it seems obvious that not only optimal places (in this case especially the regions with loess soil) were populated, given that we find Neolithic settlements in non-loess locations with conditions less favorable for farming. In these populated regions we can identify smaller communities whose origin and internal organization (as well as numerous details of their cultural identity) can differ (*Beneš 2014*, 147–149).

4.3. Northern and Northeastern Europe: borders of two worlds

The vast area between the present-day Netherlands and the Gulf of Finland was a remarkable area of contact between the 'traditional' western Neolithic and hunter-gatherer communities making ceramic vessels whose origins were in the east. Several distinct Mesolithic populations that already possessed the technology for producing ceramic vessels were located near the imaginary northern borders of the LBK and subsequent cultures.

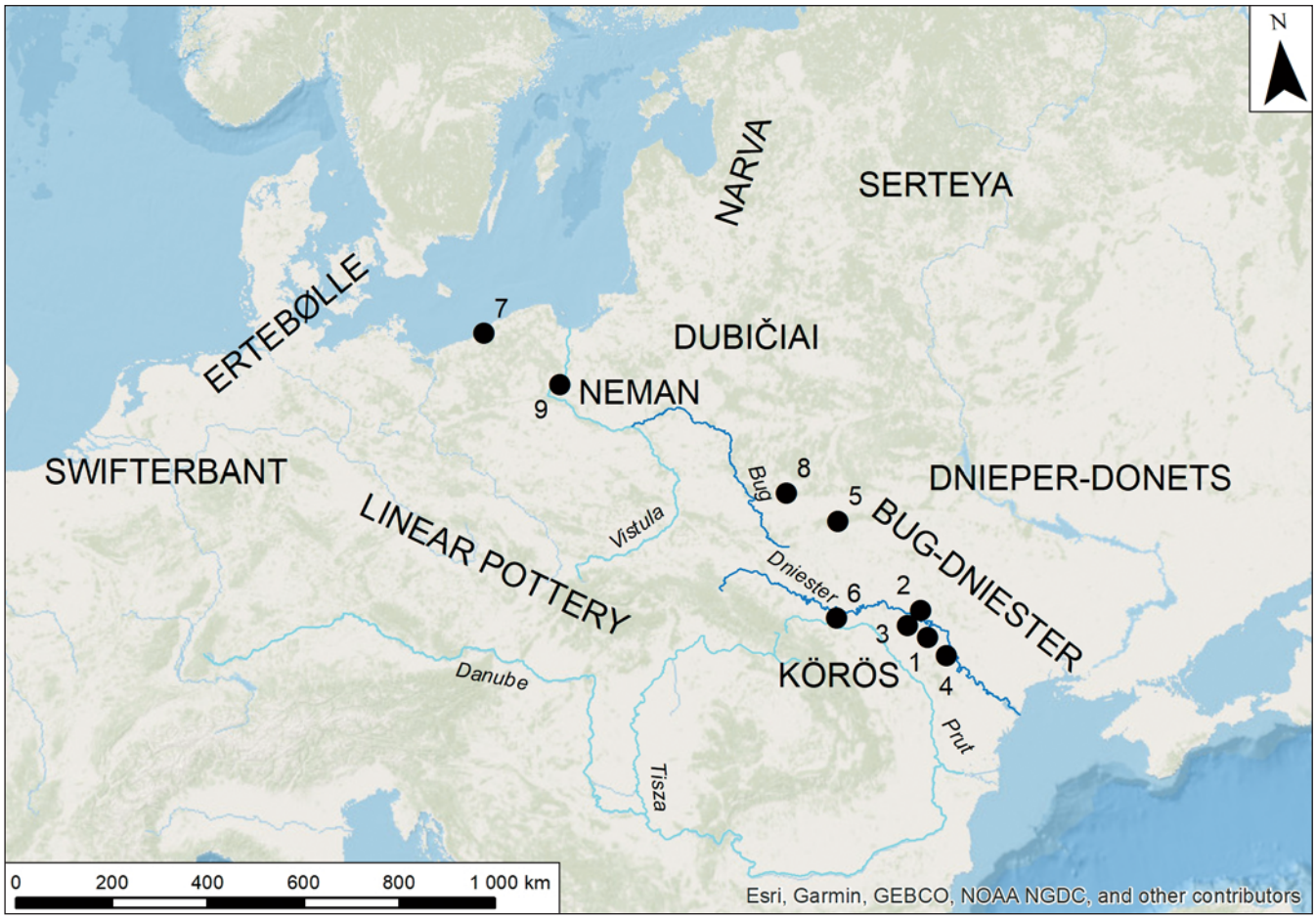

Fig. 5. *Map of the borderland between the western and eastern Neolithic with the most important sites.* ***1*** *– Sakarovka;* ***2*** *– Soroca;* ***3*** *– Floresti;* ***4*** *– Denchen;* ***5*** *– Rovno;* ***6*** *– Nezvisko;* ***7*** *– Dąbki;* ***8*** *– Gnidava;* ***9*** *– Klamry. —* ***Obr. 5.*** *Mapa hraniční oblasti mezi západním a východním evropským neolitem s vyznačením hlavních lokalit.* ***1*** *– Sakarovka;* ***2*** *– Soroki;* ***3*** *– Floresti;* ***4*** *– Denčeny;* ***5*** *– Rovno;* ***6*** *– Nezvisko;* ***7*** *– Dąbki;* ***8*** *– Gnidava;* ***9*** *– Klamry.*

These were the Swifterbant, Ertebølle, Dubičiai/Neman and Narva cultures.

Especially in Polish archaeology, the term *Paraneolithic* is used for these Mesolithic hunter-gatherer pottery-making cultures. The term is meant to clearly distinguish these 'pottery-making hunters' from Mesolithic populations without pottery and also from the 'western' Neolithic farmers of the LBK and subsequent cultures (*Nowak 2007*). One can also encounter the terms *Subneolithic* (*Kukawka 2019*) or *Forest Neolithic* (*Zvelebil 2010*). However, all these terms refer to the same phenomenon, i.e., hunter-gatherer-fisher communities producing pottery, whose origins must be sought in the eastern parts of Europe (*Nowak 2007*, 97). As will be shown below, these cultures and groups generally existed alongside the classical (i.e., western) Neolithic cultures and in some parts of Northeastern Europe they retained their distinctiveness until the Bronze Age.

Narva

Chronologically, the oldest is the Narva culture, which was located mainly in the territory of today's Estonia and Latvia. Its beginning, and hence also the beginning of the production of ceramic vessels in the region, dates back to around 5500 cal BC, with these earliest dates being associated with eastern Latvia, specifically the locations of Zvidze and Oza. Between 5200 and 5000 cal BC, the culture spread quickly northward and soon covered the rest of Latvia, all of Estonia, and part of northwestern Russia. In the south, it partially extended into the territory of present-day Lithuania and Belarus (*Kriiska et al. 2017*, 55).

The pottery vessels of the Narva culture are basically of two main forms – either larger vessels with an ovoid profile with a pointed or rounded bottom, or smaller oval bowls that probably served as some type of lamp. The pottery is mostly undecorated; in some cases, the upper half of vessels has small depressions and punctures, which in rare instances form geometric figures. An interesting fact is that the occurrence of decoration decreases towards the north (*Kriiska et al. 2017*, 59–60). For the production of ceramic vessels, organic temper was used almost exclusively, while sand and small stones appear less often. S-shaped vessels tend to be larger (diameter 18–36 cm, height 16–28 cm) than in the case of oval bowls (*Piezonka 2015a*, 163). While the oval bowls most likely served as lamps, in the case of the ovoid vessels, lipid analyses indicated their use for food storage and preparation. The entire territory of the Narva culture was exclusively occupied by hunter-gatherer populations, which makes their basic subsistence strategies clear, despite different preferences or

even hunting specializations in different microregions (*Zvelebil 2010*, 30–31). It is noteworthy that the results of lipid analyses of ceramic vessels of the Narva culture clearly showed that only fish was cooked and stored in the vessels (*Kriiska et al. 2017*, 75).

In terms of chipped industry, there is clear continuity of the Narva culture with the preceding classically Mesolithic (i.e., aceramic) Kunda culture, which originates in the Late Palaeolithic Swiderian culture and appears shortly after the beginning of the Holocene, specifically around 9000 cal BC (*Sikk et al. 2020*, 93). The chipping of blades and the production of scrapers, burins and microliths is typical, and both high-quality raw materials and less suitable (albeit more readily available) siliceous rock of local origin are also used. The same is essentially also true for the Narva culture, though a decrease in the number of blades is apparent and more knives appear (*Piezonka 2015a*, 137–138, 165). The continuity between the Kunda and Narva cultures is also evident in settlement strategies, with both cultures choosing sites near larger water surfaces, though the Narva culture appears to be more sedentary (*Nordqvist – Kriiska 2015*, 544–545; *Sikk et al. 2020*, 107, 112).

It is precisely these similarities between the two cultures that lead to speculation about the domestic origin of the first potters, whose knowledge of pottery production would thus be a kind of 'cultural appropriation' from more eastern regions (*Hang et al. 2020*, 276; *Kriiska et al. 2017*, 58), which also seems to be confirmed by DNA studies pointing to the 'domestic' origin of both cultures. The situation changes only with the arrival of the Corded Ware culture, when the original population mixes with the new arrivals from the Caucasus. It is also worth noting that a genetic trace of the bearers of the 'classical' Neolithic is essentially absent here (*Jones et al. 2016*, 2–4).

The end of the Narva culture can be dated differently in its northern and southern halves. The culture disappears from the territory of Estonia and northern Latvia around 3900 cal BC, while in the south of Latvia, the culture persists regionally until 1750 cal BC (*Kriiska et al. 2017*, 55). The culture's conclusion is primarily related to the arrival of agricultural groups, although the first fully agricultural culture in the Baltic region is the Corded Ware culture around 3000 cal BC (*Sikk et al. 2020*, 93).

Neman/Dubičiai

Dating roughly to the same period with the beginning of the Narva culture is the genesis of yet another culture linking the hunter-gatherer way of life and the production of ceramic vessels, i.e., the Neman culture in the territory of today's Lithuania, Belarus and the eastern half of Poland. The earliest phase of the Neman culture is known as the Dubičiai, which is sometimes (e.g., *Piezonka 2015a*; *Tkachou 2018*) regarded as a separate culture. However, in this text we will adhere to the standard classification (e.g., *Piezonka 2012*; *Tkachev 2017*), which considers the Dubičiai type as the earliest phase of the Neman culture. In Lithuanian archaeology, this culture is also sometimes (e.g., *Šatavičė 2020*) referred to as the Nemunas culture – the designation varies according to the name of the given river in individual countries.

The Neman culture appears in its Dubičiai phase roughly in the period of 5500 cal BC, initially in the territory of today's Lithuania and Belarus, and its origin is traditionally sought in contacts between local Mesolithic hunters and the Dnieper-Donets culture in the northern Black Sea area (*Piezonka 2015a*, 145–146; *Šatavičė 2020*, 116; *Tkachou 2018*, 82, 97), which represents one of the cultures of the 'eastern' Neolithic, i.e., a hunter-gatherer population producing ceramic vessels. At the same time, there is a great similarity between the vessels of the Dubičiai phase and the earliest Narva (*Šatavičė 2020*, 131), which could indicate the origin of both cultures. In any case, roughly a millennium later, this culture, by then already in the form of the 'classical' Neman, also appears in the territory of Poland (*Nowak 2017*, 117).

Neman culture pottery is different in its classical phase and in its Dubičiai phase (which is one reason it is sometimes regarded as a separate culture). The Dubičiai phase is characterized by the S-shaped profile of vessels with pointed bottoms, while the vast majority of vessels are not decorated. If any decoration is present, it is a line of punctures and incisions located just below the vessel rim. This decoration decreases towards the northwest, which would again indicate an origin in the northern Black Sea region, where the ceramic vessels of the Dnieper-Donets culture are richly decorated. The dimensions of the S-shaped vessels of the Dubičiai phase are usually in the range of 25–35 cm in diameter and 40–50 cm in height. The actual ceramic material contained organic temper (*Šatavičė 2020*, 126–129; *Tkachev 2017*, 111–112; *Tkachou 2018*, 82–85).

The classical phase, referred to as Neman, Pripjat-Neman or Nemunas, also contains S-shaped vessels, but in this case the bottoms are pointed or round. Decoration appears more frequently (in the eastern part of the culture) and is represented by series of punctures in various densities. The rims of vessels are also decorated in the territory of Poland. This involved deep and prominent punctures on both sides of the rims. In contrast to the Dubičiai phase, the temper in the classical Neman is also distinct, with small stones being newly employed. And yet, the dimensions of the vessels are very similar in both phases and decrease over time (*Piezonka 2015a*, 232; *Šatavičė 2020*, 132–133; *Tkachev 2017*, 112). Lipid analyses also made it possible to reveal what was stored and prepared in Neman culture vessels. Based on these analyses, it can be stated that the Neman culture, including the Dubičiai phase, used ceramics primarily for cooking and storing meat from terrestrial animals. On the other hand, compared to the Narva culture there is essentially no evidence of fish exploitation (*Šatavičė 2020*, 136–138).

Chipped stone industry is also relatively simple to decipher. Especially in Poland, but also in the eastern regions of the Neman culture, there is clear continuity with domestic traditions of the production of chipped industry, especially the Janislawicien, which in the case of Polish territory overlaps spatially with the expansion of the Neman (*Kozłowski 2019*, 28–31; *Nowak 2017*, 117; *Piezonka 2015b*, 558). The industry is produced from long, regular blades made from stone raw material of the highest quality (*Piezonka 2015a*, 136). The

predominant tools are short scrapers and trapezes (*Nowak 2007*, 92–95). The precise genesis of the Neman culture is therefore unclear. As with the Narva culture, pottery production could be an element appropriated by the local population from the area southeast (Dnieper-Donet culture) and perhaps even to the north (Narva culture) of the area in which the Dubičiai phase was located. The actual population, however, would remain local (*Nowak 2017*, 120).

And while a large number of absolute dates are not yet available for the entire Neman culture (*Tkachev 2017*, 113), it is nevertheless evident that the demise of the culture is related to the arrival of the Funnel Beaker culture (TRB) in the territory of Poland and the Corded Ware culture (CWC) in Lithuania and Belarus. The first of these spreads from the northwest and comes into contact with the Neman culture sometime around 4100–4000 cal BC, while around 3500 cal BC most of Polish territory is already 'Neolithicized'. Neman culture sites still appear in rare cases around 3000 cal BC (*Nowak 2017*, 120; *2019*, 114–117). The original 'core' area of the culture, i.e., Lithuania and Belarus, changes with the arrival of the CWC around 2500 cal BC. The CWC spread rapidly and new trends and differences from previous periods are evident in ceramics. Classical Neman elements disappear from material culture between 2200 and 2000 cal BC, i.e., at the beginning of the Bronze Age (*Sobieraj 2017*, 350–352).

Compared to the Narva culture, it is worth recalling the far more significant geographical proximity of the Neman culture and the cultures of the 'classical' Neolithic. This is especially true for the area of Poland, where the bearers of the Neman culture could encounter the LBK and its successors. The archaeological data suggest that contact between the two groups was rather rare – these are basically exclusively isolated finds of Neolithic ceramics and polished industry in the context of the Neman culture. Contact between Neman hunters and TRB farmers must have been far more intense (*Kukawka 2019*; *Nowak 2019*, 108–111). In any case, 'eastern' and 'western' potters were able to coexist side by side in a relatively small area of Poland and western Lithuania and Belarus for a very long period of nearly 3000 years, without any significant visible influence of one or the other material culture (*Nowak 2007*, 91–92).

Ertebølle

The Ertebølle culture (EBK) is one of the best archaeologically investigated and described cultures of hunters producing ceramics in Europe. The EBK spread geographically along the southwest coast of the Baltic Sea, i.e., in Denmark, north Germany and southernmost Sweden. While its beginning is dated to around 5400 cal BC, its early phase (5400–4800 cal BC) was aceramic, and vessels thus appear only after 4800 cal BC. It is noteworthy that the production of ceramic vessels appears essentially all at once in the entire territory of the EBK and this is the only archaeologically detectable change that occurred at the given time (*Andersen 2010*, 167–169; *Papakosta – Oras – Isaksson 2019*, 142–143).

The EBK itself has a relatively well-traceable origin based on essentially continuous development from the Late Palaeolithic through the preceding Mesolithic Maglemose and Kongemose cultures (*Blankholm 2010*, 110). However, the origin of knowledge of ceramic vessel production remains unexplained. In fact, three spheres are considered: eastern Europe (i.e., especially the Narva culture) due to similar pottery production techniques, western (i.e., Swifterbant) for similar vessel shapes, and southern (i.e., LBK and subsequent cultures) due to their geographical proximity (*Tranekjer 2015*, 434). Based on the differences in material culture (chipped industry and ceramics), the origin of the knowledge of pottery production in the environment of the Narva culture currently appears to be the most likely (*Poulsen 2013*); however, there are also great differences between these two cultures, especially in the ways ceramic vessels were used (*Courel et al. 2020*; *Papakosta 2020*). However, similar to previous cultures, this would again probably be knowledge of pottery production transferred to the environment of the original aceramic hunters and gatherers of local origin.

EBK ceramic vessels can be divided into two main groups: S-shaped pots with pointed or rounded bottoms and smaller oval bowls identified as lamps, which lipid analyses also confirmed (*Poulsen 2013*, 147–148). However, the second group occurs only in the territory of Denmark and north German; these lamps are not known from southern Sweden. While S-shaped vessels are thick-walled (0.5–2.7 cm), their size ranges from small (height 8 cm, diameter 5 cm) to large (height 50 cm, diameter 25 cm). The lamps have an oval shape, but they too have a pointed or rounded bottom. Their diameter is up to 30 cm. In terms of decoration, the S-shaped vessels are primarily undecorated; finger-pressed decoration of the rim and incisions appear only rarely. On some Danish islands in the Baltic Sea, a small number of vessels with finger-pressed decoration covering the entire body are found. Small oval bowls are also typically lacking decoration and at most feature a finger-pressed rim. Technologically, EBK ceramic material is characterized by a lower content of temper, which, however, is larger than that used by 'classical' Neolithic cultures. Small stones and sand were used for temper. On the other hand, organic temper is missing (*Andersen 2010*, 170–173; *Tranekjer 2015*, 434–440). It has been experimentally verified that the vessels were fired in open hearths at a temperature of 500–600 °C and that their purpose was profane, as the S-shaped vessels were used for cooking (*Poulsen 2013*, 149–151). As has already been mentioned, the oval bowls actually served as lamps, while the S-shaped vessels were used for cooking. Lipid analysis of the second group of ceramics revealed that compared to other Mesolithic pottery-making cultures in the vicinity, EBK vessels were used for cooking and storing a highly diverse range of foods, including plants, fish, meat and terrestrial animals. In contrast to cultures such as the Narva and Neman, no preference or even 'specialization' is documented in the use of vessels (*Papakosta 2020*, 47). The discovery of the presence of milk in some vessels is very surprising, and this fact is attributed primarily to EBK contacts with Neolithic farmers (*Courel et al. 2020*), as there is a lack of any other archaeological evidence that could indicate the domestication of animals (except dogs) in the EBK environment (*Andersen 2008*, 72).

The continuity of EBK with earlier cultures (understandably traced primarily on the basis of chipped industry) has already been mentioned. Microliths and the blade technique are typical. Starting with the Kongemose culture, trapezes also appear in large numbers, while retouched points newly appear in the EBK. The typical production of chipped axes is documented throughout the entire period (*Blanhkolm 2010*, 110–113; *Hartz – Lübke – Terberger 2007*, 573–581). This linear development since the Late Palaeolithic is disrupted only after the end of the EBK with the arrival of the TRB, whose chipped industry primarily involved flake tools (*Andersen 2008*, 71).

The end of the EBK is connected precisely with the TRB. Until recently, this transition was regarded as abrupt and quick (e.g., *Andersen 2010*, 175). It occurred around 4000 cal BC and was accompanied by the 'classical' (western) Neolithic with evidence of agriculture and animal husbandry. And yet, it has newly been shown (*Sørensen 2015*) that 'transitional forms' between the EBK and TRB exist precisely in this period around 4000 cal BC. Nevertheless, there are substantial differences in subsistence strategies and also in the use of vessels. It should be noted that there are no significant changes in settlement structure; hunting and fishing still retain considerable importance within these subsistence strategies (*Hartz – Lübke – Terberger 2007*, 585–589) and sometimes (e.g., *Andersen 2008*, 72) the term 'fishermen-farmers' is even used in the early stage of the TRB. For these reasons, the autochthonous development of TRB in the EBK area through the influence of the Michelsberg culture is considered (*Sørensen 2015*).

If the genesis of the TRB under the influences of the Michelsberg culture in the EBK environment were true, there would have to be contact between EBK hunter-gatherer-fishermen and central European farmers. It is within the EBK that such contacts are by far the best documented of all the cultures described here. In the EBK environment, flat polished axes originating from the environment of the LBK and subsequent cultures (especially the STK and the Rössen culture) appear, while sometimes after 5000 cal BC this evidence increases. The discovery of the bones of domesticated animals from the Grube–Rosenhof site from around 4600 cal BC is also rare, but is sometimes challenged (see *Hartz – Lübke – Terberger 2007*, 578–581). We have already discussed the rare evidence of the presence of milk in some EBK vessels (*Courel et al. 2020*), which can again be explained mainly by contacts between the two groups.

Dąbki

Unique evidence of a hunter-gatherer community producing ceramic vessels comes from a site in northwestern Poland. The local pottery finds cannot be clearly attributed to the EBK or the Neman, and therefore, even though it is a single site, the Dąbki settlement is singled out from the other cultures. This is a large settlement site located at the time of its existence on the shore of an island in a freshwater lake. According to contemporary absolute dates, the beginning of settlement can be dated to 5200 cal BC; however, a significant increase in archaeological evidence falls into the period of 4900–4800 cal BC. Since then, essentially continuous settlement has been documented here up to 4000–3800 cal BC, and the last finds date to approximately 3580 cal BC, when the lake itself also disappears. Culturally, two main ceramic horizons have been distinguished. The earlier of these is represented by vessels in the sphere of hunter-gatherer pottery. This horizon is dated to 4900–4100 cal BC, at which point it is replaced by TRB pottery (*Kotula et al. 2015*, 118–122). It is necessary here to emphasize that the TRB finds from the site show a purely hunter-gatherer (i.e., Mesolithic) character throughout the entire period the settlement was occupied, without any evidence of agriculture or animal domestication. As such, the origin of the local TRB in a purely Mesolithic environment cannot be ruled out (*Czekaj-Zastawny – Kabaciński 2017*, 112; *Czekaj-Zastawny – Kabaciński – Terberger 2011*, 163–164).

Ceramic vessels falling within the circle of hunter-gatherer settlement are made up of two basic forms. These are mainly S-shaped vessels with pointed bottoms and slightly convex rims. Rim diameters range between 10 and 33 cm, with the vast majority falling in the narrow range of 18–22 cm. Vessel height is 10–45 cm, most frequently between 20 and 35 cm. The vessels are either undecorated or decorated with a row of incisions just below the rim or directly on it. Perforations appear very rarely and were probably not functional elements, but were created either on purpose or were at least tolerated and not repaired. Small stones were used exclusively as temper, often several different types simultaneously. Besides these vessels, there are also small oval bowls, 'lamps', 3–5 cm high (the diameter could not be determined due to their fragmentary state). In terms of decoration and temper, they completely match the S-shaped vessels, including the perforations. These bowls most likely served as lamps, similar to those in the EBK. In the case of S-shaped vessels, their use for cooking is suggested due to the numerous finds of burnt pieces of food. However, lipid analyses have not yet been performed (*Kotula 2015*, 179–187). While the origin of this ceramic tradition is not easily determined, the finds here are roughly similar to the EBK; however, the finds from Dąbki are older than the beginning of pottery production in the LBK. The Neman and Narva cultures occurring in the east show a slightly different technological process in the production of ceramic vessels. The local finds thus show a technological similarity with the EBK, while in terms of time and decoration they correspond more to the Neman culture (*Kabaciński – Heinrich – Terberger 2009*, 550–551; *Kotula 2015*, 196–197).

The chipped industry from the Dąbki site was mainly produced from high-quality local siliceous rock based on the blade technique. In terms of tools, various types of scrapers, trapezes and retouched blades were most common. In this respect, the chipped industry shows continuity with the earlier Maglemose and Kongemose cultures, while also showing certain similarities with the EBK and LBK (*Ilkiewicz 1989*, 25–28; *Sobkowiak-Tabaka 2015*).

The Dąbki site also shows a relatively high level of contact with contemporary 'western' Neolithic cultures in the Danube region. In fact, the site produced ceramic fragments and vessels belonging to the LBK and the

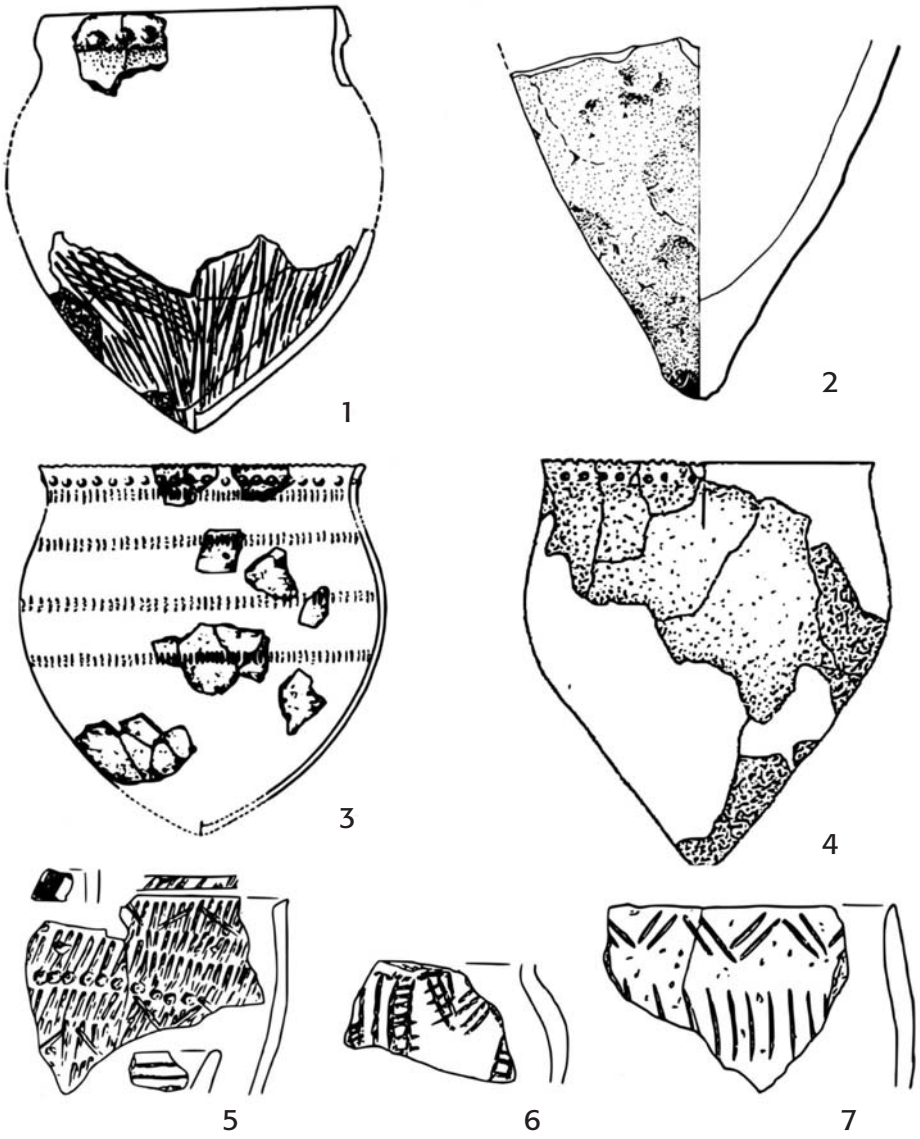

Fig. 6. *Mesolithic and Paraneolithic pottery.* ***1, 3–4*** *– Neman (after Kriiska et al. 2017);* ***2*** *– Dąbki (after Kotula 2015, 183, Fig. 8);* ***5–7*** *– Klamry (after Kozłowski – Nowak 2019). Without scale. —* ***Obr. 6.*** *Mezolitická a paraneolitická keramika.* ***1, 3–4*** *– Němen (podle Kriiska et al. 2017);* ***2*** *– Dąbki (podle Kotula 2015, 183, Fig. 8);* ***5–7*** *– Klamry (podle Kozłowski – Nowak 2019). Bez měřítka.*

STK, the occurrence of which was also dated in absolute terms to 4600 cal BC. However, the most ceramic imports come from the environment of the Brześć Kujawski group, with finds typologically dating to 4600–4300 cal BC. Pottery imports of the Bodrogkeresztúr culture from the period around 4000 cal BC also come from the period when a TRB hunting settlement was located in Dąbki. It is difficult to explain these finds as the presence of the bearers of the given cultures and they must therefore be imports of individual vessels (*Czekaj-Zastawny – Kabaciński – Terberger 2011*, 165–171; *Czekaj-Zastawny et al. 2013*, 203–205).

Swifterbant

The westernmost hunter-gatherer culture characterized by the production of ceramic vessels is the Swifterbant culture. The area of its settlement mainly covered today's Netherlands, part of Belgium and northwest Germany. In general, we can talk about the area between the Scheldt and Elbe rivers. The culture falls into the period of 5000–3400 cal BC, which is divided into early, middle and late phases. An interesting fact is that only the older part, i.e., the period of 5000–4600/4500 cal BC, is hunter-gatherer. From its middle phase, Swifterbant was a fully Neolithic, i.e., agricultural, culture (*Raemaekers – de Roever 2010*, 135). The early phase thus represents the end of the Mesolithic, while the other two are already Neolithic. The origin of the entire culture, or rather its ceramic tradition, is extremely difficult to determine. While the Mesolithic in general is still poorly understood in the given area (*Verhart 2010*), it seems that there is a relatively strong continuity of the Swifterbant culture with the previous Late Mesolithic settlement, at least from the perspective of chipped industry (*Raemaekers 1999*, 131). The origin of the technology for the production of ceramic vessels remains unknown. The culture definitely does not originate in the EBK, as it significantly precedes it chronologically. From the very beginning, the bearers of this culture were in contact with LBK communities, from whose environment knowledge of pottery production could theoretically come and its origin is often (*Constantin 2010*, 133–134; *Louwe Kooijmans 2007*, 305–306; *Raemaekers 1999*, 182; *2011*, 495–496; *Verhart 2010*, 178) seen

precisely in these contacts. However, it should be noted that Swifterbant and LBK ceramics are significantly different in terms of form and production method, and it is therefore possible to consider a kind of innovation from the perspective of the hunters, who, although they adopted knowledge of making vessels, modified it significantly (*Amkreutz et al. 2010*).

Pottery from the early phase of the Swifterbant culture is characterized by a single basic type of vessel – an S-shaped vessel with a round or slightly pointed bottom, i.e., not very formally distinct from the EBK or Narva culture (*Crombé – Vanmontfort 2007*, 273–275). Decoration is mostly sporadic and limited to slashes and incisions on the rims of vessels. In terms of technology, the firing of the vessels is not of a high quality and the material was tempered with small stones and small pieces of plants (*Raemaekers – de Roever 2010*, 137–141). The pottery changes with the emergence of the middle phase of the culture (and therefore also in concurrence with agriculture and animal husbandry). The vessel form remains the same, i.e., S-shaped, although the maximum diameter of the body increases slightly and the bottom becomes somewhat rounded. The amount of decoration increases and especially includes rows of incisions on the rim and body of vessels, as well as finger-pressed decoration. From a technological perspective, organic temper dominates small stones (*Raemaekers 1999*, 108–111; *Raemaekers – de Roever 2010*, 146). Ceramic vessels in the early phase were already being used primarily for cooking, as burnt pieces of food on ceramic fragments document. A storage function is also assumed for ceramics (*Raemaekers – de Roever 2010*, 137). Lipid analyses revealed that throughout the entire existence of the culture (i.e., in its Mesolithic and Neolithic phases), freshwater fish was primarily cooked in the vessels. However, this was not exclusive, and from around 4500 cal BC (De Bruin site) and even more so after 4000 cal BC, there is evidence of cooking bovid meat, both wild and domesticated forms. From 4300 cal BC, the cooking of cereals and pork also appears, whereas after 4100 cal BC, milk is likewise stored in the vessels. The cooking of freshwater fish is documented most in the early phase of the Swifterbant (*Raemaekers et al. 2021*, 666–667).

Swifterbant chipped industry is relatively well known. The blade technique is predominant in the early phase, and trapezes, scrapers and retouched blades dominate among tools. In terms of raw materials, both local and quality imports were used, specifically siliceous glacial sediment and Wommersom quartzite in the southern Netherlands. In this respect, it more or less coincides with the middle phase of the culture, where, of course, there is an increase in flake technique. Scrapers and retouched flakes were prominent tools. In contrast, there are fewer trapezes and transversely retouched points appear. Polished industry also appears (*Crombé – Vanmontfort 2007*, 273–277; *Raemaekers 1999*, 108–111, 129).

The end of the culture is essentially twofold. First, it is possible to speak of the end of the early phase of the Swifterbant culture, as the period around 4600/4500 cal BC marks the end of the existing hunter-gatherer style of life and the beginning of agriculture and animal husbandry. These 'western' Neolithic components were perhaps transferred to the Swifterbant culture through the Rössen and/or Michelsberg cultures (*Crombé – Vanmontfort 2007*; *Dusseldorp – Amkreutz 2015*, 23–25; *Louwe Kooijmans 2007*; *Raemaekers 1999*, 182; *Vanmontfort 2008*, 91). The culture as such then has its own conclusion around 3400 cal BC along with the arrival of the TRB (*Raemaekers – de Roever 2010*, 135). By this time, it was a 'classical' Neolithic culture with all components of the 'Neolithic package'.

As in the case of the EBK, with the Swifterbant culture it is also possible to trace possible contacts with Neolithic LBK communities and those that followed. As already mentioned, the very beginning of pottery production and, later, the changes in the middle phase of the culture occurred precisely through contacts with the Neolithic population. However, the development of relations between the two groups was apparently significantly more dynamic than it was in the case of the EBK. In fact, the Late Mesolithic groups of Northwestern Europe came into contact with the first farmers even before the emergence of the Swifterbant culture, as the LBK arrived in this region around 5300 cal BC, i.e., approximately 300 years before the beginning of the Swifterbant (*Amkreutz et al. 2010*, 15). The Dutch wetlands, which created a contact zone about 200 km long, were a kind of border between the worlds of farmers and hunters (*Raemaekers et al. 2021*, 658). From the very beginning of the culture, polished industry originating from the LBK environment also appears at some of its sites (*Constantin 2010*, 134). Interesting from this perspective is the site of Bazel-Sluis, dated in absolute terms to 4850 cal BC, which was a hunter camp of the Swifterbant culture, but where the presence of cultivated grain has also been documented, and the whole situation is interpreted precisely as the result of Swifterbant contacts with the surrounding agricultural cultures (*Raemaekers et al. 2021*, 660–661). Imports appear in the environment of the Swifterbant culture in even greater numbers after the emergence of the Rössen culture. At that time, they essentially covered the entire territorial extent of hunter-gatherer settlement, and it cannot be ruled out that it was precisely the influence of the Rössen culture that resulted in the application of agriculture (*Dusseldorp – Amkreutz 2015*, 25; *Raemaekers 1999*, 182).

Summary

The cultures and sites of pottery-making hunter-gatherer communities in Northern and Northeastern Europe show a number of similarities and differences. On the basis of chipped industry, it is apparent that they all show clear continuity with the preceding local Mesolithic development, thus indicating that only knowledge of the technology of ceramic vessel production spread and not the population.

The pottery itself can be divided into two main groups, the second of which does not occur in all cultures. The first group is composed of S-shaped to ovoid vessels of larger dimensions with pointed to slightly rounded bottoms. The second group is made up of small oval bowls serving as 'lamps'. Both types of vessels occur in the Narva culture, in the EBK and at the Dąbki site, while they are missing in the Neman and Swifterbant

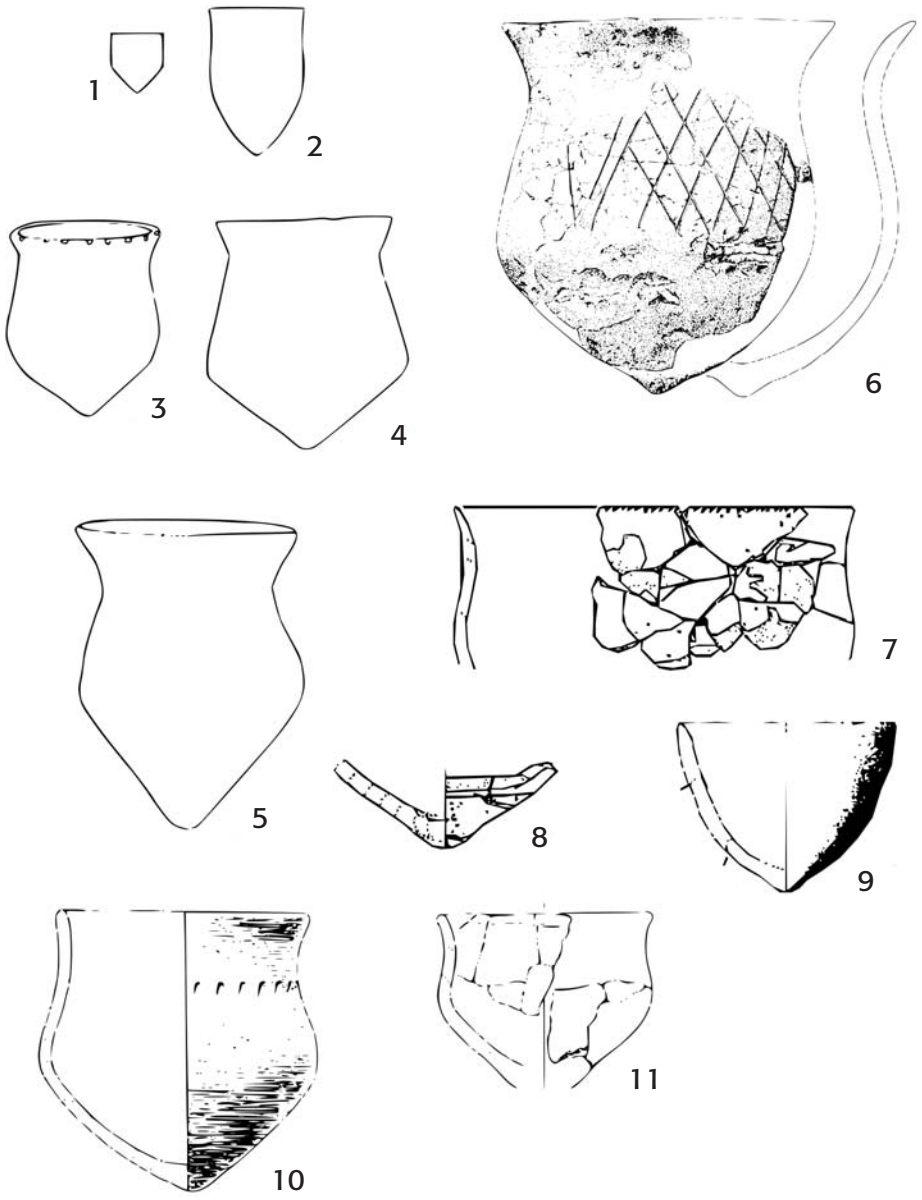

Fig. 7. *Mesolithic and Paraneolithic pottery of the Western Baltic Sea and North Sea regions.* ***1–6*** *– Ertebølle culture (after Andersen 2010, 172, Fig. 7; Nowak 2017, 121, Fig. 3);* ***7–9*** *– Early Swifterbant culture (after Raemaekers – de Roever 2010, 138, Fig. 2);* ***10–11*** *– Middle Swifterbant culture (after Raemaekers – de Roever 2010, 139, Fig. 3). Without scale. —* ***Obr. 7.*** *Mezolitická a paraneolitická keramika při západním pobřeží Baltu a Severním moři.* ***1–6*** *– kultura Ertebølle (podle Andersen 2010, 172, Fig. 7; Nowak 2017, 121, Fig. 3);* ***7–9*** *– starší fáze kultury Swifterbant (podle Raemaekers – de Roever 2010, 138, Fig. 2);* ***10–11*** *– střední fáze kultury Swifterbant (podle Raemaekers – de Roever 2010, 139, Fig. 3). Bez měřítka.*

cultures, a difference that could theoretically suggest a slightly different origin of the pottery production tradition. In the case of the Narva culture, the centers of origin are sought in (north)western Russia, while in the case of the Neman culture there is a relatively clear connection to the northern Black Sea area. The genesis of the Swifterbant culture is the least clear, but the adaptation of techniques from the surrounding agricultural communities is regarded as the most likely explanation. Among other cultures, it is obvious that the Narva culture shows the greatest technological affinity with the EBK. Theoretically, it is therefore impossible to rule out that the hunter-gatherer communities on the coast of the Baltic and North Seas were not affected by three different impulses that triggered the beginning of the production of ceramic vessels. The first such impulse would have originated in Western Russia and continued further west through the Narva culture (perhaps through Dąbki?) to the EBK. The tradition originating from the Black Sea coast would, on the other hand, have stimulated the emergence of the Neman culture (and again perhaps also affected Dąbki?). The ceramics of the Swifterbant culture would then emerge through adaptation and its own innovation from Neolithic farmers. However, it must be noted that these conclusions are purely working theories that are not supported by sufficient archaeological data.

At the same time, one cannot deny the differences in the production and use of ceramics among individual cultures, including those that were identified above as being related. In terms of the temper that was employed, two main groups can be distinguished – organic temper and small stones or sand. The Narva and Neman cultures belong to the first group, whereas stones were used by the EBK and at the Dąbki site. The Swifterbant culture used both sources, with a slight predominance of organic temper. As for the use of vessels, it can be unequivocally stated that S-shaped pots were used in all cases for cooking and storing food, although the specific types of food again differ significantly. The most

rigid in this respect is the Narva culture, whose pottery served almost exclusively for cooking and storing freshwater fish. In the other cultures, these rules were much looser, although in the case of the Neman culture, traces of the meat of terrestrial animals dominate significantly, in the case of the Swifterbant culture, freshwater fish. An actual mix, which apparently had no clearly archaeologically recognizable rules, comes from the EBK environment, where the cooking of fish, terrestrial animals and plant food components are documented.

Absolute chronology, while reasonably well supported by data for all cultures, offers no clues as to the origins of individual ceramic traditions. The Narva and Neman cultures can be considered the oldest, both dating from around 5500 cal BC. These are followed by the ceramics of the Swifterbant culture from around 5000 cal BC and then the production of vessels at the Dąbki site from 4900 cal BC and the EBK a century later. The Narva, Neman and EBK cultures share the fact that their end is related to the arrival of the agricultural way of life – be it the TRB or the Corded Ware culture. The Swifterbant culture stands out here, with agriculture and animal husbandry being adopted, and which underwent a change in pottery decoration; however, the actual nature of the culture itself was preserved, again until the arrival of the TRB. The Dąbki site is also different, where the beginning of TRB settlement, on the other hand, did not change the hunter-gatherer way of life and the demise of the local settlement was apparently naturally conditioned.

5. Neolithic as a stage

The changes on the Eurasian continent happened on both sides of the line (*Fig. 3*), which marked the limit of prehistoric agriculture (*Bellwood 2005*). Therefore, the Neolithic, within the wider meaning of the term, surpasses the developments in agriculture, settled way of life and domesticated sources of subsistence that happened to the south of this line. The changes to the north of the said border happened within the environment of hunter-fisher-gatherers who practiced a mobile way of life in regions with a very sparse population. In addition, this period preceded the beginning of plant and animal domestication by several millennia both in this region, which was particularly suitable for prehistoric agriculture, and also in other territories between Southwest Asia and east China (*Lemen 2015*).

The first step towards agriculture was probably the domestication of certain plant species. This domestication was preceded by the consumption of the wild ancestors of those species and was followed by the domestication and use of various animal species. Starting in the 9th millennium BP, the original centers of agriculture in Southwest Asia spread into those parts of Europe with similar environments: first to Aegeida (*Perlès 2001*) and then through the Balkans (*Budja 2004*) into Central Europe (*Bickle – Whittle 2013*, 5) and continuing to the Atlantic coast (*Rowley – Conwy 2011*). At the other end of Eurasian continent, people spread perhaps from the Chinese centers (*Bar-Yosef 2017*, 298) in the 16th millennium BP, in a time before agriculture but with a form of pottery seen much earlier than in other parts of Asia including Japan (*Habu 2004*; *Nakazawa et al. 2011*, 426). In both cases it has lasted until now, therefore making it possible to say that the subsistence of our present civilization rests on sources that were domesticated in the Neolithic, and which were then unintentionally genetically modified by Neolithic farmers.

The occupation of caves in southern China, together with evidence of ceramic technology that started almost 20,000 BP, shows the beginnings of a more sedentary hunter-gatherer society (*Cohen et al. 2003*; *Wu et al. 2012*). The development of ceramic technology dates from at least the 13th millennium BP, 2,500 km from the southern Chinese settlement at Houtaomuga, and played a part in the relatively fast transition to large sedentary settlements of northeastern China (*Wang – Sebillaud 2019*, 77). The prolonged beginnings of pottery vessel production bring up many questions about the causes and use of these new artefacts. The use of ceramics began in many places which had to communicate in some way, the information being exchanged in a similar way to the information about stone tool making. From the beginning, vessels were used for various purposes, but mainly for the processing of food from aquatic resources. At first, they were not necessarily used in the plant domestication process but they certainly took part in the changing forms of mobility and supporting sedentarism (*Shelach-Lavi – Tu 2017*, 8–9).

Ceramics are one of the main material constituents that form the archaeological characteristics of the Neolithic. As a comparable archaeological materialized manifestation of human behavior, ceramic technology originated independently in different places. In the Near East, containers made of various organic materials of wood and stone had already been used for a long time and limestone vessels (*vaisselle blanche*) appeared in the 8th millennium BC, the use of which caused the postponement of the production of calcined clay vessels (*Rollefson 1989*, 171). One of the oldest finds comes from Mureybet 3 dated to 10,000 BP (*Cauvin 1994*, 200; *Pavlů 1996*, 31). In the Levant, ceramics started to be more commonly used between 8500–7000 BP in various localities, and knowledge of its production spread further to Anatolia (*Aurenche et al. 1981*, 576) and later to Europe. Ceramic technology did not enter Central Europe from the Carpathian Basin until 7500 BP (*Oross – Bánffy 2009*). In Europe, the oldest finds of amorphous pieces of fired clay come from Dolní Věstonice around 28.0 ka BP (*Soffer et al. 1993*). Initially, this technology was used to make cult figures (*Budja 2016*, 507). Only later, however, in the environment of hunters and gatherers, did the technology of making containers from fired clay became common as a result of much experimentation and the accumulation of practical experience (*Rice 2015*, 8). Central European Neolithic non-ceramic vessels are exceptionally preserved – most famous being bags made of birch bark for drawing water from wells (*Stäuble – Campen 1998*).

Ordinary ceramics fulfilled various functions which can be distinguished as practical or prestigious. In the Russian Far East and China, pottery finds from long before the debut of Neolithic agriculture (*Sato – Natsuki 2017*) and beyond the potential frontier of prehistoric

agriculture raised the question of *why*? Given the contexts of the findings, the answer must be general. Ceramics met social and economic needs, i.e., they were practical. However, the authors ruled out the use of ceramics as a prestigious commodity (*Shelach-Lavi – Tu 2017*, 5). In particular, they could be used for direct cooking, a more efficient method than indirect cooking with stones thrown into baskets (*Shelach-Lavi – Tu 2017*, 6). This would also be evidenced by the cloudy bottoms of most of the oldest shapes and evidence of wild rice or other types of food, known as 'aquatic resources'. In northern and northeastern China, however, the earliest pottery has predominantly flat bottoms, so its function may have been different, although flat bottoms are explained as a consequence of achievements such as basketry (*Wang – Sebillaud 2019*, 101). Their natural use would be for long-term storage or for some collective cooking. As a result, ceramics contributed to changes in mobility and promoted seasonal sedentarization after leaving caves and in connection with the control of stable livelihoods in watercourses (*Wang – Sebillaud 2019*, 102).

If we follow the relationship between the development of agriculture and the development of ceramic technology in the two above mentioned centers of the continent, then it is possible to see that the time connection between the two places differs (*Fig. 1*; *Tab. 1*). In the Middle East lags the ceramic technology, while in the Far East the agricultural development. In both places the development of different experiences took place independently of each other, at least during the earliest millennia. This shows that their interconnectedness, according to the earlier approach to the Neolithic, is a result of later developments. Surprisingly, early radiocarbon dates from east China point at specific conditions necessary for the beginning of ceramic technology within the context of the Late Palaeolithic way of life (*Li – Kunikita – Kato 2017*). The use of pottery in these conditions and an increasing share it played in the life of the society helped cause a substantial decrease in mobility. That consequently enforced better utilization of the existing sources of food and also an experimentation with new food sources, which were mostly gathered. Pottery thus became an important tool in a complex process, which eventually led to mobile sedentism long before settled agriculture (*Shelach-Lavi – Tu 2017*, 9).

Similarly, in eastern Siberia, pottery became part of more settled hunter-fisherman settlement and took part in the process of decreasing mobility and changes to the existing strategy of subsistence (*Morisaki – Sato 2015*). The gradual transference towards agriculture in these areas was delayed because of natural, disadvantageous environmental conditions. The character of these changes can be compared to changes which elsewhere led to agriculture. Therefore, the entrance of ceramic technology together with other constituents as in the Osipovka culture to the wood-steppe zone of the Eurasian continent can also be described as Neolithic (*Oshibkina /ed./ 1996*; *Shewkomud – Yanshina 2010*, 70).

If we consider a sufficiently evolved set of changes in non-agricultural societies, we can in the Neolithic stage therefore include a wider sense of the term's meaning. Due to concrete differences in various regions, it is necessary to differentiate diverse variants of the term Neolithic on the Eurasian continent. Their launching mechanism and main common archaeological attribute remains the development of ceramic technology. In the classic agricultural Neolithic this technology is characterized by a variability of basic shapes of vessels, which gradually change. In the regions of the non-agricultural Neolithic, ovoid cauldron-like vessels prevail and their shape does not fundamentally change. They persist in the vast territories of Eurasia which reach as far as northern Scandinavian Europe for a very long time. The main regions of these Neolithic cultures can be described as the *pre-agricultural Neolithic* in east China, *classic agricultural Neolithic* in the Near East and Europe and *hunter-fisher Neolithic* in the wood-steppe zone of Eurasian Russia.

According to the original concept, the Neolithic is a sum of cultural/archaeological phenomena (*Tichý 2014*) which gradually changed into a complex first developed in the Near East, then spread further to inland Europe and the littoral areas of the Mediterranean.[2] Today we say it is more probable that it was a matter of asynchronous long-term development connected with local Late Palaeolithic occupation conditions and various acquired forms which do not exclude various concrete combinations of settlement and subsistence. The idea of a new historic moment in society and subsistence is anachronistic and demands the reformulation of basic characteristics according to concrete time-space conditions (*Bar-Yosef 2017*). The determination of the Neolithic by developments within the borders of Central and Western Europe is misleading because changes in the Late Palaeolithic demand the study of its development across the whole of the Eurasian continent. Also, restriction to the time period of the Holocene is not justifiable. As it can be shown, the fundamental changes started at the end of the Pleistocene before this climatic change.

The most archaeologically distinctive manifestation, as a connecting element of Neolithic changes, seems to be the establishment and use of ceramic technology. In the European Neolithic it is seen as an integral part of its social characteristic which developed in the Near East during a long process of gradual development of vessel production from various materials – stone, wood, lime and finally unfired clay. It is interesting that a very diverse morphology gradually developed from the different materials. Ceramic vessels appeared in the Levant around 9000 BP ('Ain Ghazal; *Rollefson – Simmons – Kafafi 1992*), at first in simple shapes which did not imitate the shapes of vessels from other materials, for example wood. This would suggest a function-spe-

[2] From the point of view of the Old Continent countries, it is necessary to remember that some of the earliest pottery also appears in sub-Saharan Africa. In the stratified sediments of the Ounjougou (Mali) site, pottery is present after 9400 cal BC (*Huysecom et al. 2009*, 909). The northwards spread of ceramic technology to the Iberian Peninsula was already considered in the 1930s (*van Willingen 2006*, 24). In Western Europe it would be the third form of the Neolithic to occur at the beginning of the Holocene, and which would be based more on cultural exchange than on mass population movement (*Gronenborn 2008*, 68).

Number on Map	Site	Lab Code	^{14}C BP	cal BP (95.4%)	Region	Temperature	Stage	Epoch	Note	References code, page
1	Xianredong: 3C1B	UCR3440	18,520 ± 140	22,881–22,187	E China	cold	LGM	Pleistocene	charcoal	a, 25
2	Yuchanyan: 3H	BA95057b	14,390 ± 120	17,925–17,130	E China	cold	LGM	Pleistocene	charcoal	a, 6
3	Liyuzui	PV-379(2)	21,020 ± 450	26,260–24,198	S China	cold	LGM	Pleistocene	shell	a
4	Miaoyan: 6L	BA92037	20,330 ± 430	25,655–23,417	S China	cold	LGM	Pleistocene	charcoal	a, 28
5	Odai-yamamoto 1	NUTA-6510	13,780 ± 180	17,281–16,179	Japan	cold	LGM	Pleistocene	silt	a, 33
6	Fukui	Fukui?	13,410 ± 50	16,318–15,977	Japan	cold	LGM	Pleistocene	charcoal	a, 59
7	Gromatucha: 3	MTC-05937	12,380 ± 70	14,893–14,143	Amur	warm	B–A	Pleistocene	charcoal	a, 6
8	Goncharka	Tka-13005	11,340 ± 110	13,456–13,086	Amur	warm	B–A	Pleistocene	charcoal	a, 14
9	Gasya: lower	AA13393	10,875 ± 90	13,061–12,719	Amur	warm	B–A	Pleistocene	charcoal	a, 13
10	Chummi: lower	AA-13392	13,260 ± 100	16,241–15,650	Amur	warm	B–A	Pleistocene	charcoal	a, 12
11	Ust'-Karenga 7	AA-602 10	12,180 ± 60	14,318–13,816	Transbaikal	warm	B–A	Pleistocene	charcoal	a, 1
12	Studenoie 1: 9g	Tka-15554	11,960 ± 80	14,043–13,607	Transbaikal	warm	B–A	Pleistocene	silt	a, 4
13	Ust'-Menza 1: 8	MTC-16738	11,600 ± 60	13,588–13,328	Transbaikal	warm	B–A	Pleistocene	silt	a, 5
14	Houtaomuga	MTC-17587	10,430 ± 50	12,610–12,056	NE China	cold	YD	Pleistocene	silt	a, 18
15	Nanzhuangtou: bottom	BK87088	10,510 ± 50	12,689–12,192	N China	cold	YD	Pleistocene	mire	a, 22
16	Lingjing	IAAA-102642	11,120 ± 50	13,156–12,904	N China	cold	YD	Pleistocene	charcoal	a, 23
17	Nizhneye Ozero III	SOAN-6199	7120 ± 140	8285–7669	Tavda: W–N					f
18	Amnya I	LE-49746	8630 ± 180	10,196–9282	Ob					i
19	Et-to I	SPB-891	7566 ± 100	8587–8178	Ob: W Siberia					g
20	Kochkino	KIA-42074	7325 ± 40	8278–8020	Tobol–Irtysh					h
21	Kairshak IV	Ki-14440	7105 ± 60	8024–7792	Kaspic			Holocene		d, 2
22	Chekalin	Spb-424	7601 ± 200	8983–8020	Middle Volga			Holocene		d, 4
23	Serteya X	Le-5260	7350 ± 180	8520–7799	Upper Volga			Holocene		d, 200
24	Dobryanka s	Ki-11108	7260 ± 170	8393–7748	Dniester			Holocene		d, 18
25	Rakushechny Yar: 20	Ki-6476	7930 ± 140	9192–8420	Don			Holocene		d, 1
26	Sakarovka I	Bin 2425	6650 ± 100	7682–7331	Dniester			Holocene		e
27	Selishche 1	Selishche I	6839 ± 130	7936–7478	Dniester			Holocene		e
28	Ust'-Khaita VI	SOAN-4441	7435 ± 130	8511–7976	Angara			Holocene		j

Tab. 1. *Selected radiocarbon dates of the earliest pottery. Compiled from:* ***a*** *– Sato – Natsuki 2017, 12;* ***b*** *– Timoshchenko 2014, 39;* ***c*** *– Ulanov – Berdnikov 2015, 68;* ***d*** *– Zaitseva et al. 2016;* ***e*** *– Dergachev – Larina 2015;* ***f*** *– Chairkina – Dubovtseva 2014;* ***g*** *– Kosinskaya 2014;* ***h*** *– Zakh 2009;* ***i*** *– McKenzie 2010;* ***j*** *– Berdnikov et al. 2014. Calibrated in OxCal 4.4. using the IntCal20 calibration curve (Bronk Ramsey 2009; Reimer et al. 2020). — **Tab. 1.** Vybraná radiokarbonová data. Sestaveno podle:* ***a*** *– Sato – Natsuki 2017, 12;* ***b*** *– Timoshchenko 2014, 39;* ***c*** *– Ulanov – Berdnikov 2015, 68;* ***d*** *– Zaitseva et al. 2016;* ***e*** *– Dergachev – Larina 2015;* ***f*** *– Chairkina – Dubovtseva 2014;* ***g*** *– Kosinskaya 2014;* ***h*** *– Zakh 2009;* ***i*** *– McKenzie 2010;* ***j*** *– Berdnikov et al. 2014. Kalibrováno v programu OxCal verze 4.4 pomocí kalibrační křivky IntCal20 (Bronk Ramsey 2009; Reimer et al. 2020).*

cific shape according to source materials, and also a long-term survival of stone vessels used mostly for farming purposes.

According to this change in concept, the Neolithic is a sum of material of social practices and institutions which gradually developed in complexity, first in the Near East, thereafter spreading further to inland Europe and the littoral areas of the Mediterranean. Today it is more probably recognized as an asynchronous long-term development of a set of relationships (*Robb 2014*, 27) connected to Late Palaeolithic local occupation conditions and acquired various forms which do not exclude various concrete combinations of settlement and subsistence. The idea of a new historic moment in society and subsistence is anachronistic and demands reformulation of the basic characteristics according to concrete time-space conditions. The determination of the notion of the Neolithic by developments within the borders of Central and Western Europe is misleading because changes in the Late Palaeolithic demand the study of development across the whole of the Eurasian continent. Also, restricting it to the period of the Holocene is not justifiable as it can be shown that fundamental changes started at the end of the Pleistocene before this climatic change. It is necessary to widen the context of the term Neolithic to the whole historical period when human society started in various ways to break away from an immediate dependency on the evolution of nature. The reason for this change was without doubt the climatic oscillations over several centuries which disrupted the steady life of Palaeolithic hunters. People were in various ways forced to deal with unexpected fluctuations in natural conditions.

The earliest settlements are hundreds of kilometers apart and are often separated by several centuries. The later development towards the Neolithic took place in the east of the Eurasian continent in a completely different form than in its western part from the center in Southwest Asia. The two main components, agriculture and ceramics, played completely different roles in this development. In the west, we can identify long-term continuous global development from the end of the Pleistocene with a growth in the components of the future Neolithic. In the east, we can see long-term development in the intentions of the previous Palaeolithic, which only after a long time, and only in a certain part of the continent, resulted in an agricultural Neolithic. If we wanted to be inspired by the principles of the

macroevolutionary process, which depends primarily on the human intent to make the necessary changes (*Zeder 2009*, 13), we would have to state that the population's intentions were completely different in the western part of the Eurasian continent than in the eastern part.

6. Conclusion

It is necessary to widen the context of the term Neolithic to the whole historical period when human society started in various ways to break away from an immediate dependency on the evolution of nature. The reason for this change was without doubt the climatic oscillations over several centuries which disrupted the steady life of Palaeolithic hunters. People were in various ways forced to deal with unexpected fluctuations in natural conditions. In those uncertain times, which spanned generations, they had to act more or less unintentionally, without an obvious strategic purpose. Despite all the difficulties which people had to surmount, despite all the long forgotten catastrophes they encountered, they successfully passed after several millennia into a whole new historical period. From today's perspective it is therefore possible to assess the Neolithic as a new way of life, change in society and as an important process that prepared humans for the subsequent historical developments.

Acknowledgement

We are thankful to Markéta Končelová for her help with finishing the maps and to Richard Peters for the English edition.

The preparation of this study was part of the Specific Research project 'The earliest Neolithic pottery at the background of the Post-Palaeolithic societies in the Eastern Europe and in the Baltic' (I. Pavlů) supported by the University of Hradec Králové, and of the project 'Locating, mapping and examining of Palaeolithic and Mesolithic sites in Eastern Bohemia' supported by the Museum of Eastern Bohemia in Hradec Králové (project no. VVI 202201; P. Čechák).

English by J. K. Dvořáková, H. J. Keen and D. Gaul

Souhrn

1. Úvod

Téměř souvislé neolitické osídlení střední Evropy, které je výsledkem postupného osidlování této oblasti kontinentu lidem kultury s lineární keramikou (LBK; 5500/5400–5100/5000 cal BC), navazuje na staroneolitické osídlení (kultura Starčevo-Kriš) z jižní oblasti Karpatské kotliny. Od svérázného osídlení dále na východ jej dělí přirozená ekologická hranice (*obr. 1*). Tato hranice vyznačuje přirozené ekologické podmínky pro novou subsistenci, kterou představuje zemědělský způsob intenzivního získávání zdrojů potravy. Usedlé zemědělské obyvatelstvo na západě odděluje široký geografický pás, který zaujímají nesouvislé regionální skupiny lovců-rybářů, jež se vytvořily za postglaciálních klimatických změn jako důsledek kontinuálních proměn původního mezolitického obyvatelstva. Zaujaly celou východní Evropu a přilehlá území za Uralem, prakticky až k oblasti Bajkalského jezera. Vedle zemědělského hospodaření byla pro obyvatele celé této části eurasijského kontinentu velkou inovací výroba keramiky.

2. Klimatické podmínky

Z pohledu přírodního prostředí lze počátky změn vedoucích k neolitu datovat více než 15 000 let před počátek holocénu. Celá tato perioda byla klimaticky nestabilním obdobím, které je možné charakterizovat četnými teplotními výkyvy, dnes nesoucími pojmenování starší dryas, bölling, alleröd a mladší dryas (*Pokorný 2011*, 107). Podobné chladné oscilace (byť výrazně kratšího trvání) jsou známy i z počátku holocénu. Jedná se o dva výkyvy globálního dopadu z doby 8236 BP a 4207 BP (*Walker et al. 2018*, 4).

Výkyv před 8200 lety znamenal zhruba 100 let trvající citelné ochlazení a sucho, které se projevily v globálním měřítku (*Rohling – Pälike 2005*). Potenciální vlivy této události na tehdejší osídlení byly zkoumány zejména v oblasti východního Středomoří. Na řadě lokalit byl skutečně objeven přibližně 50 let trvající hiát spadající právě do doby okolo 8200 BP (*Weninger et al. 2005*). Další detailní studium vybraných lokalit na Středním východě nicméně ukázalo, že klimatický výkyv nemusel nutně vést k výrazným kulturním změnám (*Nieuwenhuyse et al. 2016*). I pozdější práce shrnující poznatky z východního Středomoří (*Maher – Richter – Stock 2012*, 70) uvádí, že případné kulturní dopady klimatické události byly velice ojedinělé. Ve většině případů jsou počátky kulturních změn směřujících k neolitu známy již z doby před vlastním klimatickým výkyvem.

3. Komponenty neolitu

Z pohledu archeologie je neolit reprezentován novými způsoby subsistence, sídlení, pohřbívání a komunikace. Lze proto hovořit o do jisté míry stejných typech neolitických artefaktů a nemovitých památek. Na samém počátku byl neolit jako období definován novým provedením kamenných artefaktů (*Buchtela – Niederle 1910*, 16). Později docházelo k přidávání dalších charakteristik tohoto období – výroba keramických nádob, stálá sídliště, domestikace zvířat a kultivace rostlin vedoucí až k zemědělství. Od počátku 21. století však začaly notně přibývat studie poukazující na to, že jednotlivé prvky tohoto *neolitického balíčku* byly objeveny a užívány na řadě míst a v kontextech výrazně starších než neolitických. Tím pádem byla původní hypotéza o jednotném neolitu vyvrácena jak z pohledu místa, tak i času. Počátky neolitu jsou od té doby hledány spíše ve společenských aspektech než v prosté reakci na změny přírodního prostředí (*Pavlů /ed./ – Zápotocká 2007*, 9).

4. Regionální odlišnosti

4.1. Východní neolit

Oblasti východně od přirozené hranice potenciálního zemědělství převzaly výrobu keramiky z jiných směrů. Západně od Uralu to bylo patrně z Předního východu, ale cestou přes Přikaspí, protože nejstarší nálezy jsou na severním pobřeží Kaspického moře již na přelomu osmého a sedmého tisíciletí před současností (*Vybornov 2008*). Území východně od Uralu až k Bajkalskému jezeru jsou obsazena podobnými regionálními skupinami lovců-rybářů jako na západní straně Uralu. Charakter archeologických nálezů je analogický, keramika se liší v jednotlivých regionech, ale vyznačuje se podobným tvaroslovím, ve kterém převažují menší pohárovité nádoby, často se zaobleným vejčitým dnem. Osídlení na východ od Bajkalského jezera přišlo zřejmě západní cestou podél řeky Amur ze severovýchodní Číny. Tam je doložena výroba keramiky o tisíce let dříve než v předovýchodním centru a nezávisle na něm. Vyznačuje se velkými kotlovitými nádobami, většinou také se zaobleným vejčitým dnem. Nejzápadnější lokality jsou u hranice dnešní Burjatské republiky, u jihozápadních břehů Bajkalského jezera. Spodní vrstva na lokalitě Ust'-Menza je datována 13 588–13 328 cal BP vzorkem MTC 16738 (*tab. 1*; *Razgildeeva – Kunikita – Yanshina 2013*).

4.2. Západní neolit

Výše zmíněná ekologická hranice označuje východní mez evropského osídlení LBK, která v centrálním evropském regionu vytváří díky své mobilitě téměř souvisle zalidněná území. V okrajových oblastech je její osídlení spíše ostrůvkovité a je vázáno na vhodné podmínky daných regionů. Na jihovýchodě dospělo nejzazší rozšíření LBK až k řece Dněstru, na jejímž pravém břehu bylo země-

dělské osídlení již dříve, v době křišské kultury, zatímco levý břeh byl obsazen nositeli lovecko-rybářské kultury Bug-Dněstr. V oblasti severního Polska (podobně jako západního Německa) bylo osídlení LBK rozděleno do menších regionů podle jejich příhodnosti pro zemědělské hospodaření. V Česku je zemědělské osídlení vázáno v prvé řadě na středočeský region. Na polském území jsou neolitizované regiony odděleny od regionů staršího osídlení, ke kontaktu docházelo podél větších i menších toků a v rovinatých oblastech mezi nimi. Archeologicky se tam s neolitem prolíná osídlení staršího obyvatelstva označované jako *paraneolit* (*Kozłowski – Nowak 2019*) a další skupiny, které hospodařily mezolitickým způsobem.

4.3. Severní a severovýchodní Evropa: hranice obou světů

Kultury a lokality spadající do okruhu lovecko-sběračských komunit vyrábějících keramiku v severní a severovýchodní Evropě (*obr. 5*) vykazují řadu podobností i rozdílů. Na základě štípané industrie lze u všech z nich prohlásit, že je zde patrná jasná návaznost na předcházející lokální mezolitický vývoj. To by ukazovalo na to, že docházelo pouze k šíření vlastní znalosti technologie výroby keramických nádob, a nikoli obyvatelstva. Zejména v polské archeologii je pro tyto kultury mezolitických lovců vyrábějících keramiku užíváno označení *paraneolit*. Pojem má jednoznačně odlišovat tyto „lovce používající keramiku" od mezolitických populací bez keramiky a zároveň od „západních" neolitických zemědělců LBK a následných kultur (*Nowak 2007*). Setkat se lze i s termíny *subneolit* (*Kukawka 2019*), popřípadě *lesní neolit* (*Zvelebil 2010*). Všechny tyto pojmy se nicméně vztahují ke stejnému fenoménu, tedy lovecko-sběračsko-rybářským komunitám vyrábějícím keramiku, jehož původ je nutné hledat ve východních částech Evropy (*Nowak 2007*, 97). Jak bude ukázáno dále, tyto kultury a skupiny zpravidla existovaly vedle klasických (tj. západních) neolitických kultur a v některých částech severovýchodní Evropy si svou svébytnost udržely až do doby bronzové.

Vlastní keramiku lze rozdělit na dvě hlavní skupiny, přičemž druhá z nich se nevyskytuje ve všech kulturách. První skupinou jsou esovitě až vejčitě profilované nádoby větších rozměrů se špičatými či lehce zaoblenými dny (*obr. 6*). Do druhé skupiny náležejí oválné misky sloužící coby lampy. Oba druhy nádob se nacházejí v kulturách Narva a Ertebølle (EBK) a na lokalitě Dąbki, naopak schází v německé kultuře a Swifterbantu. Tento rozdíl by teoreticky mohl naznačovat lehce odlišný původ tradice výroby keramiky. Ohniska vzniku jsou v případě Narvy hledána v severozápadním Rusku, zatímco v případě kultury Němen je relativně jasná vazba na severní Černomoří. Nejméně jasná je geneze kultury Swifterbant, kde se ale ponejvíce uvažuje o adaptaci a úpravě techniky okolních zemědělských komunit. V rámci dalších kultur nelze pominout, že Narva vykazuje největší technologickou příbuznost s EBK. Teoreticky tak nelze vyloučit, že lovecko-sběračské komunity na pobřeží Baltského a Severního moře byly zasaženy třemi rozdílnými impulsy, které u nich vyvolaly počátek výroby keramických nádob. První takový impuls by měl původ v západním Rusku a přes kulturu Narva by pokračoval dále na západ (možná skrze Dąbki?) až po EBK. Tradice pocházející ze severního pobřeží Černého moře by naopak podnítila vznik německé kultury (a opět možná zasáhla i Dąbki?). Skrze adaptaci na zemědělský neolit i vlastní inovaci by pak vznikla keramika kultury Swifterbant. Dlužno ovšem podotknout, že tyto závěry jsou čistě pracovní a nelze se pro ně opřít o dostatek archeologických dat.

Zároveň nelze popírat rozdíly ve výrobě a užívání keramiky u jednotlivých kultur, a to včetně těch, které byly na předchozích řádcích označeny za příbuzné. Z pohledu použitého ostřiva lze vyčlenit dvě hlavní skupiny – organické ostřivo a kamínky či písek. Do první skupiny lze zařadit kultury Narva a Němen, kamínky byly využívány EBK a na lokalitě Dąbki. Kultura Swifterbant využívala obou zdrojů, nicméně lehce převládá organika. Ohledně využívání nádob lze jednoznačně prohlásit, že esovité hrnce sloužily ve všech případech k vaření a skladování potravy. Opět se ale výrazně liší konkrétní druhy potravy. Nejvíce rigidní je v tomto ohledu kultura Narva, jejíž keramika sloužila téměř výhradně pro zpracovávání a skladování ryb. U ostatních kultur byla tato pravidla mnohem volnější, byť v případě německé kultury výrazně převládají stopy po mase suchozemské fauny a u kultury Swifterbant zase sladkovodní ryby. Skutečný mix, který patrně neměl žádná jasně archeologicky rozpoznatelná pravidla, pochází z prostředí EBK, kde je doloženo vaření ryb, suchozemské fauny i rostlinné složky potravy.

Absolutní chronologie, byť je u všech kultur poměrně dobře podepřená daty, nenabízí nápovědu k původu jednotlivých keramických tradic. Za nejstarší lze považovat kultury Narva a Němen, které obě pocházejí z doby okolo 5500 cal BC. Následuje keramika kultury Swifterbant z doby okolo 5000 cal BC a poté výroba nádob na lokalitě Dąbki z období 4900 cal BC a EBK o století později. Kultury Narva, Němen a EBK mají společné to, že jejich závěr souvisí s příchodem zemědělského způsobu života, ať už je řeč o kultuře nálevkovitých pohárů (TRB), nebo později kultuře se šňůrovou keramikou. V tomto směru se odlišuje Swifterbant, kde dochází k převzetí zemědělství a domestikace zvířat i ke změně ve výzdobě keramiky, nicméně vlastní ráz kultury zůstal zachován opět až do příchodu TRB. Odlišná je i lokalita Dąbki, kde počátek osídlení TRB naopak nijak nezměnil lovecko-sběračský charakter subsistence a zánik tamního osídlení byl podle všeho podmíněn přírodně.

5. Neolit jako fáze

Neolit je výsledkem změn v oblastech společenských praktik a tradic, které se postupně vyvíjely ve své komplexnosti nejprve na Blízkém východě a poté se rozšířily dále do vnitrozemí Evropy a pobřežních oblastí Středomoří. Dnes je spíše definován jako dlouhodobý asynchronní vývoj vztahů (*Robb 2014*, 27) souvisejících s místním pozdně paleolitickým osídlením, který nabýval různých podob a který nevylučuje různé kombinace osídlení a obživy. Definice pojmu „neolit" pouze na základě vývoje ve střední a západní Evropě je zavádějící, protože změny v pozdním paleolitu vyžadují studium na celém euroasijském kontinentu. Rovněž omezení na období holocénu není opodstatněné, neboť lze prokázat, že zásadní změny začaly již na konci pleistocénu, tedy před touto klimatickou změnou.

Z globálního pohledu eurasijského kontinentu můžeme dnes rozlišovat pro pokročilou dobu holocénu tři oblasti. První je **západní** zemědělský neolit sahající po baltsko-černomořskou hranici s přežívajícími mezolitickými elementy, druhou **východní** nezemědělský neolit s keramikou navazující na lovecko-rybářskou tradici mezolitu a sahající až k Bajkalu. Třetí je **východoasijská** oblast s mobilním osídlením původem z tichomořské oblasti a s autochtonní nezávislou tradicí pozdně paleolitické výroby keramiky.

6. Závěr

Je třeba rozšířit kontext pojmu neolit na celé historické období, kdy se lidská společnost začala různými způsoby vymaňovat z bezprostřední závislosti na přírodě. Důvodem této změny byly bezpochyby klimatické výkyvy trvající několik století, které narušily ustálený život paleolitických lovců. Lidé byli různými způsoby nuceni vyrovnávat se s nečekanými výkyvy přírodních podmínek. V těchto nejistých dobách, které se táhly přes celé generace, museli jednat bez konkrétního strategického záměru. Přes všechny obtíže, které museli lidé překonávat, a přes všechny dávno zapomenuté katastrofy, s nimiž se setkali, úspěšně přešli po několika tisíciletích do zcela nového historického období. Z dnešního pohledu je tedy možné hodnotit neolit jako nový způsob života, fungování společnosti a jako důležitý proces, který připravil člověka na následující historický vývoj.

Bibliography

Amkreutz et al. 2010:
Amkreutz, L. W. S. W. – Vanmontfort, B. – De Bie, M. – Verbeek, C.: Bowls of contention. Mesolithic sites with pottery in the Lower Rhine Area. In: Vanmontfort, B. – Louwe Kooijmans, L. – Amkreutz, L. – Verthart, L. /eds./: Pots, Farmers and Foragers. Pottery traditions and social interaction in the earliest Neolithic of the Lower Rhine Area. Archaeological Studies Leiden University 20. Leiden: Leiden University Press, 15–26.

Andersen, S. H. 2008:
The Mesolithic-Neolithic transition in Western Denmark seen from a kitchen midden perspective. A survey. In: Fokkens, H. – Coles, B. J. – van Gijn, A. L. – Kleijne, J. P. – Ponjee, H. H. – Slappendel, C. G. /eds./: Between Foraging and Farming. Analecta Praehistorica Leidensia 40. Leiden: Faculty of Archaeology, Leiden University, 67–74.

Andersen, S. H. 2010:
The first pottery in South Scandinavia. In: Vanmontfort, B. – Louwe Kooijmans, L. – Amkreutz, L. – Verthart, L. /eds./: Pots, Farmers and Foragers. Pottery traditions and social interaction in the earliest Neolithic of the Lower Rhine Area. Archaeological Studies Leiden University 20. Leiden: Leiden University Press, 167–176.

Aurenche et al. 1981:
Aurenche, O. – Cauvin, J. – Cauvin, M.-C. – Copeland, L. – Hours, F. – Sanlaville, P.:
Chronologie et organisation de l'espace dans le Proche-Orient de 12000 à 5600 avant J.-C. In: Cauvin, J. – Sanlaville, P. /eds./: Préhistoire du Levant. Chronologie et organisation de l'espace depuit les origins jusqu'au 6e millénaire. Paris: Centre national de la Recherche Scientifique, 571–601.

Barber et al. 1999:
Barber, D. C. – Dyke, A. – Hillaire-Marcel, C. – Jennings, A. E. – Andrews, J. T. – Kerwin, M. W. – Bilodeau, G. – McNeely, R. – Southon, J. – Morehead, M. D. – Gagnon, J. M.:
Forcing of the Cold Event of 8,200 Years Ago by Catastrophic Drainage of Laurentide Lakes. Nature 400, 344–348.
https://doi.org/10.1038/22504

Barker, G. 2006:
The Agricultural Revolution in Prehistory: Why did Foragers become Farmers? Oxford: Oxford University Press.
https://doi.org/10.1093/oso/9780199281091.001.0001

Bar-Yosef, O. 2017:
Multiple Origins of Agriculture in Eurasia and Africa. In: Tibayrenc, M. – Ayala, F. J. /eds./: On Human Nature: Psychology, Ethics, Politics and Religion. Amsterdam – Boston: Elsevier, 297–331.
https://doi.org/10.1016/B978-0-12-420190-3.00019-3

Bellwood, P. 2005:
First Farmers: The Origins of Agriculture Societies. Malden: Blackwell Publishing.

Beneš, J. 2004:
Palaeoecology of the LBK: Earliest agriculturalist and landscape of Bohemia, Czech Republic. In: Lukes, A. – Zvelebil, M. /eds./: LBK Dialogues. Studies in the formation of the Linear Pottery Culture. British Archaeological Reports, International Series 1304. Oxford: BAR publishing, 143–150.
https://doi.org/10.30861/9781841716541

Beneš, J. 2018:
Počátky zemědělství ve Starém světě: Pohled paleoekologie a environmentální archeologie. České Budějovice: Episteme.

Berdnikov et al. 2014:
Berdnikov, I. M. – Berdnikova, N. E. – Vorobieva, G. A. – Rogovskoi, E. O. – Klementiev, A. M. – Ulanov, I. V. – Lokhov, D. N. – Dudariok, S. P. – Novoseltseva, V. M. – Sokolova, N. B.:
Geoarkheologicheskie kompleksy rannego golotsena na yuge Srednei Sibiri. Otsenka dannykh i perspektivy issledovanii. Izvestiya Irkutskogo Gosudarstvennogo Univesiteta 9, 46–76.

Berdnikov et al. 2015:
Berdnikov, I. M. – Berdnikova, N. E. – Rogovskoi, E. O. – Lipnina, E. A. – Ulanov, I. V. – Lokhov, D. N. – Sokolova, N. B. – Klementiev, A. M. – Krutikova, K. A. – Abrashina, M. E.:
Mestonakhozhdenie Elovka-Nugan I – pervyi multisloichatyi arkheologicheskii obekt, golotsenovogo vozrasta v Tunkinskoi doline. Izvestiya Irkutskogo Gosudarstvennogo Universiteta 14, 24–48.

Berdnikov et al. 2017:
Berdnikov, I. M. – Rogovskoi, E. O. – Lokhov, D. N. – Kuznetsov, A. M. – Kogai, S. A. – Lipnina, E. A. – Berdnikova, N. E. – Saveliev, N. A. – Sokolova, N. B. – Ulanov, I. V.:
Novye radiouglerodnye dannye dlya neoliticheskikh kompleksov mnogosloinykh mestonakhozhdenii Tunkinskoi doliny i Priangariya. Evraziya v kainozoe. Stratigrafiya, paleoekologiya, kultury 6, 220–230.

Berdnikova, N. E. 2017:
Two Scenarios of the Neolithization of the Baikal Siberia. In: Güneri, A. S. /ed./: 6th International Congress of Eurasian Archaeology. Eurasian Prehistory. ICEA 2017, Buca. İzmir: Dokuz Eylül Üniversitesi, 15–16.

Bickle, P. – Whittle, A. /eds./ 2013:
The First Farmers of Central Europe: Diversity in LBK Lifeways. Oxford – Oakville: Oxbow Books.

Binford, L. R. 1968:
Post-Pleistocene Adaptations. In: Binford, S. R. – Binford, L. R. /eds./: New Perspectives in Archaeology. Chicago: Aldine, 313–341.

Blankholm, H. P. 2010:
Southern Scandinavia. In: Bailey, G. – Spikins, P. /eds./: Mesolithic Europe. Cambridge: Cambridge University Press, 107–131.

Bogucki, P. 1988:
Forest Farmers and Stockherders: Early Agriculture and its Consequences in North-Central Europe. Cambridge: Cambridge University Press.

Boivin et al. 2016:
Boivin, N. L. – Zeder, M. A. – Fuller, D. Q. – Crowther, A. – Larson, G. – Erlandson, J. M. – Denham, T. – Petraglia, M. D.:
Ecological consequences of human niche construction: Examining long-term anthropogenic shaping of global species distributions. Proceedings of the National Academy of Sciences of the United States of America 113/23, 6388–6396.
https://doi.org/10.1073/pnas.1525200113

Boyd, B. 2006:
On 'sedentism' in the Later Epipalaeolithic (Natufian) Levant. World Archaeology 38/2, 164–178.
https://doi.org/10.1080/00438240600688398

Braun, P. – Sokol, P. 2004:
K neolitickému osídlení na katastru Litice, okr. Plzeň-město. Sborník Západočeského muzea v Plzni. Historie 13, 5–15.

Bronk Ramsey, C. 2009:
Bayesian analysis of radiocarbon dates. Radiocarbon 51/1, 337–360.
https://doi.org/10.1017/S0033822200033865

Buchtela, K. – Niederle, L. 1910:
Rukověť české archaeologie. Praha: Jan Laichter.

Budja, M. 2004:
The Neolithisation of the Balkans: Where in the Puzzle? In: Lukes, A. – Zvelebil, M. /eds./: LBK Dialogues. Studies in the formation of the Linear Pottery Culture. British Archaeological Reports, International Series 1304. Oxford: BAR publishing, 37–48.
https://doi.org/10.30861/9781841716541

Budja, M. 2007:
The 8200 calBP 'climate event' and the process of neolithisation in south-eastern Europe. Documenta Praehistorica 34, 191–201.
https://doi.org/10.4312/dp.34.14

Budja, M. 2013:
Neolithic pots and potters in Europe: the end of 'demic diffusion' migratory model. Documenta Praehistorica 40, 38–56.
https://doi.org/10.4312/dp.40.5

Budja, M. 2016:
Ceramics among Eurasian hunter-gatherers: 32 000 years of ceramic technology use and the perception of containment. Documenta Praehistorica 43, 61–86.
https://doi.org/10.4312/dp.43.2

Carlson et al. 2012:
Carlson, L. – Bassett, G. – Buehring, W. – Collins, M. – Folga, S. – Haffenden, B. – Petit, F. – Phillips, J. – Verner, D. – Whitfield, R.:
Resilience: Theory and Applications. Argonne: Argonne National Laboratory.
https://doi.org/10.2172/1044521

Cauwin, J. 1994:
The Birth of the Gods and the Origins of Agriculture. Cambridge: Cambridge University Press.

Chairkina, N. M. – Dubovtseva, E. N. 2014:
Keramicheskiye kompleksy epokhi neolita poseleniya Nizhneye Ozero III. Vestnik arkheologii, antropologii i etnografii 24/1, 4–13.

Chairkina, N. M. – Kosinskaya, L. L. 2010:
Early Hunter-Gatherer Ceramics in the Urals and Western Siberia. In: Jordan, P. – Zvelebil, M. /eds./: Ceramics before Farming. The Dispersal of Pottery Among Prehistoric Eurasian Hunter-Gatherers. New York: Routledge, 208–236.
https://doi.org/10.4324/9781315432373

Chen, S. – Yu, P.-L. 2017:
Early "Neolithics" of China: Variation and Evolutionary Implications. Journal of Anthropological Research 73/2, 149–180.

Childe, G. V. 1949:
Člověk svým tvůrcem. Praha: Svoboda.

Childe, G. V. 1957:
The Dawn of European Civilization. 6th edition. London: Routledge – Kegan Paul.

Çilingiroğlu, Ç. 2005:
The concept of "Neolithic Package": considering its meaning and applicability. Documenta Praehistorica 32, 1–13.
https://doi.org/10.4312/dp.32.1

Cladders, M. 2001:
Die Tonware der Ältesten Bandkeramik: Untersuchung zur zeitlichen und räumlichen Gliederung. Universitätsforschungen zur prähistorischen Archäologie 72. Bonn: Habelt.

Cohen et al. 2017:
Cohen, D. J. – Bar-Yosef, O. – Xiaohong, W. – Patania, I. – Goldberg, P.:
The emergence of pottery in China: Recent dating of two early pottery cave sites in South China. Quaternary International 441/B, 36–48.
https://doi.org/10.1016/j.quaint.2016.08.024

Constantin, C. 2010:
Fine plant temper and the origin of the Swifterbant culture. In: Vanmontfort, B. – Louwe Kooijmans, L. – Amkreutz, L. – Verthart, L. /eds./: Pots, farmers and foragers: Pottery traditions and social interaction in the earliest Neolithic of the Lower Rhine Area. Archaeological Studies Leiden University 20. Leiden: Leiden University Press, 131–134.

Coudart, A. 2015:
The Bandkeramik Longhouses: A Material, Social, and Mental Metaphor for Small-Scale Sedentary Societies. In: Fowler, C. – Harding, J. – Hofmann, D. /eds./: The Oxford Handbook of Neolithic Europe. Oxford: Oxford University Press, 309–326.
https://doi.org/10.1093/oxfordhb/9780199545841.013.006

Courel et al. 2020:
Courel, B. – Robson, H. K. – Lucquin, A. – Dolbunova, E. – Oras, E. – Adamczak, K. – Andersen, S. H. – Astrup, P. M. – Charniauski, M. – Czekaj-Zastawny, A. – Ezepenko, I. – Hartz, S. – Kabaciński, J. – Kotula, A. – Kukawka, S. – Loze, I. – Mazurkevich, A. – Piezonka, H. – Piličiauskas, G. – Sørensen, S. A. – Talbot, H. M. – Tkachou, A. – Tkachova, M. – Wawrusiewicz, A. – Meadows, J. – Heron, C. P. – Craig, O. E.:
Organic residue analysis shows sub-regional patterns in the use of pottery by Northern European hunter-gatherers. Royal Society Open Science 7/4, 192016.
https://doi.org/10.1098/rsos.192016

Crombé, P. – Vanmontfort, B. 2007:
The neolithisation of the Scheldt basin in western Belgium. In: Whittle, A. – Cummings, V. /eds./: Going Over: The Mesolithic-Neolithic Transition in North-West Europe. New York: Oxford University Press, 262–285.
https://doi.org/10.5871/bacad/9780197264140.003.0014

Czekaj-Zastawny, A. – Kabaciński, J. 2017:
Hunter-gatherers and the first farmers. In: Włodarczak, P. /ed./: The Past Societies 2. Polish lands from the first evidence of human presence to the Early Middle Ages: 5500–2000 BC. Warszawa: Institute of Archaeology and Ethnology, Polish Academy of Sciences, 108–124.

Czekaj-Zastawny, A. – Kabaciński, J. – Terberger, T. 2011:
Relacje łowiecko-zbierackich społeczności z Dąbek z kulturami neolitycznymi Europy środkowej. In: Stankiewicz, U. – Wawrusiewicz, A. /eds./: Na rubieży kultur. Badania nad okresem neolitu i wczesną epoką brązu. Białystok: Muzeum Podlaskie w Białymstoku, 161–174.

Czekaj-Zastawny et al. 2013:
Czekaj-Zastawny, A. – Kabaciński, J. – Terberger, T. – Ilkiewicz, J.:
Relations of Mesolithic hunter-gatherers of Pomerania (Poland) with Neolithic cultures of central Europe. Journal of Field Archaeology 38/3, 195–209.
https://doi.org/10.1179/0093469013Z.00000000059

Čižmář, Z. 2002:
Keramika z pohřebiště v „Široké u lesa". — The Pottery from the cemetery at „Široká u lesa". In: Podborský et al.: Dvě pohřebiště neolitického lidu s lineární keramikou ve Vedrovicích na Moravě. Brno: Ústav archeologie a muzeologie Filozofické fakulty Masarykovy univerzity v Brně, 151–190.

Dergachev, V. A. – Larina, O. V. 2015:
Pamyatniky kultury Krish Moldovy. Kishinev: Tipografia Centrala.

Dusseldorp, G. L. – Amkreutz, L. W. S. W. 2015:
Foraging for Farmers? Praehistorische Zeitschrift 90/1–2, 20–44.
https://doi.org/10.1515/pz-2015-0007

Eriksen, T. H. 2007:
Antropologie multikulturních společností: Rozumět identitě. Praha: Triton.

Gamba, C. 2016:
Genomic appoaches and their contributions to understanding the European Neolithisation. Documenta Praehistorica 43, 253–264.
https://doi.org/10.4312/dp.43.12

Gemenne, F. – Rankovic, A. 2019:
Atlas de l'Anthropocène. Paris: Les Presses de Sciences Po.

Gibbard, P. L. – Head, M. J. – Walker, M. J. C. 2010:
Formal ratification of the Quaternary System/Period and the Pleistocene Series/Epoch with a base at 2.58 Ma. Journal of Quaternary Science 25/2, 96–102.
https://doi.org/10.1002/jqs.1338

Gomart et al. 2015:
Gomart, L. – Hachem, L. – Hamon, C. – Giligny, F. – Ilett, M.:
Household integration in Neolithic villages: A new model for the Linear Pottery Culture in west-central Europe. Journal of Anthropological Archaeology 40, 230–249.
https://doi.org/10.1016/j.jaa.2015.08.003

Gornitz, V. 2012:
The Great Ice Meltdown and Rising Seas: Lessons for tomorrow. Available at:
https://www.giss.nasa.gov/research/briefs/2012_gornitz_10/ [accessed 27-10-2020].

Gradstein et al. 2004:
Gradstein, F. M. – Ogg, J. G. – Smith, A. G. – Bleeker, W. – Lourens, L. J.:
A new Geologic Time Scale, with special reference to Precambrian and Neogene. Episodes 27/2, 83–100.
https://doi.org/10.18814/epiiugs/2004/v27i2/002

Gronenborn, D. 2008:
Early pottery in Afroeurasia – Origins and possible routes of dispersal. Bericht der Römisch-Germanischen Kommission 89, 59–88.

Gronenborn, D. 2009a:
Climate fluctuations and trajectories to complexity in the Neolithic: towards a theory. Documenta Praehistorica 36, 97–110.
https://doi.org/10.4312/dp.36.5

Gronenborn, D. 2009b:
Transregional Culture Contacts and the Neolithization Process in Northern Central Europe. In: Jordan, P. – Zvelebil, M. /eds./: Ceramics before Farming. Walnut Creek: Left Coast Press, 527–550.

Gronenborn, D. 2012:
Das Ende von IRD 5b: Abrupte Klimafluktuationen um 5100 den BC und der Übergang vom Alt- zum Mittelneolithikum im westlichen Mitteleuropa. In: Smolnik, R. /ed./: Siedlungsstruktur und Kulturwandel in der Bandkeramik. Dresden: Landesamt für Archäologie, 241–250.

Gronenborn et al. 2014:
Gronenborn, D. – Strien, H. Ch. – Dietrich, S. – Sirocko, F.:
'Adaptive cycles' and climate fluctuations: a case study from Linear Pottery Culture in western Central Europe. Journal of Archaeological Science 51, 73–83.
https://doi.org/10.1016/j.jas.2013.03.015

Habu, J. 2004:
Ancient Jomon of Japan. Cambridge: Cambridge University Press.

Hang et al. 2020:
Hang, T. – Veski, S. – Vassiljev, J. – Poska, A. – Kriiska, A. – Heinsalu, A.:
A new formal subdivision of the Holocene Series/Epoch in Estonia. Estonian Journal of Earth Sciences 69/4, 269–280.
https://doi.org/10.3176/earth.2020.15

Harris, D. R. /ed./ 1996:
The Origins and Spread of Agriculture and Pastoralism in Eurasia. London: University College London Press.

Harris, M. 1992:
The Rise of Anthropological Theory: A history of theories of culture. Lanham: AltaMira Press.

Hartz, S. – Lübke, H. – Terberger, T. 2007:
From fish and seal to sheep and cattle: new research into the process of neolithisation in northern Germany. In: Whittle, A. – Cummings, V. /eds./: Going Over: The Mesolithic-Neolithic Transition in North-West Europe. New York: Oxford University Press, 567–594.
https://doi.org/10.5871/bacad/9780197264140.003.0027

Head, M. J. 2019:
Formal subdivision of the Quaternary System/Period: Present status and future directions. Quaternary International 500, 32–51.
https://doi.org/10.1016/j.quaint.2019.05.018

Hemming, S. R. 2004:
Heinrich events: Massive late Pleistocene detritus layers of the North Atlantic and their global climate imprint. Reviews of Geophysics 42/1, 1–43.
https://doi.org/10.1029/2003RG000128

Hodder, I. 1990:
The Domestication of Europe. Oxford – Cambridge: Basil Blackwell.

Huysecom et al. 2009:
Huysecom, E. – Rasse, M. – Lespez, L. – Neumann, K. – Fahmy, A. – Ballouche, A. – Ozainne, S. – Maggetti, M. – Tribolo, C. – Soriano, S.:
The emergence of pottery in Africa during tenth millenium cal BC: new evidence from Ounjougou (Mali). Antiquity 83/322, 905–917.
https://doi.org/10.1017/S0003598X00099245

Ilkiewicz, J. 1989:
From studies on cultures of the 4th millennium B.C. in the central part of the Polish coastal area. Przegląd Archeologiczny 36, 17–55.

Ingold, T. 2007:
The Perception of the Environment: Essays in livelihood, dwelling and skill. London – New York: Routledge.

Jakucs et al. 2016:
Jakucs, J. – Bánffy, E. – Oross, K. – Voicsek, V. – Ramsey, C. B. – Dunbar, E. – Kromer, B. – Bayliss, A. – Hofmann, D. – Marshall, P. – Whittle, A.:
Between the Vinča and Linearbandkeramik Worlds: The Diversity of Practices and Identities in the 54th–53rd Centuries cal BC in Southwest Hungary and Beyond. Journal of World Prehistory 29, 267–336.
https://doi.org/10.1007/s10963-016-9096-x

Jones et al. 2016:
Jones, E. R. – Zarina, G. – Moiseyev, V. – Lightfoot, E. – Nigst, P. R. – Manica, A. – Pinhasi, R. – Bradley, D. G.:
The Neolithic Transition in the Baltic Was Not Driven by Admixture with Early European Farmers. Current Biology 27/4, 576–582.
https://doi.org/10.1016/j.cub.2016.12.060

Kabaciński, J. – Heinrich, D. – Terberger, T. 2009:
Dąbki revisited: new evidence on the question of earliest cattle use in Pomerania. In: McCartan, S. – Schulting, R. – Warren, G. – Woodman, P. /eds./: Mesolithic Horizons. Volume II. Oxford – Oakville: Oxbow Books, 548–555.

Kelly, R. L. 2007:
The Foraging Spectrum: Diversity in Hunter-Gatherer Lifeways. New York: Eliot Werner Publications.
https://doi.org/10.2307/j.ctv2sx9gc9

Kind, C. J. 2010:
Diversity at the Transition – a view from the Mesolithic. In: Gronenborn, D. – Petrasch, J. /eds./: Die Neolithisierung Mitteleuropas. Mainz: Verlag des Römisch-Germanischen Zentralmuseums Mainz, 449–460.

Knipper, C. 2011:
Die räumliche Organisation der linearbandkeramischen Rinderhaltung: naturwissenschaftliche und archäologische Untersuchungen. British archaeological reports, International series 2305. Oxford: Archaeopress.

Kosarev, M. F. 1996:
Neolit Vostochnogo Zauralya i Zapadnoi Sibiri. In: Oshibkina, S. V. /ed./: Arkheologia. Neolit Severnoi Evrazii. Moscow: Nauka. 253–269.

Kosintsev, P. A. – Bobkovskaya, N. E. – Besprozvannye, J. M. 2004:
Radiouglerodnaya Khronologiya Arkheologi-cheskikh Pamyatnikov Taezhnoi Zony Zapadnoi Sibiri. In: Yakovlev, Y. A. /ed./: Khanty-Mansiisky Avtonomny Okrug v Zerkale Proshlo-go. Tomsk: Tomsk State University, 17–32.

Kosinskaya, L. L. 2014:
Rannyaya grebentchataya keramika v neolite Zauralya. Uralskiy istoritcheskiy vestnik 43 /2, 30–40.

Kotova, N. S. 2015:
Drevnejshaya keramika Ukrainy. – Early Pottery of Ukraina. Kyiv – Kharkiv: Maidan.

Kotula, A. 2015:
Contact and adaptation – The early local pottery at Dąbki and its relations to neighbouring hunter-gatherer ceramics. In: Kabaciński, J. – Hartz, S. – Raemaekers, D. C. M. – Terberger, T. /eds./: The Dąbki Site in Pomerania and the Neolithisation of the North European Lowlands (c. 5000–3000 calBC). Archäologie und Geschichte im Ostseeraum 8. Rahden: Marie Leidorf, 175–202.

Kotula et al. 2015:
Kotula, A. – Czekaj-Zastawny, A. – Kabaciński, J. – Terberger, T.:
Find distribution, taphonomy and chronology of the Dąbki site. In: Kabaciński, J. – Hartz, S. – Raemaekers, D. C. M. – Terberger, T. /eds./: The Dąbki Site in Pomerania and the Neolithisation of the North European Lowlands (c. 5000–3000 calBC). Archäologie und Geschichte im Ostseeraum 8. Rahden: Marie Leidorf, 113–136.

Kozłowski, S. K. 2019:
Polish Mesolithic Pots. Jasiu Kowalczyk – in memoriam. Archaeologia Polona 57, 23–34.
https://doi.org/10.23858/APa57.2019.002

Kozłowski, S. K. – Nowak, M. 2019:
I przyszli ludzie zza Gór Wysokich: ziemie polskie od VI do IV tysiąclecia BC. Warszawa: Ośrodek Badań nad Antykiem Europy Południowo-Wschodniej Uniwersytetu Warszawskiego.

Kriiska et al. 2017:
Kriiska, A. – Oras, E. – Lõugas, L. – Meadows, J. – Lucquin, A. – Craig, O. E.:
Late Mesolithic Narva Stage in Estonia: Pottery, Settlement Types and Chronology. Estonian Journal of Archaeology 21/1, 52–86.
https://doi.org/10.3176/arch.2017.1.03

Kukawka, S. 2019:
The State of Current Knowledge of the Eastern European sub-Neolithic in Poland. Archaeologia Polona 57, 63–77.
https://doi.org/10.23858/APa57.2019.005

Kutílek, M. 2012:
Přírodní katastrofy z kritického pohledu. In: Heřt, J. – Zlatník, Č. /eds./: Věda kontra iracionalita 5. Praha: Academia, 81–97.

Lemen, C. 2015:
Cultural and demic diffusion of first farmers, herders, and their innovations across Eurasia. Documenta Praehistorica 42, 93–102.
https://doi.org/10.4312/dp.42.5

Lenneis, E. – Lüning, J. 2001:
Die altbandkeramischen Siedlungen von Neckenmarkt und Strögen. Bonn: Habelt.

Levi et al. 2015:
Levi, K. G. – Miroshnichenko, A. I. – Kozyreva, E. A. – Kadetova, A. V.:
Modeli evolutsii ozernych bassejnov Vostochnoj Sibiri v pozdnem pleistocene i golocene. Isvestija Irkutskogo gosudarstvennogo universiteta 11, 55–85.

Li, Z. – Kunikita, D. – Kato, S. 2017:
Early pottery from the Lingjing site and emergence of pottery in northern China. Quaternary International 441/B, 49–61.
https://doi.org/10.1016/j.quaint.2016.06.017

Lička, M. 2011:
Osídlení kultury s lineární keramikou v Kosoři, okr. Praha-západ. Fontes Archaeologici Pragenses 37. Praha: Národní muzeum.

Louwe Kooijmans, L. P. 2007:
The gradual transition to farming in the Lower Rhine Basin. In: Whittle, A. – Cummings, V. /eds./: Going Over. The Mesolithic-Neolithic Transition in North-West Europe. New York: Oxford University Press, 286–309.
https://doi.org/10.5871/bacad/9780197264140.003.0015

Lüning, J. 2005:
Bandkeramische Hofplätze und die absolute Chronologie der Bandkeramik. In: Lüning, J. – Fridrich, Ch. – Zimmermann, A. /eds./: Die Bandkeramik im 21. Jahrhundert. Symposium in der Abtei Brauweiler bei Köln vom 16.9.–19.9.2002. Rahden: Marie Leidorf, 49–74.

Maher, L. A. – Richter, T. – Stock, J. T. 2012:
The Pre-Natufian Epipaleolithic: Long-term Behavioral Trends in the Levant. Evolutionary Anthropology 21/2, 69–81.
https://doi.org/10.1002/evan.21307

Mazurié de Keroualin, K. 2003:
Genèse et diffusion de ľagriculture en Europ: Agriculteurs – Chasseurs – Pasteurs. Paris: Errance.

Mazurkevich, A. – Dolbunova, E. V. /eds./ 2015:
Tradicii i innovacii v izutchenii drevneishei keramiki. St. Petersburg: Gosudarstvennyy Ermitazh.

McKenzie, H. G. 2010:
Review of early Hunter-Gatherer Pottery in Eastern Siberia. In: Jordan, P. – Zvelebil, M. /eds./: Ceramics before Farming: The Dispersal of Pottery Among Prehistoric Eurasian Hunter-Gatherers. New York: Routledge, 167–208.

Medvedev, V. E. 2010:
The Neolithic of the Amur river region. In: III. severnyy arkheologicheskiy kongress. Ekaterinburg – Khanty-Mansiysk: IzdatNaukaServis, 55–91.

Milisauskas, S. 1978:
European Prehistory. New York: Academic Press.

Modderman, P. J. R. 1988:
The Linear Pottery Culture: Diversity in Uniformity. Berichten van de Rijksdienst voor het Outheidkundig Bodemonderzoek 38, 63–139.

Morisaki, K. – Sato, H. 2015:
Hunter-gatherer responses to abrupt environmental change from the terminal Pleistocene to the early Holocene in the Lower Amur region. In: Sázelová, S. – Novák, M. – Mizerová, A. /eds./: Forgotten Times and Spaces: New perspectives in paleoanthropological, paleoetnological and archeological studies. Brno: Institute of archaeology of the CAS, Brno – Masaryk University, 418–434.
DOI: 10.5817/CZ.MUNI.M210-7781-2015-31

Nakazawa et al. 2011:
Nakazawa, Y. – Iwase, A. – Akai, F. – Izuho, M.:
Human responses to the Younger Dryas in Japan. Quaternary International 242/2, 416–433.
https://doi.org/10.1016/j.quaint.2010.12.026

Nieuwenhuyse et al. 2016:
Nieuwenhuyse, O. P. – Akkermans, P. – van der Plicht, J. – Russell, A. – Kaneda, A.:
The 8.2 Event in Upper Mesopotamia: Climate and Cultural Change. In: Biehl, P. F. – Nieuwenhuyse, O. P. /eds./: Climate and Cultural Change in Prehistoric Europe and the Near East. IEMA Proceedings 6. Buffalo: State University of New York Press, 67–93.

Nordqvist, K. – Kriiska, A. 2015:
Towards Neolithisation: The Mesolithic-Neolithic transition in the central area of the eastern part of the Baltic Sea. In: Kabaciński, J. – Hartz, S. – Raemaekers, D. C. M. – Terberger, T. /eds./: The Dąbki Site in Pomerania and the Neolithisation of the North European Lowlands (c. 5000–3000 calBC). Archäologie und Geschichte im Ostseeraum 8. Rahden: Marie Leidorf, 537–556.

Nowak, M. 2007:
Middle and Late Holocene hunter-gatherers in East Central Europe: changing paradigms of the 'non-Neolithic' way of life. Documenta Praehistorica 34, 89–103.
https://doi.org/10.4312/dp.34.7

Nowak, M. 2017:
The second stage of neolithisation and para-Neolithic in the Southern Baltic. Samara Journal of Science 6/4, 116–124.
https://doi.org/10.17816/snv201764202

Nowak, M. 2019:
The first vs. second stage of neolithisation in Polish territories (to say nothing of the third?). Documenta Praehistorica 46, 102–127.
https://doi.org/10.4312/dp.46.7

Oross, K. – Bánffy, E. 2009:
Three successive waves of Neolithisation: LBK development in Transdanubia. Documenta Praehistorica 36, 175–189.
https://doi.org/10.4312/dp.36.11

Oshibkina, S. V. /ed./ 1996:
Arkheologia. Neolit Severnoy Evrazii. Moscow: Nauka.

Papakosta, V. 2020:
Early Pottery Use among Hunter-Gatherers around the Baltic Sea. Theses and Paper in Scientific Archaeology 17. Stockholm: Stockholm University.

Papakosta, V. – Oras, E. – Isaksson, S. 2019:
Early pottery use across the Baltic – A comparative lipid residue study on Ertebølle and Narva ceramics from coastal hunter-gatherer sites in southern Scandinavia, northern Germany and Estonia. Journal of Archaeological Science: Reports 24, 142–151.
https://doi.org/10.1016/j.jasrep.2019.01.003

Pavlů, I. 1996:
Původ keramiky. Praha: Filozofická fakulta Univerzity Karlovy. Unpublished PhD thesis.

Pavlů, I. 2000:
Life on a Neolithic site. Bylany – situational analysis of artefacts. Praha: Institute of Archaeology, Prague, Czech Academy of Sciences.

Pavlů, I. 2005:
Neolitizace střední Evropy. Archeologické rozhledy 57/2, 293–302.

Pavlů, I. 2008:
Lineární keramika v předovýchodních i evropských souvislostech. Pravěk: Nová řada 18, 3–137.

Pavlů, I. – Machová, T. – Pchálková-Bártová, A. 2019:
Earliest Pottery in Eurasia Continent. Archeologické rozhledy 70/4, 589–614.
https://doi.org/10.35686/AR.2019.24

Pavlů, I. – Vokolek, V. 1992:
Early Linear Pottery Culture in the East Bohemian Region. Památky archeologické 83/1, 41–87.

Pavlů, I. – Vokolek, V. 1996:
The Neolithic Settlement at Holohlavy (Hradec Králové). Památky archeologické 87/1, 5–60.

Pavlů, I. /ed./ – Zápotocká, M. 2007:
Neolit. Archeologie pravěkých Čech 3. Praha: Archeologický ústav AV ČR, Praha, v. v. i.

Pavúk, J. 2014:
Vznik kultúry s lineárnou keramikou vo svetle chronológie neolitických kultúr na Balkáne. In: Popelka, M. – Šmidtová, R. /eds./: Neolitizace aneb setkání generací. Praha: Filozofická fakulta Univerzity Karlovy v Praze, 175–217.

Perlés, C. 2001:
The Early Neolithic in Greece: The first farming communities in Europe. Cambridge: Cambridge University Press.

Piezonka, H. 2012:
Stone Age hunter-gatherer ceramics of North-Eastern Europe: new insights into the dispersal of an essential innovation. Documenta Praehistorica 39, 22–51.
https://doi.org/10.4312/dp.39.2

Piezonka, H. 2015a:
Jäger, Fischer, Töpfer. Wildbeutergruppen mit früher Keramik in Nordosteuropa im 6. und 5. Jahrtausend v. Chr. Bonn: Habelt.

Piezonka, H. 2015b:
Older than the farmers' pots? Hunter-gatherer ceramics east of the Baltic Sea. In: Kabaciński, J. – Hartz, S. – Raemaekers, D. C. M. – Terberger, T. /eds./: The Dąbki Site in Pomerania and the Neolithisation of the North European Lowlands (c. 5000–3000 calBC). Archäologie und Geschichte im Ostseeraum 8. Rahden: Marie Leidorf, 557–574.

Pinhasi, R. 2003:
A new model for the spread of the first farmers in Europe. Documenta Praehistorica 30, 1–47.
https://doi.org/10.4312/dp.30.1

Podborský, V. 2002:
Vedrovická pohřebiště ve starším moravském a středoevropském neolitu. — Vedrovice cemetery in the Early Moravian and Central European Neolithic. In: Podborský, V. /ed./: Dvě pohřebiště neolitického lidu s lineární keramikou ve Vedrovicích na Moravě. Brno: Masarykova univerzita, 293–338.

Pokorný, P. 2011:
Neklidné časy: Kapitoly ze společných dějin přírody a lidí. Praha: Dokořán.

Poulsen, K. 2013:
The introduction of ceramics in the Ertebølle Culture. Danish Journal of Archaeology 2, 146–163.
https://doi.org/10.1080/21662282.2013.904127

Price, T. D. – Bar-Yosef, O. 2011:
The Origins of Agriculture: New Data, New Ideas. Current Anthropology 52 – Supplement 4, 163–174.
https://doi.org/10.1086/659964

Price, T. D. – Bentley, R. A. 2005:
Human Mobility in Linearbandkeramik: An Archaeometric Approach. In: Lüning, J. – Frirdich, Ch. – Zimmermann, A. /eds./: Die Bandkeramik im 21. Jahrhundert. Rahden: Marie Leidorf, 203–216.

Quitta, H. 1960:
Zur Frage der ältesten Bandkeramik in Mitteleuropa. Prähistorische Zeitschrift 38/1–2, 1–38, 133–188.
https://doi.org/10.1515/prhz.1960.38.1-2.1

Raemaekers, D. C. M. 1999:
The Articulation of a 'New Neolithic': The meaning of Swifterbant Culture for the process of neolithisation in the western part of the North European Plain (4900–3400 BC). Archaeological Studies Leiden University 3. Leiden: Faculty of Archaeology, Leiden University.

Raemaekers, D. C. M. 2011:
Early Swifterbant pottery (5000–4600 calBC): Research history, age, characteristics and the introduction of pottery. In: Hartz, S. – Lüth, F. – Terberger, T. /eds./: Early Pottery in the Baltic – Dating, Origin and Social Context. Bericht der Römisch-Germanischen Kommission 89. Frankfurt a. M.: Philipp von Zabern, 485–500.

Raemaekers, D. C. M. – de Roever, J. P. 2010:
The Swifterbant pottery tradition (5000–3400 BC): matters of fact and matters of interest. In: Vanmontfort, B. – Louwe Kooijmans, L. – Amkreutz, L. – Verthart, L. /eds./: Pots, farmers and foragers. Pottery traditions and social interaction in the earliest Neolithic of the Lower Rhine Area. Archaeological Studies Leiden University 20. Leiden: Leiden University Press, 135–149.

Raemaekers et al. 2021:
Raemaekers, D. C. M. – Demirci, Ö. – Kamjan, S. – Talebi, T. – Schepers, M. – Huisman, H. – Peeters, H. – Çakirlar, C.:
Timing and Pace of Neolithisation in the Dutch Wetlands (c. 5000–3500 cal. BC). Open Archaeology 7/1, 658–670.
https://doi.org/10.1515/opar-2020-0157

Rainbird, R. P. 2014:
Review of "The Domestication of Europe" by Ian Hodder.
Available at:
https://australianarchaeologicalassociation.com.au/journal-contents/review-of-the-domestication-of-europe-by-ian-hodder/ [accessed 26-12-2020].

Razgildeeva, I. I. – Kunikita, D. – Yanshina, O. V. 2013:
Novyje dannyje o vozraste drevnejshich keramicheskikh kompleksov zapadnovo Zabaikalya. In: Medvedev, G. I. /ed./: Evraziya v Kainozoe: Stratigrafiya, paleoekologiya, kultury 2. Irkutsk: Irkutsk State University Press,168–178.

Reimer et al. 2020:
Reimer, P. J. – Austin, W. E. N. – Bard, E. – Bayliss, A. – Blackwell, P. G. – Bronk Ramsey, C. – Butzin, M. – Cheng, H. – Edwards, R. L. – Friedrich, M. – Grootes, P. M. – Guilderson, T. P. – Hajdas, T. P. – Heaton, T. J. – Hogg, A. G. – Hughen, K. A. – Kromer, B. – Manning, S. W. – Muscheler, R. – Palmer, J. G. – Pearson, C. – van der Plicht, J. – Reimer, R. W. – Richards, D. A. – Scott, E. M. – Southon, J. R. – Turney, C. S. M. – Wacker, L. – Adolphi, F. – Büntgen, U. – Capano, M. – Fahrni, S. M. – Fogtmann-Schulz, A. – Friedrich, R. – Köhler, P. – Kudsk, S. – Miyake, F. – Olsen, J. – Reinig, F. – Sakamoto, M. – Sookdeo, A. – Talamo, S.:
The IntCal20 Northern Hemisphere Radiocarbon Age Calibration Curve (0–55 cal kBP). Radiocarbon 62/4, 725–757.
https://doi.org/10.1017/RDC.2020.41

Rice, P. M. 2015:
Pottery Analysis: A sourcebook, second edition. Chicago: The University of Chicago Press.

Robb, J. 2014:
The future Neolithic: A New Research Agenda. In: Bickle, P. – Whittle, A. /eds./: Early Farmers: The view from Archaeology and Science. Oxford: Oxford University Press, 21–38.
https://doi.org/10.5871/bacad/9780197265758.003.0002

Robinson et al. 2006:
Robinson, S. A. – Black, S. – Sellwood, B. W. – Valdes, P. J.:
A review of palaeoclimates and palaeoenvironments in the Levant and Eastern Mediterranean from 25,000 to 5000 years BP: setting the environmental background for the evolution of human civilisation. Quaternary Science Review 25/13–14, 1517–1541.
https://doi.org/10.1016/j.quascirev.2006.02.006

Rohling, E. J. – Pälike, H. 2005:
Centennial-scale climate cooling with a sudden cold event around 8,200 years ago. Nature 434, 975–979.
https://doi.org/10.1038/nature03421

Rollefson, G. O. – Simmons, A. H. – Kafafi, Z. 1992:
Neolithic Cultures at 'Ain Ghazal, Jordan. Journal of Field Archaeology 19/4, 443–470.
https://doi.org/10.2307/530427

Rowley-Conwy, P. 2011:
Westward Ho! The Spread of Agriculture from Central Europe to the Atlantic. Current Anthropology 52 – Supplement 4, 431–451.
https://doi.org/10.1086/658368

Saile et al. 2016:
Saile, T. – Dębiec, M. – Posselt, M. – Ţerna, S. – Kiosak, D.:
Zur Bandkeramik zwischen Pruth und Südlichem Bug. Praehistorische Zeitschrift 91/1, 1–15.
https://doi.org/10.1515/pz-2016-0001

Sato, H. – Natsuki, D. 2017:
Human behavioral responses to environmental condition and the emergence of the world's oldest pottery in East and Northeast Asia: An overview. Quaternary International 441/B, 12–28.
https://doi.org/10.1016/j.quaint.2016.12.046

Shelach-Lavi, G. – Tu, D. 2017:
Food, pots and socio-economic transformation: The beginning and intensification of pottery production in North China. Archaeological Research in Asia 12, 1–10.
https://doi.org/10.1016/j.ara.2017.10.001

Shewkomud, I. J. – Yanshina, O. V. 2010:
Perekhod ot paleolita k neolitu v Priamurye: obzor osnovnykh komplexov i nekotoryie problemy. In: Kluev, N. A. – Vostretsov, Y. E. /eds./: Priotkryvaya zavesu tysyacheletiy: k 80-letiyu Zhanny Vasilyevny Andreevoy. Vladivostok: Reya, 50–72.

Shewkomud, I. Y. – Yanshina, O. V. 2012:
Nachalo neolita v Priamur'e: poselenie Goncharka-1. Saint Petersburg: Kunstkamera.

Sikk et al. 2020:
Sikk, K. – Krüska, A. – Johanson, K. – Sander, K. – Vindi, A.:
Environment and Settlement Location Choice in Stone Age Estonia. Estonian Journal of Archaeology 24/2, 89–140.
https://doi.org/10.3176/arch.2020.2.01

Sobieraj, J. 2017:
Beyond the world of farmers: The Subneolithic, 4000–2000 BC. In: Włodarczak, P. /ed./: The Past Societies 2. Polish lands from the first evidence of human presence to the Early Middle Ages: 5500–2000 BC. Warszawa: Institute of Archaeology and Ethnology, Polish Academy of Sciences, 337–360.

Sobkowiak-Tabaka, I. 2015:
Lithic industry of the Late Mesolithic and Early Neolithic communities from Dąbki sites 9 and 10. In: Kabaciński, J. – Hartz, S. – Raemaekers, D. C. M. – Terberger, T. /eds./: The Dąbki Site in Pomerania and the Neolithisation of the North European Lowlands (c. 5000–3000 calBC). Rahden: Marie Leidorf, 233–272.

Soffer, O. – Vandiver, P. – Oliva, M. – Seitl, L. 1993:
Case of the exploring figurines. Archaeology 46/1, 36–39.

Sørensen, L. 2015:
Hunters and farmers in the North – the transformation of pottery traditions and distribution patterns of key artefacts during the Mesolithic and Neolithic transition in southern Scandinavia. In: Kabaciński, J. – Hartz, S. – Raemaekers, D. C. M. –

Terberger, T. /eds./: The Dąbki Site in Pomerania and the Neolithisation of the North European Lowlands (c. 5000–3000 calBC). Rahden: Marie Leidorf, 385–432.

Stäuble, H. 2005:
Häuser und absolute Datierung der ältesten Bandkeramik. Universitätsforschungen zur prähistorischen Archäologie 117. Bonn: Habelt.

Stäuble, H. – Campen, I. 1998:
7000 Jahre Brunnenbau im Südraum von Leipzig. In: Koschik, H. /ed./: Brunnen der Jungsteinzeit. Internationales Symposium Erkelenz, 27. bis 29. Oktober 1997. Köln: Rheinland-Verlag – Bonn: Habelt, 51–71.

Stocký, A. 1926:
Pravěk země české. Díl I. Věk kamenný. Praha: Národní museum.

Stolz, D. 2009:
Neolitické a eneolitické osídlení Hořovické kotliny se zaměřením na kamennou industrii. Praha: Filozofická fakulta Univerzity Karlovy. Unpublished PhD thesis. Available at: http://hdl.handle.net/20.500.11956/21270 [accessed 09-02-2023].

Strien, H. Ch. – Gronenborn, D. 2005:
Klima- und Kulturwandel während des mitteleuropäischen Altneolithikums (58./57.–51./50. Jahrhundert v. Chr.). In: Gronenborn, D. /ed./: Klimaveränderung und Kulturwandel in neolithischen Gesellschaften Mitteleuropas, 6700–2200 v. Chr. Mainz: Verlag des Römisch-Germanischen Zentralmuseums, 131–150.

Stuiver, M. – Grootes, P. M. – Braziunas, T. F. 1995:
The GISP2 $\delta^{18}O$ Climate Record of the Past 16,500 Years and the Role of the Sun, Ocean, and Volcanos. Quaternary Research 44/3, 341–354.
https://doi.org/10.1006/qres.1995.1079

Sümegi, P. – Kertész, R. – Hertelendi, E. 2002:
Environmental change and human adaptation in the Carpathian basin at the late glacial/postglacial transition. In: Jerem, E. – Biró, K. T. – Rudner, E. /eds./: Archaeometry 98/1. Proceedings of the 31st International Symposium on Archaeometry, Budapest, April 26 – May 3 1998. British Archaeological Reports, International Series 1043. Oxford: BAR publishing, 171–177.

Šatavičė, E. 2020:
Neolithic societies and their pottery in south-eastern Lithuania. Lietuvos Archeologija 46, 111–145.
https://doi.org/10.33918/25386514-046004

Šumberová, R. 2012:
Cesta napříč časem a krajinou: Katalog k výstavě nálezů ze záchranného výzkumu v trase obchvatu Kolína 2008–2010. Praha: Archeologický ústav AV ČR, Praha, v. v. i.

Thomas, J. 1999:
Understanding the Neolithic: A revised second edition of Rethinking the Neolithic. London – New York: Routledge.

Tichý, R. 2014:
Neolitizace jako proces vzájemného učení. — Neolithisation as a process of mutual learning. In: Popelka, M. – Šmidtová, R. /eds./: Neolitizace aneb setkání generací. Praha: Univerzita Karlova, 301–319.

Timoshchenko, A. A. 2014:
Khronologiya i periodizatsiya kamennogo veka Kansko-Rybinskoi kotloviny. Izvestiya Irkutskogo gosudarstvennogo universiteta 10, 27–49.

Tkachev, O. Y. 2017:
Ranneneoliticheskaya keramika Zapadnoy Belarusi: sovremennoe sostoyanie i perspektivy izucheniya. Samarskiy nauchnyy vestnik 6/4, 110–116.

Tkachou, A. 2018:
Early Neolithic Pottery from Western Belarus. Archaeologia Baltica 25, 82–99.
https://doi.org/10.15181/ab.v25i0.1832

Tranekjer, L. D. 2015:
Danish Ertebølle ceramics – more than a pointed bottom. In: Kabaciński, J. – Hartz, S. – Raemaekers, D. C. M. – Terberger, T. /eds./: The Dąbki Site in Pomerania and the Neolithisation of the North European Lowlands (c. 5000–3000 calBC). Rahden: Marie Leidorf, 433–444.

Trigger, B. G. 1989:
A history of archaeological thought. 1st edition. Cambridge: Cambridge University Press.

Ulanov, I. V. – Berdnikov, I. M. 2015:
Keramicheskie kompleksy Ust'-Beloy: sistematizatsiya, khronometriya, khronologiya. Izvestiya Irkutskogo gosudarstvennogo universiteta 12, 47–80.

van de Velde, P. 1979:
On Bandkeramik Social Structure. Analecta Praehistorica Leidensia 12. Leiden: Sidestone Press.

van de Velde, P. 2007:
The Bandkeramik settlement. In: van de Velde, P. /ed./: Excavations at Geleen-Janskamperveld 1990/1991. Analecta Praehistorica Leidensia 39. Leiden: Sidestone Press, 223–244.

Vanmontfort, B. 2008:
A southern view on north-south interaction during the Mesolithic-Neolithic transition in the Lower Rhine Area. In: Fokkens, H. – Coles, B. J. – van Gijn, A. L. – Kleijne, J. P. – Ponjee, H. H. – Slappendel, C. G. /eds./: Between foraging and farming: an extended broad spectrum of papers presented to Leendert Louwe Kooijmans. Analecta Praehistorica Leidensia 40. Leiden: Leiden University, 85–97.

Vencl, S. /ed./ – Fridrich, J. 2007:
Paleolit a mezolit. Archeologie pravěkých Čech 2. Praha: Archeologický ústav AV ČR, Praha, v. v. i.

Vetrov, V. M. 2011:
Arkheologiya Vitimskogo ploskogoriya: Ust'-karengskaya kultura (13 000–5000 l. n.). Aktualnye problemy arkheologii Sibiri i Dalnego Vostoka, 173–187.

Vybornov, A. A. 2008:
Neolit Volgo-Kamya. Samara: PGSGA.

Vybornov, A. 2016:
Initial stages of two Neolithisation models in the Lower Volga basin. Documenta Praehistorica 43, 161–166.
https://doi.org/10.4312/dp.43.7

Walker et al. 2009:
Walker, M. – Johnsen, S. – Rasmussen, S. O. – Popp, T. – Steffensen, J.-P. – Gibbard, P. – Hoek, W. – Lowe, J. – Andrews, J. – Björck, S. – Cwynar, L. C. – Hughen, K. – Kershaw, P. – Kromer, B. – Litt, T. – Lowe, D. J. – Nakagawa, T. – Newnham, R. – Schwander, J.:
Formal definition and dating of the GSSP (Global Stratotype Section and Point) for the base of the Holocene using the Greenland NGRIP ice core, and selected auxiliary records. Journal of Quaternary Science 24/1, 3–17.
https://doi.org/10.1002/jqs.1227

Walker et al. 2018:
Walker, M. – Head, M. J. – Berkelhammer, M. – Björck, S. – Cheng, H. – Cwynar, L. – Fisher, D. – Gkinis, V. – Long, A. – Lowe, J. – Newnham, R. – Rasmussen, S. O. – Weiss, H.:
Formal ratification of the subdivision of the Holocene Series/Epoch (Quaternary System/Period): two new Global Boundary Stratotype Sections and Points (GSSPs) and three new stages/subseries. Episodes 41/4, 213–223.
https://doi.org/10.18814/epiiugs/2018/018016

Wang, L. – Sebillaud, P. 2019:
The Emergence of Early Pottery in East Asia: New Discoveries and Perspectives. Journal of World Prehistory 32, 73–110.
https://doi.org/10.1007/s10963-018-9126-y

Weninger et al. 2005:
Weninger B. – Alram-Stern, E. – Bauer, E. – Clare, L. – Danzeglocke, U. – Jöris, O. – Kubatzki, C. – Rollefson, G. – Todorova, H.:
Die Neolithisierung von Südosteuropa als Folge des abrupten Klimawandels um 8200 cal BP. In: Gronenborn, D. /ed./: Klimaveränderung und Kulturwandel in neolithischen Gesellschaften Mitteleuropas, 6700–2200 v. Chr. Mainz: Verlag des Römisch-Germanischen Zentralmuseums, 75–117.

Weninger et al. 2006:
Weninger, B. – Alram-Stern, E. – Bauer, E. – Clare, L. – Danzeglocke, U. – Jöris, O. – Kubatzki, C. – Rollefson, G. – Todorova, H. – van Andel, T. 2006:
Climate Forcing Due to the 8200 Cal yr BP Event Observed at Early Neolithic Sites in the Eastern Mediterranean. Quaternary Research 66/3, 401–420.
https://doi.org/10.1016/j.yqres.2006.06.009

Whittle, A. 2010:
The Körös Culture of the Great Hungarian Plain: implications of a recent research project at Ecsegfalva. Co. Békés. In: Gronenborn, D. – Petrasch, J. /eds./: Die Neolithisierung Mitteleuropas. Mainz: Verlag des Römisch-Germanisches Zentralmuseums Mainz, 189–210.

van Willingen, S. 2006:
Die Neolithisierung im nordwestlichen Mittelmeerraum. Iberia Archaeologica 7. Mainz: Philipp von Zabern.

Wu et al. 2012:
Wu, X. – Zhang, Ch. – Goldberg, P. – Cohen, D. – Pan, Y. – Arpin, T. – Bar-Yosef, O.:
Early Pottery at 20,000 Years Ago in Xianrendong Cave, China. Science 336/6089, 1696–1700.
https://doi.org/10.1126/science.1218643

Yanshina, O. V. – Sobolev, A. E. 2018:
The earliest pottery of Xianrendong cave: what do we know about it? Journal of Ancient Technology Laboratory 14 /3, 9–21.
DOI: 10.21285/2415-8739-2018-3-9-21

Zaitseva et al. 2016:
Zaitseva, G. I. – Lozovskaya, O. V. – Vybornov, A. A. – Mazurkevich, A. N. /eds./:
Radiouglerodnaya khronologiya epo- khi neolita Vostochnoi Evropy VII-III tysjacheletiya do n. e. Smolensk: Svitok.

Zakh, V. A. 2009:
Khronostratigrafiia neolita i rannego metalla lesostepnogo Tobolo-Ishim'ia. Novosibirsk: Nauka.

Zápotocká, M. 1998:
Bestattungsritus des böhmischen Neolithikums (5500–4200 B.C.): Gräber und Bestattungen der Kultur mit Linear-, Stichband- und Lengyelkeramik. Prag: Archäologisches Institut der Akademie der Wissenschaften der Tschechischen Republik.

Zeder, M. A. 2009:
The Neolithic Macro-(R)evolution: Macroevolutionary Theory and the Study of Culture Change. Journal of Archaeological Research 17, 1–63.
https://doi.org/10.1007/s10814-008-9025-3

Zubrow, E. B. W. 2016:
Epilogue to a Prologue. The Changing Climate of the Past, Present, and Future. In: Biehl, P. F. – Nieuwenhuyse, O. P. /eds./: Climate and Cultural Change in Prehistoric Europe and the Near East. Albany: State University of New York Press, 279–293.

Zvelebil, M. 2010:
Innovating Hunter-Gatherers: The Mesolithic in the Baltic. In: Bailey, G. N. – Spikins, P. /eds./: Mesolithic Europe. Cambridge: Cambridge University Press, 18–59.

Zvelebil, M. – Lukes, A. – Pettitt, P. 2010:
The emergence of the LBK Culture: search for the ancestors. In: Gronenborn, D. – Petrasch, J. /eds./: Die Neolithisierung Mitteleuropas. Mainz: Verlag des Römisch-Germanischen Zentralmuseums Mainz, 301–326.

Prof. PhDr. Ivan Pavlů, DrSc., Department of Archaeology, Faculty of Arts, University of Hradec Králové (Katedra archeologie, Filozofická fakulta, Univerzita Hradec Králové), Náměstí Svobody 331, CZ 500 03 Hradec Králové 3;
e-mail: ivan.pavlu@uhk.cz

Mgr. Petr Čechák, Ph.D., Museum of Eastern Bohemia in Hradec Králové (Muzeum východních Čech v Hradci Králové), Eliščino nábřeží 465, CZ 500 03 Hradec Králové 3;
e-mail: p.cechak@muzeumhk.cz