Introduction

The Neolithic farming societies of Europe embarked on a rapid journey across diverse landscapes,[1] sparking significant debates over their movements, particularly in the last three decades.[2] Several theories have been proposed to explain the Neolithic agricultural expansion, yet most available data stem from research conducted in Western and Central Europe.[3] Meanwhile, the eastern frontier of early farming, encompassing the steppe and forest-steppe regions north of the Black Sea (including present-day Moldova, western and southern Ukraine), remains poorly understood.

The primary objective of this work is to present and discuss the southeasternmost distribution of early farming communities, as revealed by recent excavations in eastern Romania, the Republic of Moldova, and southwestern Ukraine. This region, extending from the Carpathian Mountains in the west to the Dnieper River valley in the east (Carpathian-Dnieper region, **[fig. 1: B]**), has provided significant new insights into the spread of early agriculture.

This book is primarily based on a newly acquired series of radiocarbon dates that have greatly improved our understanding of the

1 Biagi et al. 2005; Dolukhanov et al. 2005; Fort 2022; Krauß et al. 2018; Shennan 2018.

2 Allentoft et al. 2024; Bickle, Whittle 2013; Binder et al. 2017; Perrin, Manen 2021.

3 For an overview, see Shennan 2018.

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chronology of early farmers and their contemporaries in southern Eastern Europe. Accelerator Mass Spectrometry (AMS) dating has resolved several long-standing chronological disputes, reducing previous uncertainties of up to half a millennium to estimates within a century or two. However, for dating to be meaningful, it is crucial to understand precisely what is being dated. Therefore, this book also incorporates the latest advances in field research and the reinterpretation of previously known archaeological complexes. While the publication of archaeological materials is not the primary focus, it is necessary to characterise these findings to formulate the research questions addressed through dating.

By integrating new radiocarbon dates with current archaeological research, the study aims to provide a more accurate timeline and a deeper understanding of the early farming communities in the Carpathian-Dnieper region. New radiocarbon dates have created some imbalance in the structure of our knowledge of the Neolithic in southern Eastern Europe. Certain phenomena have received radiocarbon dates that are radically different from those expected.[4] The current chronology requires changes in our understanding of historical flow of events in the region; first of all, a radical restructuring of the typo-chronological schemes, often not confirmed by radiocarbon dating. Moreover, the very perception of the groupings identified by the typo-chronological method now needs to be re-examined – the concept of a well-defined chronologically limited package of material culture seems to have to be replaced by various possible chronological relationships between the identified phenomena.[5] Coexistence, partial or complete, seems to occur more often than was assumed in the development of typo-chronologies.[6] Furthermore, the sequence of phases, when the first one leads to the next, is questioned because frequently, where a smooth development has been expected, the radiocarbon chronology shows suspicious gaps.[7]

The Neolithic period marked a pivotal phase in cultural and technological advancement, namely, the move from a lifestyle centred around hunting and foraging to one predominantly centred on agriculture: the Neolithic way of life. It included a change towards more enduring or permanent habitation, the emergence of robust housing structures, the inception of pottery usage, and profound shifts in human beliefs and ideologies.[8]

4 Biagi et al. 2007; Kiosak et al. 2023c; Lillie et al. 2020a; Motuzaite Matuzeviciute et al. 2015; Shatilo 2021; Videiko 2016.

5 Nakoinz, Knitter 2016.

6 Diachenko et al. 2024.

7 Nielsen et al. 2019.

8 Childe 1925; Dennell 1983; Shennan 2018; Whittle 1996.

The expansion of the Neolithic way of life is known as 'Neolithisation'. The advantage of this term is its ambiguity. It refers to:

1. the spread of the Neolithic way of life with the migration of its carriers;
2. the spread of the Neolithic as an idea.[9]

Since the former is extensively documented, and the latter is subjected to a reasonable doubt in our region under study, it seems reasonable to use the term Neolithisation, referring to the processes of agricultural spread in the Carpathian-Dnieper region.[10] Neolithisation laid the groundwork for many of the material and cultural achievements that would contribute to later developments in the prehistoric period.

Some scholars believe agriculture in the Balkans north of the Rhodope Mountains began around 6050 BCE, with available data supporting the arrival of early farmers in the region east of the Carpathians around 5800-5700 BCE.[11] These settlers, belonging to the later stages of the Criş culture **[fig. 1: I]**, established their villages up to the western bank of the Dniester River.[12] Only in a subsequent phase, from 5250-5100 BCE, did the Neolithisation process expand to encompass the broad territories of Podillia and Volhynia, extending as far as the Southern Buh and Dnieper rivers.[13] During this period, groups of the Linear Pottery culture (hereafter LBK **[fig. 1: II]**) founded more than 300 sites in the study region. The third wave of agricultural colonisation was attributed to the Trypillia-Cucuteni people during the fifth millennium BCE **[fig. 1: III]**, as they ventured across the Dnieper River and settled in the Central Ukrainian uplands. Over at least two millennia, the easternmost periphery of the Neolithic world traversed the plains of southern Eastern Europe, sometimes pausing for extended periods without apparent geographic barriers. The question is, did this movement lead to contact with the local population?

In the sixth and fifth millennia BCE, the Carpathian-Dnieper region acted as a zone where two distinct subsistence economy systems lived side by side. The intrusive lifestyle was represented by early farmers originating from the Balkans and Central Europe.[14] They inhabited settlements and shared religious beliefs and group

9 Budja 1993.

10 Kotova 2009.

11 Dergachev, Dolukhanov 2007; Ursulescu 1984.

12 Yanushevich 1989.

13 Saile 2020.

14 Dergachev, Dolukhanov 2007; Lillie et al. 2020b; Telegin 1987.

identity expressions, such as linear-decorated pottery. In contrast, the local tradition exhibited characteristics that diverged from the Neolithic practices of the Balkans and Central Europe. These local inhabitants were predominantly hunter-gatherers with probable (yet to be validated) limited experience in a specific form of agriculture and herding,[15] alongside the use of polished stone axes and pottery.[16] They settled vast territories in Eastern Europe, stretching from the Dniester River's catchment area to the Don and Volga Rivers.[17]

The Neolithisation in this region remains insufficiently studied despite a long history of research.[18] One of the reasons for this is the distinctiveness of local archaeological traditions, in particular their own special set of terms. In particular, the very concept of the Neolithic is often understood only by the presence of certain innovative elements of material culture rather than the complete establishment of the Neolithic way of life. Ceramic ware is often considered the defining feature of the Neolithic period.[19] And sometimes even the characteristics of the knapped stone assemblages.[20] Therefore, studies of Neolithisation often focus on the spread of some ceramic styles rather than on the diffusion of cultivated plants and domestic animals. The corresponding dissonance, when the term 'Neolithic' has two senses, makes it difficult to understand the results of Eastern European archaeologists and distorts the local tradition's reception of pan-European explanatory models.[21]

In this text, we propose to designate as 'Neolithic' only those groups that practised agriculture and cattle breeding. Groups that had ceramic technology but primarily engaged in fishing, hunting, and gathering – often labelled as 'Neolithic' in local archaeological traditions – will be referred to as 'para-Neolithic' hereafter. This clear terminological distinction will allow for better systematisation of the data, making the material culture differences between early farmers and ceramic-using foragers more apparent.

Why not simply refer to the latter as 'Mesolithic'? Doing so would confuse Eastern European readers, as the term 'Mesolithic' is traditionally reserved for the well-known predecessors of the ceramic and agricultural spread in this region. The para-Neolithic is not a separate and distinct archaeological period like the Neolithic or

15 Endo et al. 2022; Motuzaite Matuzeviciute 2020.

16 Telegin 1985b; 1987.

17 Dolbunova et al. 2023.

18 Tovkailo 2020.

19 Kolpakov et al. 2023.

20 Man'ko 2007; Zaliznyak 1998.

21 Man'ko; Telizhenko 2016; Zaliznyak 2017.

Mesolithic. Instead, in the context of Eastern Europe during the sixth to fifth millennium BCE, the Neolithic and para-Neolithic refer to two groups of roughly contemporaneous communities: one primarily engaged in agriculture and animal husbandry, and the other did not.

Do para-Neolithic groups represent 'transitional societies' between the Mesolithic and Neolithic communities 'on the way to the Neolithic'?[22] Not necessarily. It is premature and often erroneous to assert this for all para-Neolithic communities.

Along with the term 'para-Neolithic', it has been suggested that the term 'sub-Neolithic' should refer to a roughly similar range of phenomena.[23] However, the concept of 'sub-Neolithic' implies that the changes observed in hunter-gatherer communities, which distinguish them from earlier Mesolithic hunter-gatherers, were driven by contact with Neolithic groups.[24] In our opinion, this thesis is debatable and requires additional evidence. Therefore, we will use the more neutral term 'para-Neolithic'.

Several methodological tools allow us to see the archaeology of the first farmers and their contemporaries in southern Eastern Europe in a new light. They include:

1. post-depositional criticism armed with a microstratigraphic approach to the sites;
2. serial radiocarbon dating to complement and verify the typological seriation;
3. deconstruction of traditional ethnically-concerned archaeological taxonomies.[25]

These methodological tools have been known for a long time. Nevertheless, the peculiarities of the national archaeological traditions make them still novel here when applied in combination.

Therefore, the microstratigraphical approach, detecting cultural layer disturbances, later admixtures, and non-synchronous structures, combined with flotation and water-sieving, proved a powerful tool. Namely, until not long ago, the synchronisation of many phenomena relied on the detection of their characteristic things in the same contexts. Concerning the Neolithic, these contexts often were only cultural layers and not some features. The 'microstratigraphic critique' demonstrates that these synchronies are questionable due to contamination of the cultural layers with later materials. Moreover, the definition of archaeological groupings could be erroneous because of the mixing of entirely different types of phenomena since

22 Haskevych et al. 2020; Zvelebil, Lillie 2000.

23 Haskevych et al. 2019.

24 Nowak 2007.

25 Kohl 1998.

it relied on sites yielding systematic disturbances of cultural layers in certain natural conditions and not on archaeological reality.[26]

Thus, a microstratigraphic approach to excavations, even of well-known sites, seems productive. It allowed us to identify differences that the first excavators did not notice and to detect new cultural layers and stratigraphic units at some sites. In particular, two 'long sequences', Kamyana Mohyla 1 and Melnychna Krucha, were studied this way (together with N. Kotova, W. Tinner, and E. Nielsen). At both sites, the stratigraphic sequence was confirmed by palaeopedological analysis and 3-D analysis of the finds' point cloud. Properly dated sites constitute a reference that can be used to solve problems of the chronology of some archaeological phenomena of a larger scale.

When a site's stratigraphy is clarified and understood at the microstratigraphic level, sampling for radiocarbon dating becomes meaningful. We understand what we are dating (in most cases). The new radiocarbon dates were obtained using accelerated mass spectrometry (AMS) in the laboratories of Bern and Poznan. This method provides minor standard deviations than most conventional dates available for the study area. During the author's MSCA project and related inquiries, the radiocarbon database was expanded by 45 new dates.

The dates were then processed using calibration and statistical techniques based on the Bayesian algorithm in the OxCal software.[27] Calibration is the transition from a sample's radioactive carbon content to the sample's position on a time scale.[28] The now widely accepted Intcal20 curve makes it possible to accurately shift to calibrated dates within the Holocene.[29]

Bayesian statistics offers a straightforward, probabilistic approach to blending various types of evidence in estimating prehistorical event dates and explicitly expressing the uncertainties in these estimations. This methodology allows us to factor in the interconnections among samples when calibrating a set of connected dates. An obvious application of this type of modelling is the implementation of stratigraphic information on the order of stratigraphic units. This allows the dating of the lower unit to be used as a *terminus post quem* for the upper unit, and so on.[30] Also, it is natural to test typo-chronological schemes when the order of phenomena established by the latter is used as a hypothesis to order relevant radiocarbon dates.[31] Thus, the validity of the

26 Sorokin 2006.

27 Bronk Ramsey 1995; 1998; 2009; Bronk Ramsey, Lee 2013.

28 Buck et al. 1991.

29 Reimer et al. 2020.

30 Bronk Ramsey 2009.

31 Diachenko et al. 2024.

resulting model corresponds to the validity of the typo-chronological scheme. For this purpose, the built-in functions Boundary, Sequence, Phase and several others are used in OxCal software.[32]

All new radiocarbon dates were obtained from fragments of bones and all results are conventional radiocarbon ages.[33] Here and thereafter, we differentiate clearly between calibrated 14C dates (cited 'calBCE') and estimates interpolated from 14C dates, typological seriation and stratigraphies (cited 'BCE').

An archaeological culture is an amorphous classificatory unit, which is meant to imply both temporal longevity and spatial coherence of some similar items in the archaeological record.[34] The complete dominance of the cultural-historical approach in local archaeological traditions has led to an understanding of archaeology as a 'science of cultures', with 'culture' often having a distinct ethnic meaning.[35] However, archaeological culture is only a tool, a unit of classification, important insofar as it is useful for the purpose of research.[36] Therefore, one of the techniques constantly used in this work is the 'deconstruction' of the well-known archaeological cultures of the region, attempting to see the archaeological reality behind the classification grid. A logical move to prehistoric reality requires seeing beyond the classificatory frameworks and understanding the actual duration and limits of human societies under question.

The Carpathian-Dnieper region lies in the temperate climate zone of the Northern Hemisphere. Within its borders, three physical and geographical zones can be seen: forest, forest-steppe and steppe, and in the Carpathians, there is a high-altitude zone. The region's physical and geographical zones vary markedly from west to east (primarily regarding climate, soil, and vegetation). Summers are long, sunny, hot, and arid. Autumn is warm and rainy in the second half. Winters are short, mild, and snowy. Spring comes early. Due to a sharp rise in air temperature, moisture evaporates quickly from the soil.[37] Chernozem is the region's predominant soil type, encompassing over 65% of the land. This soil variety boasts an abundance of nutrients and exceptional fertility, making it the preferred choice for Neolithic farmers across many regions.[38]

32 Bronk Ramsey, Lee 2013.

33 Stuiver, Polach 1977.

34 Childe 1929, v-vi.

35 Kohl 1998.

36 Shanks, Tilley 1992.

37 Marynych 1990.

38 Kiosak, Matviishyna 2023.

The book's structure is organised according to the archaeological classification of the studied phenomena. Chapter 1 discusses the current chronology of the Mesolithic in the region, using the 'long sequences' from Kamyana Mohyla 1 and Melnychna Krucha as reference case studies. Chapter 2 addresses the para-Neolithic, focusing on the spread of the first ceramics in the region and the formation of para-Neolithic communities. This chapter also touches upon the deconstruction of certain typological concepts, such as the 'Buh-Dniester culture'. Chapter 3 presents the latest data on the chronology of agricultural dispersals in the Carpathian-Dnieper region. Chapter 4 employs a microregional approach, concentrating on a small region of the Southern Buh River valley **[fig. 1: A]**. This chapter aims to elucidate the spatial aspects of agricultural dispersals and their probable relationship to the spatial patterns of the local population.

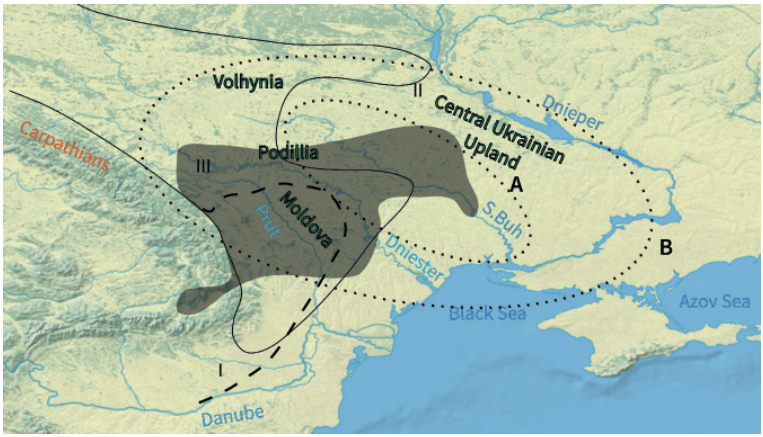

Figure 1 A – focus micro-region (Chapter 4), Southern Buh region; B – the study region, Carpathian-Dnieper region. Distribution areas of the following cultural aspects: I – Criș; II – LBK; III – Early Trypillia. Map by the Author, Topo: Natural Earth