Edited by:

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HABITUS?

The Social Dimension of Technology and Transformation

SCALES OF TRANSFORMATION IN PREHISTORIC AND ARCHAIC SOCIETIES | 3

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Preface of the series editors

With this book series, the Collaborative Research Centre 'Scales of Transformation: Human-Environmental Interaction in Prehistoric and Archaic Societies' (CRC 1266) at Kiel University enables the bundled presentation of current research outcomes of the multiple aspects of socio-environmental transformations in ancient societies by offering this new publication platform. As editors, we are pleased to be able to publish monographs with detailed basic data and comprehensive interpretations from different case studies and landscapes as well as the extensive output from numerous scientific meetings and international workshops.

The new book series is dedicated to the fundamental research questions of the CRC 1266 dealing with transformations on different temporal, spatial and social scales, here defined as processes leading to a substantial and enduring reorganization of socio-environmental interaction patterns. What are the substantial transformations that describe human development from 15,000 years ago to the beginning of the Common Era? How did the interaction between natural environment and human populations change over time? What role did humans play as cognitive actors trying to deal with changing social and environmental conditions? Which factors triggered the transformations that led to substantial societal and economic inequality?

The understanding of human practices within the often intertwined social and environmental contexts is one of the most fundamental aspects of archaeological research. Moreover, in current debates, the dynamics and feedback involved in human-environmental relationships have become a major issue looking at the sometimes devastating consequences of human interference with nature. Archaeology, with its long-term perspective on human societies and landscapes, is in the unique position to trace and link comparable phenomena in the past, to study the human involvement with the natural environment, to investigate the impact of humans on nature, and the consequences of environmental change on human societies. Modern interlinked interdisciplinary research allows for reaching beyond simplistic monocausal lines of explanation and overcoming evolutionary perspectives. Looking at the period from 15,000 to 1 BCE, the CRC 1266 takes a diachronic view in order to investigate transformations involved in the development of late Pleistocene hunter-gatherers, horticulturalists, early agriculturalists, early metallurgists as well as early state societies, thus covering a wide array of societal formations and environmental conditions.

The volume *Habitus, the social dimension of technology and transformation* is intended for international academia and represents an important compilation of information and interpretations for all archaeologists and readers interested in European Prehistory. The problem of the social dimension of technology and transformation seen in the perspective of "habitus" has been repeatedly addressed in

various works. However, the complexity of these phenomena leads to subsequent attempts to present and explain them in new contexts and provide relevant observations. The anthology is intended to contribute to a better understanding of a system of embodied dispositions hidden behind the term „habitus“. This will be achieved by presenting the latest studies on the social dimension of technology and transformation. The book is the outcome of a CRC workshop organized mainly by our Mercator Fellow Sławomir Kadrow. We are deeply grateful to him for his engagement not only during the workshop, but also for the preparation and editing of this book. Many thanks also to Katharina Fuchs, who managed the editorial process, and to Carsten Reckweg for editing the figures for publication.

Wiebke Kirleis and Johannes Müller

Contents

Preface

This volume contains papers which were presented during the International Workshop *Habitus? The social dimension of technology and transformation* which took place at Kiel University on June 18-19, 2018 and was organized by the CRC 1266 Subproject F5.

The aim of the workshop was to consider the various scales of social transformation seen from the perspective of human-environmental interaction. At the same time, it was assumed that people work in a routine manner, *i.e.* in a system (habitus) of embodied dispositions, usually shared by people from a similar cultural milieu, which organizes the ways in which individuals perceive the social world around them.

Attention was in particular focused on the importance of technology in transformation processes, especially in its social aspects. To cope with new challenges, past peoples actively used various technologies. However, in many cases new technologies were introduced almost unconsciously and subsequently affected the direction of transformation in a slow and evolutionary way. In other cases, some technologies, regardless of whether they were adopted consciously or not, reinforced and accelerated certain tendencies in social development.

Archaeologists from different parts of Europe were invited to the workshop to meet these objectives. Their task was to explore technology as a trigger of socio-cultural change and in its mutual relations with social structures, institutions, power, ideologies, traditions, inequalities, and conflicts in the context of the relevant economic and environmental backgrounds.

Papers mainly cover areas of Europe from Scandinavia to Italy and the Balkans and from the British Isles to Ukraine and the North Caucasus. In the chronological dimension, they include the time from the Neolithic to the beginning of the Iron Age. Among the topics discussed are rock art, Trypillian mega-sites, stone axes and adzes, metallurgy, wagons, archery items, pottery produced on a fast wheel, mechanisms of cultural genesis, dualistic social systems, and comments on Pierre Bourdieu‘s theory of practice, including the concept of habitus.

In summary, the volume presents various approaches to the role of technology in social transformation in the context of the habitus concept: from practices and processes to theories and ideas concerning prehistoric societies.

Sławomir Kadrow, Johannes Müller

Habitus? The social dimension of technology and transformation – an introduction

Sławomir Kadrow, Johannes Müller***

The principal investigators of CRC 1266 subproject F5, Berit V. Eriksen, Wiebke Kirleis and Johannes Müller, decided to organize a workshop focused on the consideration of the interrelations between technology and social change. This volume, which is entitled *Habitus? The social dimension of technology and transformation,* contains articles which were presented during this workshop.

Habitus is the central concept because it allows us to explain and understand the multiple conditions surrounding every manufacture. It is a system of permanent dispositions, functioning as structuring structures, that is to say, as principles generating and organizing practices and ideas that can be objectively adapted to goals, without requiring conscious goal orientation and deliberate mastery of the activities necessary to achieve this goal. Habitus is the internalization of external structures (norms, moral orders) and generates strategies that allow a person to deal with different situations in a consistent and systematic way. Habitus leaves some space for improvisation, which is also important.

Pierre Bourdieu, in his theory of practice, developed the key terms of habitus, field, social capital, social violence, maintaining that each of them should be considered in the context of the others. Archaeologists, with the possibility of studying the past from a long-term perspective, can also effectively examine the impact of environmental changes on social transformation in its technological dimension.

In general, the content of the articles published in this volume corresponds with the above theses and fits their purposes and thematic scope.

Vesa Arponen, in his contribution, presents a short and condensed philosophical review of the habitus and related concepts. Their goal was to synthesize agency and structure. There is also a discussion of some archaeological applications of the concepts mentioned. Arponen notes that the concentration of some post-processual archaeologists on agency threatens the loss of the synthesizing character of the theory of practice.

Marko Porčić describes the various cultural and social aspects of changes in the Neolithic and Early Copper Age of the Balkans, including changes in the technology of copper metallurgy and pottery manufacturing. He notices that technology can be both a cause and/or a consequence of sociocultural processes. The relationship

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between the main moments of technological change (pottery appearance and intensification of metallurgy) and the periods of demographic growth is noticeable. In conclusion, Porčić states that the habitus of Neolithic people was greatly influenced and shaped by technological changes, but the available evidence does not confirm that these changes were of crucial importance for the social process.

Jan Kolář discusses the relationship between landscapes, technologies and societies. The concept of landscape technology is particularly useful in this context. Axes and adzes had special importance for the Neolithic way of life consisting of, among other things, deforestation and managing woodlands, constructing houses, preparing firewood or gathering winter fodder for domestic animals. These artefacts were very important innovations in Neolithic human history. Their possession and use makes it possible to change landscapes. The significant role of stone and flint axes is reflected in ritual deposition, burial rites and supraregional interactions. Social significance did not originate in the axe itself, but in practices performed in reality or symbolically. That is why knowledge about the habitus of axe producers and users is so important.

Bisserka Gaydarska analyses the amazing length and immutability of the habitus of the population of the vast Cucuteni-Trypillia cultural complex, which is manifest in the practising of various technologies. This is particularly visible in housebuilding, house sizes, arrangement of houses on the settlements, low level of agriculture, and continuity in faunal exploitation. Trends toward slightly higher variability are observed in the range of local forms and decoration of pottery and figurines. On the other hand, attention is drawn to the appearance and disappearance of megasites. The author explores the phenomenon of this disjunction on the level of figurine consumption and settlement architecture using visual graph analysis. In order to get deeper into the process of social change, Gaydarska introduces the concept of Big Other, borrowed from Jacques Lacan. This concept is of key importance for understanding the disappearance of Cucuteni-Trypillia megasites. As a result of the adopted interpretative perspective, she states that neither technological innovations nor environmental change caused the abandonment of megasites. It was caused rather by changes in the Big Other sphere (fictional ideas of anonymous authoritative power and/or knowledge), which was manifested by breakdowns in the traditional use of social space. According to Gaydarska, the habitus, as a concept, does not have an explanatory potential of change.

Aleksandr Diachenko examines the relationship between social fields, population size, carrying capacity, migratory behaviour, social organization of the Cucuteni-Trypillia cultural complex (CTCC). It was found on the one hand that demographic increase followed technological and economic innovations. On the other hand, migrations and territorial expansion of CTCC populations have a strong correlation with some environmental shifts. An unbounded possibility for territorial expansion provoked an inertia in its development. The continuation processes prevailed over the changes. Trypillia megasites resulted from migratory behaviour. That also allowed local populations to avoid demographic stresses. In this situation, it seems that the habitus contributed to the continuation and stabilization of social structures. Social transformations were impacted rather by external influences, because local populations were open to innovations from outside.

Sabine Reinhold looks for an answer to the question to what degree the appropriation of particular technologies has the potential to trigger social change in the West Eurasian Early Bronze Age context. She assumes that production and technology are both highly effective means by which individuals mediate their social positions in society and generate political power. Reinhold wonders whether the elite of the Bronze Age in the form of the habitus of aristocratic warriors (legible in its oldest form in the Maykop Culture) is not a product of the introduction of a number of new technologies, mainly in the form of metallurgy. She also wonders

whether the steppe habitus (in the oldest phase of the Yamnaya Culture) was not the result of the introduction of wheeled wagons.

Clément Nicholas describes and characterizes flint arrowheads and stone bracers from the Late Neolithic and Early Bronze Age in Europe. In the Bell Beaker Culture, each warrior was able to shape his own archery-related items. In some regions during the Early Bronze Age, all these items were manufactured by craftsmen for the elite. Some of these artefacts were intended for display only. They resulted from the use of various technologies and constituted socially valuable items. Changes in their production and social functions reflect transformations in social practices. Arrowheads and bracers and their technologies could not be considered proper triggers for social change; they rather reflected them. During the Bell Beaker Culture, there is evidence of regular contacts between distant regions. Later, in the Early Bronze Age, material culture was more regionalized and expressed strong, local identities.

Rune Iversen investigates non-figurative rock art during the Neolithic and the Bronze Age in Scandinavia. He asks if its appearance, disappearance and reappearance could be linked with crucial social transformations observed there? The oldest motive of rock art (cup-marks) is dated back to the beginning of the 3rd millennium BC at the latest. Thus it is not excluded that this kind of rock art could have been part of the neolithization process. With the advent of the Corded Ware Culture and decisive social changes, megalith tombs and rock art disappeared. Only with the arrival of the Early Bronze Age in Scandinavia, with a new social transformation, did rock art begin to flourish again. This time the figurative representations were the most typical. It was a manifestation of new social structures. Rock art became a medium through which people could engage with their forebears.

Lieve Donnellan, in her interesting study, analyses the innovations in pottery production techniques which took place in the Bay of Naples in Italy in the 8th century BC. Painted fine wares, produced on a fast wheel, were introduced alongside other forms. They partially substituted or supplemented local handmade, coarse pottery. In founding their colonies, the Greeks transmitted material and social culture to native, local groups. Donnellan shows how small numbers of newcomers introduced new practices (technology and customs) into native communities. They radically transformed society and the landscape without engaging in large-scale migrations. Post-colonial theories allow the attribution of more agency to native populations. Attention is drawn to the selective adoption of the dominant culture of the Greeks and to expressions of native identities. Habitus is best manifested through technologies that help us to understand how relations between people are mediated. The change in production technology changes the relations with other parts of the network (people, objects, landscapes).

Christian Jeunesse shows the results of his own ethnoarchaeological research conducted on the Indonesian island of Sumba. He describes the dualistic socio-political system of the communities for which the homogeneous material culture was typical. In some of them, the segmented acephalous system of social organization prevailed, while others reached the level of stratified society. The dualistic system generates deep differences in the life of all communities and individuals. The author then refers to the Hallstatt-Early La Tène cultural complex, in which a similar dualistic system could prevail. However, most researchers believe that in this case we are dealing with nothing more than two different ways to display wealth and prestige within the same sociocultural system.

Valentine Pankovski critically discusses two different concepts of cultural genesis in the eastern European Bronze Age (popular and vividly discussed among archaeologists of the Russian language area) that, in the intention of their creators, were to have a holistic character. The first of them (*Pulsatile Centres Theory*) puts in the foreground vast areas and continuous diffusive pulsation from the centres to the peripheries. The second one (*Accumulative Centre Theory*) concentrates on sudden

accumulation in certain island-like areas 'with subsequent fading invasion into the multiple competitive centres far outside'. In both theories centres are defined as vibrant wellsprings of technological and social innovations. The author is convinced that an innovation-oriented conception of cultural genesis would have gained additional support in assessing its integrity and consistency by means of the habitus concept applied to a large spatial and temporal scale.

The volume of *Habitus? The social dimension of technology and transformation* presents a variety of approaches to the role of technology in social transformation in the context of the habitus concept. The authors of some articles refer a little more to theoretical issues; others focus only on showing social change through the analysis of specific cases from different periods of the prehistory of Europe. All works contribute to a better understanding of the relationship between technology and social change or social persistence.

Habitus as a theoretical concept

*Vesa PJ Arponen**

Abstract

This paper provides a brief philosophical overview of the concept of habitus and the associated conceptual framework of practice theory with focus on the work of Pierre Bourdieu. Some broad areas of archaeological application are discussed. It is argued that while the original impetus behind practice theory was to synthesize structure and agency, some of the synthetic character of practice theory may have been lost in the focus of post-processual archaeology on agency.

Keywords: habitus, practice theory, Bourdieu, Giddens, holism

The concept of habitus

Habitus became a pivotal concept in modern social theory with the work of Bourdieu from the 1970s onwards (Bourdieu 1977). Together with Giddens' (1979; 1984) concept of structuration, habitus became a keyword for a new wave in social theory centred on practices (Schatzki *et al.* 2001). Central to both, for Bourdieu and Giddens, was to create a synthesizing framework for understanding human action as springing on the one hand from human agency and on the other from the external-to-agent social structures within which agents operate. Practices were understood as the context in which agency and structure come together and are continuously and recursively lived out in the reproduction of human social life.

With Bourdieu we are to think of social life as a vast set of processes that are continually unfolding in time and space, which he calls the 'field'. Interlocking in the temporal and spatial unfolding of the fields of practice are agential deliberation as well as dispositions and practical (embodied) know-how together with the societal structures, all fitting each other, as if puzzle pieces, to generate, regenerate and reproduce social life and daily basis.

The overall picture is characterized by the attempt to bring together concepts that would seem to be each other's opposites: subjectivism and objectivism, internal agency and external structure, dynamism and change as well as durability and structured reproduction, practical and embodied as well as reflective and deliberative reason.

In Bourdieu, a host of further key concepts enter into the overall picture. Thus Bourdieu recognizes cultural, symbolic and economic capital understood as different

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kinds of resources agents deployed in practices. Cultural capital denotes knowledge of social norms as well as (embodied) know-how appropriate to a field. Symbolic or social capital denotes positions in the social world: titles, roles, and so on. Economic capital denotes control and command of economic resources needed to operate in a field. The field of practices is understood as a field of power struggle in which the different forms of capital can be deployed. Accordingly, Bourdieu recognizes social classes as defined by the agents' command of and access to different types of capital.

Habitus in use

The concept of habitus and the associated terminology constitute thus, in the first instance, a framework of 'high' theory as opposed to, say, 'middle range' theory. The precise implications and the application of the framework in archaeology remains an open issue.

That is not to say that habitus and the associated conceptual apparatus would not have been influential in a range of human sciences. It seems fair to say this is because the apparatus so ambitiously synthesizes, organizes and relates to each other a whole range of phenomena of interest to social scientists whether it concerns agency or structure. As a grand holistic synthesis, the framework is hard to reject outright and has accordingly been criticized either over some detail or another (such as that the social psychology contained therein is overtly simplistic, Chandler 2013) or that the synthesis is so comprehensive that it rather describes a set of problems than provides a solution for dealing with them (King 2000). Many meanings of habitus and related notions have accordingly been distinguished (Brubaker 1993).

As noted above, the concept of habitus is a part in a larger conceptual apparatus that was originally conceived to *synthesize* what had until then been seen as separate modes of inquiry, namely agency *and* structure. In archaeology, however, this synthesizing endeavour came to be branded as *agency* theory (Dobres & Robb 2000). The cause for this seemingly one-sided reading of the original synthesizing efforts of Giddens and Bourdieu may go back to some of the original impetus for the critique of processualism in archaeology. Shanks and Tilley's (1988, 51) 13-point critique of processualism in social archaeology time and again criticizes the lack of attention to the individual and the particular in processual archaeology. Post-processual archaeology, by contrast, was to bring the individual, the particular, and meaning into focus – hence presumably why, in archaeology, practice theory has been referred to as agency theory. For many, habitus was a term that could be used to shed the older processualist focus on external influences on human conduct in favour of a more human and culture-focused view that put the social formation processes at the forefront and centre (Barrett 2005).

Be that as it may, the kinds of things highlighted in Bourdieu's work have been seen as particularly interesting for archaeologists for a number of reasons. For one, archaeology has long been fundamentally interested in prehistoric production techniques (of pottery, tools, *etc.*). This old archaeological interest is captured in a different way in the concept of agential (embodied) know-how. As a result, the word 'embodiment' has begun to enjoy widespread currency in archaeology, denoting, broadly speaking, the human bodily or corporeal engagement with the world, including the different cultural, identity, gender, and other forms this might take (Hamilakis *et al.* 2002). Embodiment has also been taken up in philosophy of cognitive science and therewith in archaeology, as cognition has now begun to be seen as embodied rather than purely mental (Clark 1997; 2008; Malafouris 2013).

Secondly, archaeology has been quite plausibly characterized as a pluralistic, synthesizing discipline or indeed a conglomerate of disciplines (Shiffer 1988), and so the concept of a field of interactive practices promises to offer a way of concep-

tually bringing the archaeological family of disciplines under one roof because the processes investigated in the various disciplines came together in the prehistoric practice. That is to say, in so far as archaeology involves making a holistic synthesis from a range of information from economic and subsistence practices to ritual and cultural particularities, the concept of the field of practices and the different types of capital therein may seem attractive. Relatedly, the multidimensional nature of the 'field of the social' as seen in Bourdieu's work has corresponded in archaeology to the (Marxist) interest in power and social differentiation. Here the field is typically referred to as 'negotiated' or 'contested' as different agents deploy different forms of capital to shape the field in their interests.

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Society and technology in the Neolithic and Eneolithic of the Balkans

*Marko Porčić**

Abstract

The long period from ~6500 cal BCE to ~4200 cal BCE in the Balkans is associated with changes in different aspects of culture and society, which include changes in technology. As a matter of fact, the entire period is divided into two major units - the Neolithic and Eneolithic - based on the single technological criterion, which is the invention and development of copper metallurgy. As technology can be both cause and/or consequence of sociocultural change, in this paper I review and discuss the appearance and development of technology during the Neolithic and Eneolithic in the Balkans with the aim to address the following questions. What were the major technological changes during this long period? Can we identify their direct or indirect causes in other aspects of culture and society and, most importantly, what were the social implications and consequences of different technological developments?

Keywords: Neolithic, Eneolithic, Balkans, technology, sociocultural change

Introduction

The study of technology is commonplace in archaeological research, particularly in specialist fields such as pottery and stone tools analysis. The domain of technology plays an important role in most general anthropological theories. In theories of sociocultural evolution, both in their 19th-century formulations as well as in the neoevolutionary revisions of the mid 20th century, technology is tightly correlated with the general social evolution and increase in social complexity. For example, Morgan's evolutionary stages and substages were associated with the development of certain technologies (*e.g.* bow and arrow) (Morgan 1877), whereas in Leslie White's neoevolutionary scheme the very culture itself was defined by the amount of energy that could be harnessed with the available technological knowledge (White 1959). Perhaps the strongest and most explicit link between technology and culture is proposed in the classical version of Marxism, where technology, as a key component of forces of production, combined with relations of production, determines the entire fabric of

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culture and society. In the cultural transmission theory, development of complex technologies is viewed as dependent on population size (Henrich 2004; Shennan 2001).

Even this short glimpse of the various roles assigned to technology in different theoretical systems clearly suggests that sociocultural structure and change cannot be divorced from the study of technology. Technological changes can lead to sociocultural changes and vice versa. These changes happen on various scales; therefore not all technological inventions have the same impact. For example, we can witness how the introduction of mobiles changed the habits of people and patterns of interaction, making everyday routines a bit different from in the era before mobile telephones. But this change is slight when compared to changes resulting from the invention of steam power or internal combustion engines.

The long period from ~6500 cal BCE until ~4200 cal BCE (Neolithic and Eneolithic periods) in the Balkans is associated with changes in different aspects of culture and society, which include changes in technology. There are numerous studies dealing with specific aspects of specific technologies over this period in different parts of the Balkans (*e.g.* Miloglav and Vuković 2018; Vitezović and Antonović 2017). In this paper I discuss the appearance and development of different technologies during the Neolithic and Eneolithic in the Balkans from the perspective of anthropological archaeology. The first task is to answer the question: what were the major technological changes during this long period? Can we identify their direct or indirect causes in other aspects of culture and society and, most importantly, what were the social implications and consequences of different technological developments? Therefore my approach is not technical in the sense of discussing the details of technology, but it is anthropological as I tend to understand the social and cultural context of technology through selected examples. I do not attempt to provide a comprehensive temporal and spatial coverage of the Neolithic and Eneolithic in the Balkans but rather to identify the major issues and present illustrative case studies. This brings the danger of extrapolating from small regions or single sites to large areas, but I make no assumption of uniformity over larger regional and temporal domains. With the lack of comprehensive and systematic data, these illustrative cases are merely the starting point for discussing the subject matter.

Archaeology of the Balkans between 6500 and 4200 BCE

The Balkans is a peninsula surrounded by the Adriatic and Ionian Seas in the west, Aegean Sea in the south and the Black Sea in the east (Fig. 1). The area of the Balkans can be subdivided into several major cultural provinces: the southern Balkan Neolithic (Greece), the western Balkan inland Neolithic and Eneolithic cultures (Macedonia, Kosovo, Bosnia and Herzegovina, Serbia), Adriatic region (Croatia, Montenegro and Albania) and the eastern Balkans (Turkish Thrace, Bulgaria, southern Romania). The temporal domain of this study is a two-thousand year period between 6500 and 4200 BCE – the Balkan Neolithic and Eneolithic. As there are many different archaeological traditions in the Balkans, usually separated along national borders, there is a great diversity in terminology and chronological divisions (*e.g.* the Eneolithic starts at different times in different places in the Balkans and is rarely used in Greece compared to the central and eastern Balkans). In spite of the great diversity between regions it is possible to define three major temporal periods of (almost) pan-Balkan significance:

1. ~6500 to ~5300 BCE. This is the phase corresponding to the appearance and consolidation of the first Neolithic cultures across the Balkans (first in Thessaly and northern Greece, spreading during ~6200 BC to the rest of the Balkans).

Figure 1. A map of the Balkans with the Neolithic and Eneolithic sites mentioned in the text.

2. ~5300 to ~4500 BCE. This phase is characterized by what seems to be an almost pan-Balkan phenomenon of the appearance of the black-burnished pottery, best and most famously represented by the Vinča Culture (Garašanin 1997). More importantly, the beginning of this phase is also defined by the beginning of the first copper metallurgy and the appearance of large extended tell settlements with above-ground houses in the western and eastern Balkans (Chapman 1981; Chapman 2015; Garašanin 1982; Radivojević 2015; Radivojević *et al.* 2010; Todorova 1995; Todorova 2003).

3. ~4500 to ~4200 BCE. In this phase, the large settlements of the western Balkans disappeared and the largest stylistic entity, the Vinča Culture, also disappeared from the archaeological record (Borić 2015a), while in the eastern Balkans there was a development of tell settlements and cemeteries culminating in the most conspicuous examples of social differentiation in the entire Balkan Neolithic and Eneolithic period (Bailey 2000; Chapman 2015; Todorova 1995; Todorova 2003). By the end of the 5th millennium, these communities had disappeared as well.

Copper metallurgy

The Balkan Neolithic communities discovered the technology of copper metallurgy by the end of the 6th millennium BCE, which marked the transition to the Eneolithic (Copper Age) period (Antonović 2002; Borić 2009; Jovanović 1971; Krauß 2008; Pernicka *et al.* 1997; Radivojević 2015; Radivojević and Rehren 2016; Radivojević *et al.* 2010; Todorova 1995; Todorova 2003). It is the major technological invention after the arrival of farming in the region. The earliest evidence of metallurgy is documented in the Vinča Culture in the western Balkans and is dated to the end of the 6th millennium BCE (Radivojević and Rehren 2016; Radivojević *et al.* 2010). In the eastern Balkans, there was also a development of copper metallurgy related to copper mines in Thrace (Ivanova 2012; Pernicka *et al.* 1997). The earliest objects made of copper were small rings and hooks, but by the second quarter of the 5th millennium heavier objects such as bracelets and various forms of heavy tools/weapons were produced (Balaban 2017; Heyd and Walker 2015; Todorova 1995; Todorova 2003).

Leaving technical issues aside, from the perspective of this review the most important question is: what was the impact of metallurgy on the Balkan Neolithic societies? What were copper objects used for and did they play a role as status or prestige objects? Who were the metallurgists and what was their status in the community? Did the appearance of this new technology change the basis of production systems and/or the social relations?

Let us start with the question of function of copper objects. Greenfield studied cut marks on animal bones from the Vinča Culture contexts from the first half of the 5th millennium BCE in order to determine the frequency of cut marks made by copper tools and stone tools (Greenfield 1999). Results of this study show that the frequency of marks made by copper tools was very low, but interestingly they seemed to increase from 5.88% in the Early Vinča (~5000 BCE) to 16.28% in the Late Vinča (~4500 BCE) context (Greenfield 1999, table 2).

It is possible that copper objects were some kind of prestige or status marking items during the first half of the 5th-millennium Balkans (cf. Siklósi 2004). Such an interpretation can be supported by different lines of evidence. For example, an analysis of the distribution of grave goods from the Late Neolithic Vinča Culture cemetery at Gomolava (Srem district, Republic of Serbia; between ~4700 and ~4650 cal BCE) indicates that copper bracelets and beads were present in some of the graves but not in others (Borić 1996; Borić 2009; Brukner 1980). It is interesting to note that the infant (0.5-1 years) from grave 8 at Gomolava was buried with copper beads and ceramic vessels, which is interpreted as evidence of inherited status (Borić 1996). In Divostin (Šumadija district, Republic of Serbia), another Late Vinča site (~4700-4600 BCE), copper items and a macehead were found in the largest houses, which would suggest that these households were of greater wealth and status (Porčić 2012; Porčić 2018).

By the middle of the 5th millennium, tools and weapons made of copper became widespread in the Balkans. Copper objects from Varna (Gulf of Varna, Republic of Bulgaria) and Durankulak (Dobrich Province, Republic of Bulgaria) graves as well as a hoard of copper hammer axes from Pločnik (Toplica district, Republic of Serbia) suggest that copper tools were widely used (Krauß *et al.* 2017; Todorova 2002). An unusual find of 43 clay anthropomorphic figurines, some of them equipped with miniature copper tools (hammer axes similar to the ones found in Pločnik), were discovered inside a burnt Vinča Culture house at the site of Stubline (Belgrade, Republic of Serbia; second quarter of the 5th millennium) (Crnobrnja 2011; Crnobrnja 2014; Crnobrnja *et al.* 2009). The excavator interpreted this situation as evidence of hierarchical social structure, as some figurines were larger than others and were placed in the central position (Crnobrnja 2011; Crnobrnja 2012; Crnobrnja *et al.*

2009). However, it should be noted that one figurine that was conspicuously larger than the others, modelled slightly differently from the rest and placed in a central space, was most probably equipped with a miniature representation of a stone macehead rather than a copper hammer axe. In any case, this group of figurines shows that copper tools were incorporated into the iconography related to social symbolism, particularly symbolism related to the construction of gender identity, as the placement of tools over the right shoulder of male individuals was a widespread phenomenon in the Neolithic (Borić 2015b).

There is no doubt that copper metallurgy required highly specialized knowledge (Ottaway 2001). Copper smelting activities were identified at Vinča Culture sites but there is insufficient information to estimate the level and scale of specialization and also no evidence for the special status of copper metallurgy specialists (Radivojević *et al.* 2010). In addition to copper, golden objects are known from the mid-5th-millennium Balkans as grave goods in the Varna necropolis (Leusch *et al.* 2014; Leusch *et al.* 2015). Leusch *et al.* (2015) concluded that there was a specialized and serial production of golden objects based on the Varna evidence. Therefore we know that metallurgy required complex knowledge, organization of ore acquisition and exchange (Radivojević 2007; Radivojević 2015; Radivojević and Grujić 2017; Radivojević and Rehren 2016; Radivojević *et al.* 2010), but we are able to say very little about the specifics of the social organization of metallurgy. Were metallurgist specialists part-time or full-time? Were they independent or attached to the elite (Brumfiel and Earle 1987)? Leusch *et al.* (2017) speculate that metallurgists did form a new societal segment given the coexistence of metallurgy with traditional Late Neolithic crafts.

The mid-5th-millennium Eneolithic cemetery in Varna offers important insights into the relations between metallurgy and social structure. There were ~300 Eneolithic burials in Varna. Several graves (mostly cenotaphs) contained large quantities of golden objects (mostly decorative) – the most famous being the individual from grave 43 with the total of 1.5 kg of gold appliqués and ornaments, spondylus bracelet, copper items and the stone axe-sceptre with handle inserted into gold tubes. The individual from grave 43 was an elderly male between 50 and 65 years old, with robust lower arm muscle attachments, pronounced lower limb muscles and several pathological conditions related to hard work (conditions associated with squatting) (Krauß *et al.* 2014). The stable isotopes analysis has shown increased concentrations of both C13 and N15 in comparison to other individuals, suggesting that this person also had a slightly different diet from the rest (increased consumption of aquatic resources?) (Honch *et al.* 2006). Grave 43 has usually been interpreted as a high-status burial for obvious reasons, but Krauß *et al.* (2014) offered an intriguing intepretation based on the results of the physical anthropological analysis. They interpreted the absence of robusticity of the upper arm muscle attachments as not consistent with the warrior status; moreover, they suggested that the heavy use of the lower arm was consistent with a craftsman who worked with soft metals like copper and gold (Krauß *et al.* 2014. This would mean that metallurgical skills could have been a pathway to high status. However, Leusch *et al.* (2017) point out the osteological indicators for the individual from grave 43 are also consistent with other activities (such as long travels, presumably for trade) which could have been related to this person's social status.

A statistical analysis of the Varna grave good data published by Leusch *et al.* (2017) reveals interesting patterns of variation. Correspondence analysis (CA) can be used to illustrate the results and conclusions reached by Leusch *et al.* (2017) about the existence of four types of burial kit. The CA plot suggests that there were two main axes of variation which explain almost equal amounts of variance (Fig. 2). The first CA axis, which explains 35.1% of variance, separates graves with spondylus, cushion stones and copper jewellery on the one hand from graves with all kinds

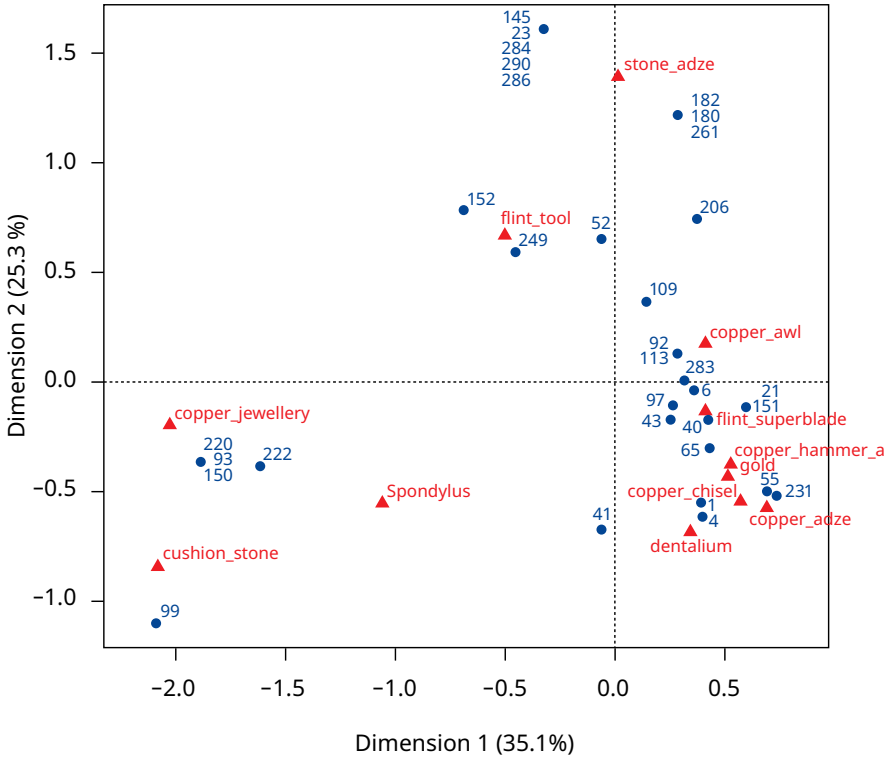

Figure 2. Correspondence analysis of the grave good data published in Leusch et al. 2017, Table 2.

of metal tools, gold, stone adzes, flint superblades and dentalium on the other. The second dimension, which explains 25.3% of variance, separates graves with metal objects from graves with objects made of stone. The first dimension can probably be interpreted as gender, as almost all graves that were designated as probably female are on the lower end of this dimension (similar grave good inventories were found in female graves in Durankulak) (Leusch *et al.* 2017; Todorova 2002), whereas those on the far right are males. The second dimension is more difficult to interpret; it may represent temporal or status differences; it separates mostly males with prestige items made of copper and gold from the males with only flint tools and polished stone adzes. The most important pattern is the clustering of graves with gold, superblades and copper tools/weapons in the lower right quadrant of the graph. This suggests that copper and gold went together and were markers of prestige and wealth.

A more recent and more comprehensive statistical analysis of Varna burials gives us a somewhat different picture (Krauß *et al.* 2017). Krauß and colleagues (2017) also performed a correspondence analysis on a full set of Varna burials but they interpreted the resulting pattern (Krauß *et al.* 2017, Fig. 6) in terms of chronology, not status or gender – the major axis of variation separates the earliest from the latest graves. As time goes by, the polished stone tools, flint tools, spondylus and copper jewellery, which are dominant in the earlier part of the sequence, are replaced with heavy copper tools/weapons and gold items in the later part of the sequence (Krauß *et al.* 2017). This development clearly illustrates the increase in production and use of copper tools and weapons, as well as gold, in the mortuary arena, which probably included the status signalling component, as copper tools/weapons and gold items still cluster in the correspondence analysis space.

Pottery

The study of pottery has been the backbone of the traditional culture-historical archaeology of the Balkan Eneolithic and Neolithic. The major change in the tech-

nology of pottery making occurred ~5400/5300 BCE when black(dark grey)-burnished pottery replaced the reddish coloured pottery, which was recognized as the major turning point in the Balkan Neolithic as it marked the beginning of the Late Neolithic period (Garašanin 1982; Garašanin 1997). This 'event' was most pronounced in the western Balkans where it marked the transition from the Early Neolithic Starčevo Culture to the Late Neolithic Vinča Culture. The technological component of the change is dominant as the process of firing was altered. For example, Starčevo pottery was fired in oxidizing conditions. In contrast, the black/grey colour of the typical Vinča Culture pottery was derived by firing in reducing conditions. This technological change was accompanied by a change in style – globular and conical forms of the Early Neolithic gave way to the biconical forms of the Late Neolithic.

Why and how did this technological change occur in the Balkans? Balkan prehistorians, most notably Milutin Garašanin, saw this change as a second wave of Anatolian influence, possibly including a flux of people from Anatolia (Garašanin 1997), whereas others saw this change as a process of technological and stylistic evolution that played out within the Early Neolithic cultures – for example that there was a cultural and demographic continuity between the Starčevo and Vinča Cultures (Leković 1990; Makkay 1990). This issue of the appearance of black-burnished pottery is further complicated by the fact that it seems to appear at different times and places in Asia Minor as well. Brami and Heyd (2011) defined two main complexes related to the spread of the Neolithic from Anatolia to the Balkans: the dark-faced burnished ware horizon and the red-slipped burnished ware horizon. They notice that the Early Neolithic cultures of the Balkans, including the Starčevo culture, belong to the red-slipped burnished ware group (Brami and Heyd 2011). Brami and Heyd (2011) located the core of the dark-faced burnished ware horizon on the Syro-Cilician coast. In their scheme, this kind of pottery making spread to the Marmara region and potentially to the south-easternmost part of the Balkans in the second half of the 7th millennium BCE. They indicate that the Fikirtepe Culture, which dates to this period, is an example of a dark-faced burnished ware horizon. In western Anatolia, the black burnished pottery is associated with contexts dating as early as ~5600 BCE, although at other sites the absolute date of its appearance is somewhat later ~5400/5300 BCE (Çevik 2018), coinciding with the spread of the black-burnished pottery cultures in the Balkans. Therefore it seems that the technology of making dark-burnished pottery was present much earlier than ~5300 BCE, but according to Brami and Heyd (2011) it was associated with other traits of culture as well, constituting a distinct Neolithic package.

Recent studies in which attempts were made to reconstruct population dynamics in the Balkan Neolithic and Eneolithic suggest that there was a demographic event of population decrease ~5400/5300 BCE (Porčić *et al.* 2016; Silva and Vander Linden 2017) coinciding with the change in pottery technology. It seems that the end of the Early Neolithic was characterized by the population decrease followed by an increase coinciding with the beginning of the Late Neolithic. The correlation between technological change visible in pottery and demography can be interpreted in two ways (Porčić *et al.* 2016):

1. A population bottleneck occurred and the change we observe in pottery styles between the Early and the Late Neolithic resulted from cultural drift (Shennan 2000).

2. The alternative to the bottleneck would be a population discontinuity between the Early and the Late Neolithic as the new population migrated from somewhere else into the Balkans ~5300 cal BCE, bringing along a new kind of pottery making technology.

The second scenario is consistent with the results of the aDNA study by Hervella *et al.* (2015), who conclude (based on the analysis of the mitochondrial genetic material from several 6th- and 5th-millennium sites in Romania) that there is evidence for the influx of new people from Anatolia (they explicitly refer to it in terms of the second Anatolian wave).

On a settlement scale, Vuković (2015) made a review of assemblages that were considered to be mixed Starčevo and Vinča assemblages and noticed that they were usually interpreted as stratigraphic disturbances resulting during the mixing of pottery. A detailed study of pottery technology at the site of Pavlovac-Čukar (Pčinja district, southern Serbia), where mixed assemblages of Late Starčevo and Early Vinča pottery were found, provided a high resolution insight into the Starčevo-Vinča transition (Vuković 2017). Vuković was able to identify hybrid forms of pottery – Vinča forms executed with the Starčevo technique and vice versa. When Starčevo forms were made using Vinča techniques, the end product appeared to be imperfect and irregular, suggesting unfamiliarity of the artisan with the Starčevo traditions of forming and decorating vessels (Vuković 2017). Vuković interpreted this situation as indicative of the existence of two distinct groups at this site with collapsed social boundaries between groups. Such an interpretation would be consistent with the hypothesis of demographic discontinuity between the Late Starčevo and Early Vinča people.

Discussion and conclusion

From the perspective of the 20th and 21st centuries, with an enormous technological change that occurred in only one hundred years, we would be inclined to say that not much had happened during the two-millennia period of the Balkan Neolithic and Eneolithic. The only major technological development was the invention of copper metallurgy. However, it is not clear how this technological change affected and was affected by the sociocultural development. In his seminal paper on the social context of metalworking in the Balkan Eneolithic, Renfrew (1978) proposed that metallurgy played an important role for social differentiation. Leusch *et al.* (2017) suggest that the social differentiation within the 5th-millennium communities of the eastern Balkans (Kodjadermen – Gumelniţa – Karanovo VI cultural complex) started long before the intensification of metallurgy. A similar position is held by Müller (2012), who also rejected a deterministic link between copper metallurgy and increase in complexity and inequality.

Indeed, it could be argued that copper items did not contribute to the increase in complexity and inequality per se as it seems that copper objects did not play any significant role in the basic means of subsistence production (the axes and hammer axes seem to be weapons and status symbols). It seems that the metal was used in the situation of an already existing and growing inequality as another material symbol of status and prestige (cf. Porčić 2018). Perhaps the case of the southern Balkans illustrates this point nicely as it seems that the development of social complexity and inequality in the Neolithic of Thessaly happened in the near absence of copper (Halstead 1995; Halstead 1999; Halstead 2006) because traces of copper metallurgy are relatively rare in the southern Balkans.

On the other hand, the development of metallurgy must have created organizational challenges to the social life of Neolithic communities, as the logistics of acquiring and processing ores are not simple. Therefore even if the invention and development of metallurgy did not cause social differentiation it certainly had an impact once it was introduced, perhaps acting as a catalyst for the processes that had already started. The appearance of gold in graves is difficult to explain in any other way, but the details of this social process remain elusive, however.

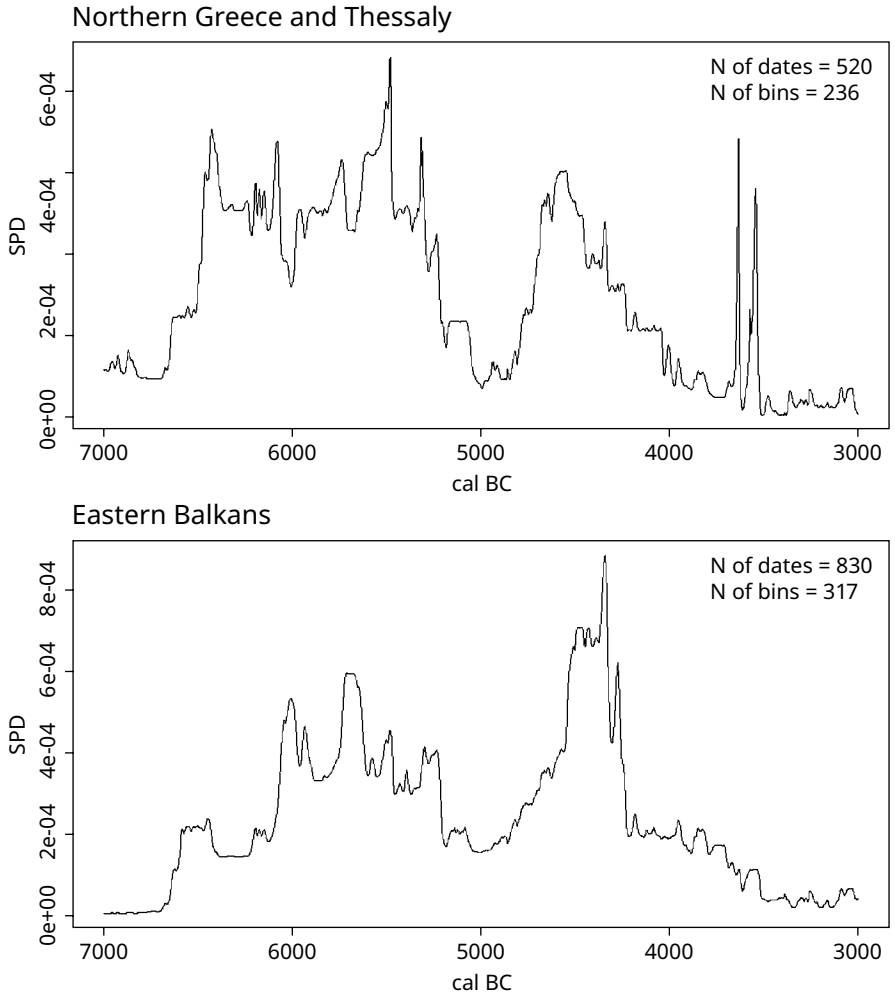

Figure 3. Summed calibrated probability distributions of radiocarbon dates for different parts of the Balkans. Graphs for southern and eastern Balkans based on radiocarbon data collated in Reingruber and Thissen (based on radiocarbon data collated in Reingruber and Thissen 2016). Individual dates were binned to account for research bias according to the procedure published in Shennan et al. (2013).

Can we observe any macroevolutionary trends related to technology in this period? As both theoretical and empirical research has shown, population size is a dimension correlated with many other aspects of culture (Feinman 2011; Henrich 2004). Therefore we may compare the patterns of technological dynamics and population dynamics. Silva and Vander Linden made a comprehensive reconstruction of the Balkan population, including the Neolithic and Eneolithic periods, using the method of summed calibrated radiocarbon probability distributions (Silva and Vander Linden 2017). If we compare the reconstruction of major population trends in the Balkans between 6500 and 4500 BCE we will see that major episodes of technological change (pottery, appearance and intensification of metallurgy) roughly coincide with population growth episodes.

If we break the radiocarbon data by regions, we can see similar patterns in different parts of the Balkans suggesting that this is indeed a general trend rather than an artefact of combining several trends (Fig. 3 see Porčić *et al.* 2016, Fig. 3 for the western Balkans). In the eastern Balkans, the 5th-millennium population peak is ~4500 BCE while in the western Balkans and southern Balkans it is ~4800 BCE. These two peaks coincide with the peaks of metallurgical development in these regions. As for the correlation between demography and pottery change, in all main regions there seems to be a trough in the relative population size proxy somewhere

between 5500 and 5000 BCE (Fig. 3), roughly coinciding with the introduction of the black-burnished pottery.

At the moment it is difficult to interpret these correlations – is this the case where a complex technology develops after a certain demographic threshold is crossed, or is the demographic growth a consequence of technological development, or could it be that this correlation is just spurious? The fact is that the appearance of metal tools did not have any impact on the subsistence technology, and therefore we can exclude the scenario where development of metallurgy influenced demography in any direct way. The influence of demography on the development of technology might have been present, but only in an indirect way via an overall increase in social complexity and intensification of production (see Porčić 2018).

The issue of intensification of production is closely related to the presence of craft specialization. As Timothy Earle succinctly formulated: 'The research question that keeps specialization on the prehistorians' front burner is whether the division of labour in crafting effected and was affected by social hierarchies' (Earle 2018, 2). Specialization of craft production is a multidimensional phenomenon and consequently there are many kinds and degrees of specialization (Costin 1991).

In the Balkan Neolithic and Eneolithic archaeology, numerous claims have been made for the existence of craft specialization in different domains of craft production. In Thessaly, it was inferred that the obsidian was procured and shaped into tools by a group of itinerant specialists, based on the fact that only worked cores and finished tools made by the complex pressure flaking technique were present in the Early and Middle Neolithic settlements without fall-off patterns in the distribution (Perlès 1992; Perlès and Vitelli 1999). Perlès and Vitelli (1999) also argued that specialized production of pottery was present in the Early Neolithic of Thessaly, as the number of potters was lower than the number of households, which implies some kind of specialized production. For the Vinča Culture, claims have been made for the existence of specialized production of lithics, bone tools and pottery (Petrović 2018; Spataro 2018; Vitezović 2018; Vuković 2011; Vuković and Miloglav 2018).

It seems to me that most of the claims regarding specialization need to be put into perspective. The key question in this context is not whether some people engaged in crafts more than others, thus becoming specialists in the broadest sense of the term, but whether this fact had implications for technology and social structure. Following Earle, we may ask which of these technologies are suitable for economy of scale and which of these technologies can create bottlenecks (Earle 2018)? Pottery and metallurgy are the most likely candidates for economies of scale (Earle 2018), but there is no evidence for this. More importantly, we do not see drastic differences in the quality and quantity of different classes of material culture between the beginning and an end of this period.

What can we conclude about the relationship between technology and society in the Neolithic and Eneolithic Balkans? We can be certain that the habitus of the Neolithic people was greatly influenced and shaped by technological changes, but the available evidence does not suggest that these changes were of crucial importance for the social process, at least not in a monocausal way, and certainly not in the same way in different parts of the Balkans. It should also be emphasized that what I presented here are only snapshots of technological and sociocultural processes. Given the fragmentary state of the record, we are still far away from observing the complete picture.

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Axe as landscape technology. How did it transform societies and landscapes?

*Jan Kolář**

Abstract

The paper discusses the relationship between landscapes, technologies and societies. Social archaeology often studies artefacts and their social significance, whereas landscape archaeology and palaeoecology focus on the economic potential of landscapes and vegetation cover. With the help of the concept of landscape technologies and the example of Neolithic axes and adzes, the paper stresses that these artefacts were two of the most important innovations in human history, through which the ability of landscape modification was symbolized in ritual depositions, burial rite and supraregional interactions. Therefore the knowledge of the social significance and environmental impact of this technology is crucial for many disciplines.

Keywords: *landscape archaeology, technology, Neolithic, Copper Age, axe, warfare*

Introduction

Landscape as a significant constituent of human life has been an important topic in archaeology for decades. The term 'landscape archaeology' has been in use since the 1970s (David and Thomas 2008), but the origins of thinking about past human communities beyond the level of an excavated site or individual impressive finds is much older. In German archaeology, the questioning of the spatial extent of human dwellings already started with Kossina (for details, see Gramsch 1996); nevertheless, deeper interest in past landscapes was propagated by Jankuhn in the 1950s, who continued with these studies in the following decades (Jankuhn 1955; Jankuhn 1977). Genuine interest in large-scale excavations of dwellings and a diverse range of surveys of the surrounding landscapes combined with questions on past economies, subsistence strategies and environment is observable in several central European countries until today (Zimmermann *et al.* 2009; Kuna and Dreslerová 2007).

Archaeologists have been interested in the area surrounding past settlements from both theoretical and practical points of view. Processual archaeology introduced several procedures for modelling the economic territory of a settlement (*e.g.* Vita-Finzi and Higgs 1970; Hodder and Orton 1980) and with the onset of geographi-

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cal information systems (GIS) from the 1990s onwards these computational techniques became frequently used and combined with detailed environmental analyses (*e.g.* Zimmermann et al 2005; Conolly and Lake 2006; Kuna 2006). The theory of community areas defined by Neustupný and later on developed by his colleagues (Neustupný 1991; Kuna and Dreslerová 2007) conceptualized past landscapes with the help of activity areas, which seems to be closer to the point of view of prehistoric humans. Around the same time, Ingold argued for a closer connection of archaeology and social anthropology and developed his concept of a taskscape (Ingold 1993).

Researchers in the past few decades have enriched the environmental and economic understanding of past landscapes with social and symbolic dimensions. For example, Gramsch (1996, 28) stressed human creativity in the process of constituting a landscape. This 'creative act' is defined through several simultaneous practices fulfilling human biological and social needs. During the process of creation, the landscape has both passive (economic resource) and active roles (structuring the perception and socializing people). Thus the comprehensive research of a landscape has to include questions on communication, networks and interactions, social reproduction and power relations, reshaping of artificial and natural features, long-term dynamics and the perception of landscapes by the studied communities (Gramsch 1996, 31).

David and Thomas (2008, 38) concluded in their introductory chapter of the *Handbook of Landscape Archaeology* that the current research of landscapes includes how people, intentionally or unintentionally, visualize and manipulate the space, how they organize their daily and seasonal routines or how they decide who goes where for work or spiritual purposes, which could reflect gender, age or power structures of the society. Landscapes are structured according to the ecological knowledge and social norms and they are politically controlled territorial spaces.

Regardless of the disciplinary perspective or one's paradigm, technologies played a crucial role in the shaping or using of landscapes. Technologies are often investigated from the point of view of social archaeology and social anthropology. Analysing prehistoric artefacts requiring new materials or production procedures, researchers often ask questions about their symbolic connection with prestige (*e.g.* Bernbeck and Müller 1996) or their role within exchange systems (*e.g.* Kerig and Shennan 2015), but their environmental impact or significance in modifying the landscape remains unclear. The situation concerning the environmental impact of technologies is similar to the perception of landscapes as it stood several decades ago, albeit in the opposite way. Environmental conditions for habitation have been in the focus of archaeological research since the beginnings of theories on the economic territories of past communities. In contrast, the social and symbolic roles of landscapes have been understood as secondary or have not been considered at all. Maybe it is time to change the viewpoint in the case of technologies and artefacts too and to examine their role in landscape dynamics.

European landscapes comprise many natural and anthropogenic components, among which vegetation is certainly one of the most important. Vegetation is highly dynamic. It reacts significantly to disturbances (*e.g.* storms, floods, beavers, humans) and changes continuously over longer periods of time reflecting climatic variation. Vegetation can also be completely altered through agricultural practices. Plants have provided human communities with an energy source, material for building and the production of mobile artefacts, medicines, food for themselves and their domestic animals. Humans therefore have had a lively interest in the direct or indirect modifications of the vegetation cover within their landscapes. The complex research of landscapes needs to incorporate more disciplines such as palaeoecology with its deep insight into long-term vegetation dynamics and social archaeology investigating the social and ritual role of artefacts and technologies used for landscape manipulations. Approaching landscapes in a transdisciplinary manner (cf. Izdebski

et al. 2016) allows researchers to answer questions about the complex relationship between technologies, social transformations and the appearance of landscapes. Did some artefacts symbolize the ability to shape the landscape? And how important was this ability for the societies?

Landscape technologies during prehistory

Technologies are important components of human lives. Humans in fact completely rely on them, which puts technologies in the focus of archaeology and social anthropology. Technologies do not comprise only hardware, tools, production processes and products as sometimes suggested in popular notions, but they also include relationships with other phenomena such as religion, social identities (based on gender, age or affiliation), politics, and the environment. Technologies thus do not simply fulfil economic or biological needs, but they also have important social meaning (Gosselain 2011; Dobres and Hoffman 1994). From the behavioural perspective, technologies can be defined through their three dimensions: (1) artefacts and physical objects, (2) activities or processes, and (3) what people know and can do (Hollenback and Schiffer 2010). Understanding technologies in these three dimensions allows for a better view on the production of artefacts (*e.g.* invention, innovation, adoption, experimentation), practices performed with the artefacts (*e.g.* utilitarian function, social significance and symbolic role) and indigenous knowledge (Hollenback and Schiffer 2010). Technologies can be studied on wide temporal and spatial scales.

Similarly to the current situation, different technologies influenced inhabited landscapes differently in the past as well. Technologies with a significant impact on the appearance of landscapes can be further divided into two main groups. The crucial criterion is the purpose of a specific practice. If landscape change is the goal of such practices, we speak about landscape technologies. One can mention among such goals the change of natural woodland or grassland into a field, garden or pasture, or coppiced woodland as a result of the modification of forest age structure and species composition. Leaving the prehistoric period, a good example of such a landscape technology would be the afforestation of central European landscapes with commercial conifer plantations. Artefacts and technologies used for such practices in prehistory include fire, axe, ard, plough or hoe. Nonetheless, modified open landscapes can also be maintained through large domestic herbivores, which are neither artefacts nor technologies. Or are they?

If landscape change is characterized as unintentional and the main goal of a specific practice is something other than landscape change, we talk about technologies with a landscape impact. Among good examples are mining and extraction activities, whose desired product was the raw material (silicite, copper ore, salt *etc.*) and the changes in the landscape were considered secondary. These can include modifications of terrain through digging and accumulation of slag, small-scale deforestation caused by use of wood in the mining process, or environmental pollution. Some of the artefacts and technologies involved in these changes can be similar to the previous group (axe), others can be activity-specific (picks, hammers, containers and the like).

It is clear that the types of landscape changes cannot be always separated. They were connected through the same artefacts and technologies and in many cases through the same communities practising economic and ritual activities within their community areas or taskscapes. These technologies should be also viewed in a dynamic perspective, stressing their spatial, temporal and social variability. The use of a technology cannot be viewed only from the utilitarian (Western, capitalistic) perspective (Hollenback and Schiffer 2010), because all technologies and their changes were incorporated into social and cosmological systems.

Axes, landscapes and warriors

Axes are among the artefacts defining farming communities of the European and Near Eastern Neolithic and the use of axes for light woodworking in the Pre-Pottery Neolithic A (Barkai 2011) suggests that the landscape technology interacting with a wide range of plant sources was more important than the storage and cooking technology materialized in pottery. Axes were crucial artefacts enabling the Neolithic way of life comprising clearing and managing woodland, building large wooden structures, preparing firewood for pottery production, or gathering winter fodder for domestic herbivores. The technology of polished stone artefacts (axes and adzes) significantly transformed the way people interacted with forested areas and changed the way and scale of usage of wood in their material culture (Noble 2017, 59). For sure, Mesolithic hunters and gatherers had an impact on woodland, but the nature and scale was different. Anthropogenic impact on forests caused by foragers was most likely small-scale and they used fire to make larger clearances to encourage valued plant resources such as hazelnuts and berries or ringbarking to cut individual trees (*e.g.* Bell and Noble 2012; Kaplan *et al.* 2016). There are also indications that in some European regions hunters and gatherers possibly practised coppicing, which provided them with wooden material for fish traps (Klooß 2014).

Central European farmers probably could not practise their lifestyle without axes, but axes could be used also in the context of a hunting and gathering way of life. In some regions this technology was the most attractive from the so-called Neolithic package for centuries and was adopted prior to the full transition to agriculture. In southern Scandinavia, Late Mesolithic Ertebølle foragers used imported axes to transform the forests and for building (Malmer 2002, 15) and axes were probably useful in exploiting wetland environments with the help of dugout boats (Klooß and Lübke 2009; Christensen 1990).

There are also other regions in Europe where polished stone axes and adzes occur outside the Neolithic habitation areas (*e.g.* Dreslerová 2015; Verhart 2012). In this case an attractive technology changing the appearance of landscape and human behaviour within it preceded major social and economic changes. Nevertheless, we do not know whether the same landscape technology led to similar landscapes. In other words, did Mesolithic hunters and gatherers create a Neolithic landscape by the use of a Neolithic technology? Or did they just appreciate the ability of the new artefact to modify the human experience of a landscape? Was the symbolic value related to exotic character and long-distance exchange more important than the utilitarian function?

There is another unclear aspect in this technology transfer. From the Lower Rhine Basin we know that the Mesolithic communities did not possess the knowledge to produce polished stone implements or repair broken ones. Nevertheless, they tried to repair damaged pieces and create a new shaft hole with their own indigenous technique – pecking (Verhart 2012). Thus it seems that the transfer of the landscape technology was not connected with the transfer of technology crucial for the production of the desired tools.

The Neolithic way of life in central Europe where a lot of areas were naturally forested would not be possible without axes. Landscapes did not need to be naturally fully forested (for an ongoing discussion, see *e.g.* Vera 2000; Szabó 2009; Whitehouse and Smith 2010; Kuneš *et al.* 2015), but existing woodlands exploited with axes provided prehistoric societies with a necessary resource – wood. Occasional use-wear analyses and experiments showed that axes and adzes were used in connection with wood, although other activities like animal butchering or working of hide are also possible (*e.g.* Masclans Latorre *et al.* 2017; Elburg *et al.* 2015). The simple clearing of the woodland was probably not the most wanted function of this technology and in many regions it was not needed at all. The ability to manage

woodland on a regular basis in order to provide a wide range of resources was the most desired. Axes and adzes were used by Neolithic farmers also in naturally open areas such as the Carpathian Basin (Biró 2003). These artefacts were in use also in later periods and basically became one of those Neolithic innovations which are in use, *mutatis mutandis*, until now.

This technology transformed also the way people created their built environment – from the Neolithic onwards there is evidence of monumental architecture and houses built from timber (Noble 2017, 59). European Neolithic longhouses (recently Květina and Hrnčíř 2013) and rondels of the Lengyel Culture (Řídký 2011) are among the best examples, but the role of timber in the construction of megalithic monuments cannot be underestimated (*e.g.* Darvill 2010). Neolithic longhouses comprised large posts and wattle and daub walls, which could not be built without axes and adzes. The large stones of megalithic tombs and henges weighing several tons could not be moved or lifted without timber prepared with axes. Circular palisades of rondels could not be built without axes. People used axes and adzes to build wooden trackways allowing movement across marshes and wetlands for often ritual purposes (*e.g.* Cummings 2017, 83-84). Polished stone artefacts connected with woodland and woodworking played a crucial role in social organization and ceremonial life. Archaeology often sees this importance through the lens of exchange of raw materials and products (*e.g.* Ramminger 2009; Torrence 1986), but these artefacts obviously facilitated the creation of larger communities, supracommunity gatherings and feastings or performing the relationship with the ancestors.

The importance of woodland management and woodworking symbolized by the axe was materialized in the ritual sphere of human lives too. Axes, adzes and semi-finished products with assumed utilitarian functions were deposited in hoards (for central Europe *e.g.* Vencl 1975) or in wetland areas (Verhart 2012; Wentink 2008). Depositions of deliberately destroyed flint and stone axes from exotic raw materials can also be mentioned (Larsson and Broström 2014). For the Dutch Middle Neolithic Funnel Beaker Culture (*Trichterbecherkultur* – TRB) there is even evidence of using two types of flint axes. Smaller artefacts with visible traces of use for woodworking were deposited in megalithic graves and are interpreted as real tools and larger pieces deposited individually or in hoards in wetland areas were most likely used only for ceremonial purposes. This is indicated by the use-wear showing evidence of regular wrapping and unwrapping, traces of ochre colouring and the length exceeding the possibility of utilitarian use (Wentink 2008).

Another important context for symbolizing woodland and woodworking is burial behaviour. From the earliest Neolithic, in central Europe represented by the *Linearbandkeramik* Culture (LBK), through the Funnel Beaker Culture and later on during the Corded Ware Culture, there is strong evidence of depositing these artefacts in individual and collective graves. Although the direct connection of grave goods and the deceased person is of course problematic, burying communities followed specific rules during the highly ritualized burial behaviour. Thus burials reflect idealized concepts of the past society (for a detailed discussion, see *e.g.* Kolář 2016). LBK adzes are regularly found in graves of male individuals and these artefacts are often combined with arrowheads (*e.g.* Vedrovice, Elsloo, Niedermerz; Květina 2004; Podborský *et al.* 2002; van de Velde 1995). The interpretative concepts are constructed often around masculine symbolism and prestige, although they are discussed relatively vaguely.

Corded Ware Culture is often viewed through the lens of warfare in real or symbolic form (*e.g.* Vandkilde 2006; Neustupný 2013). This is due to the frequent occurrence of axe-hammers in some of the male graves, frequent single finds of these artefacts and direct evidence of interpersonal violence (Meyer *et al.* 2009). Archaeologists created typologies and chronologies of axe-hammers and investigated whether these artefacts were really for killing other people or not. However, the

role of axes (both stone and flint) in these societies is relatively underestimated. In Moravia, for example, nearly 42% of all polished stone artefacts in graves are axes (Kolář 2018). Flint axes in graves with Corded Ware in Little Poland are twice as abundant as axe-hammers and more than 50% of graves are equipped with at least one of them. They are relatively frequent in both male and female graves and interpreted as working tools (Włodarczak 2006, 71).

Axes obviously played an important role during burial rituals, but why was this so? Did they symbolize important activities which would be also useful to perform for the deceased? Does the abundance of axes and adzes signal the importance of these activities? Because of the high degree of intentionality of burial behaviour, grave goods inform us about the ideology of past societies. The artefacts such as tools or weapons do not speak about the profession of the deceased, but about his or her idealized identity constructed by the mourners (*e.g.* Ježek 2017; Kolář 2016; Parker Pearson 1982). It is known from previous studies that stone and flint axes were used in woodland management and woodworking, but surprisingly also the powerful weapons of the Corded Ware Culture – axe-hammers – bear traces of woodworking (Kufel-Diakowska and Skuła 2015). Obviously, we are dealing with multipurpose artefacts which could be used both as woodworking tools and weapons. Would it be difficult to estimate the ratio of activities practised using axes? Or how can we compare the social significance of warfare and woodland management? Why are archaeologists so much interested in warfare related to prestige, often sidelining other aspects of human daily lives? Is it because we as members of academia are also interested in gaining academic prestige through competitive publishing and grant applications? Or is it because forest workers (in contrast to foresters) in our current societies do not get that much social credit and are more or less unseen on the edge of society?

Axes in regional interactions and social transformations

Axes and adzes can be interpreted as highly important landscape technologies. From the beginning of farming life, they equipped humans with an incredible ability to directly modify the woody vegetation resulting in land-use changes (*e.g.* clearances, fields, pastures, coppices). These activity areas did not just change the appearance of the landscape and the way in which people moved and behaved within it, but they also provided human communities with important products and raw materials. Obviously a polished stone artefact was crucial for the farming and herding lifestyle. Even some foragers adopted this landscape technology, but would it be possible to live as a farmer without an axe? Would it be possible to practise your economic, social and ritual needs without this artefact? Pierre and Anne-Marie Pétrequin asked a similar question (Pétrequin and Pétrequin 2016, 55):

> '*Why, and how, were simple, polished stone axe-heads able to be socially over-interpreted, from efficient tools for woodworking to socially valuable signs?*'

I would look for the answer in the economic and social necessity of using axes and adzes. From the subsistence point of view, axes and adzes enabled farmers and herders to create all the types of landscapes they needed. From a social perspective, they made it easier to build houses reflecting the social relationships and needs for everyday social life and large supracommunity places for larger social events. Nevertheless, there is another important sphere of human life into which this landscape technology was incorporated – regional interactions. Raw materials for axes and adzes could be local, but in many cases exotic materials from distant places were preferred. LBK communities massively used metabasite of the Jistebsko type

from northern Bohemia for their adzes and transported it for hundreds of kilometres (Přichystal 2015); Globular Amphora communities in today's Poland preferred banded flint to other sources, although all available materials have similar characteristics (Borkowski *et al.* 1991).

The social significance and symbolic role of axes could be probably best illustrated by the Neolithic axe-heads made from jadeitite, omphacite and fine-grained eclogites (commonly called jade axes). These objects have been found for decades in most of the regions of western Europe, occasionally also in the western Balkans and Bulgaria. Outcrops and exploitation sites were discovered just recently in northern Italy in Mont Viso and Monte Beigua Massif. These high-altitude (above 1,500 m) sources were used between 5000 and 3700 BCE during seasonal expeditions. Most of the axes were then transported to communities belonging today to many diverse archaeological cultures in the Paris basin, Brittany, Great Britain and Germany, and some of them were even used as grave goods at the well-known Black Sea Copper Age cemeteries of Varna and Durankulak. Transportation was most likely organized by elite groups within these communities and these groups also deposited them in caves and rock shelters, wetland areas, mountains, around natural or anthropogenic rock formations and graves (Pétrequin and Pétrequin 2016). People with similar but also with different cultural backgrounds acquiring these socially important artefacts symbolizing woodland management and woodworking organized interaction networks, where they directly or indirectly communicated, exchanged gifts, goods, ideas, partners, and knowledge, and they also competed and collaborated.

Nevertheless, prehistoric societies were dynamic and so these systems of interaction were transformed. The introduction of the axe as landscape technology represents a significant transformation of the human-environment relationship and its importance was symbolized in many spheres of human life. As archaeologists, we often study social changes – introduction of new materials such as metals, greater mobility, changes in pottery styles, increased hierarchies and the like, which could have an impact on landscape technologies and practised land use. A good example is the introduction of copper metallurgy. For several hundreds of years in the 5th and 4th millennia BCE, copper axes and Alpine jade axes divided Europe into western (jade) and south-eastern (copper) parts. After the process of imitating each other in a contact zone mainly in current Germany, the new material originating in the south-east started to dominate and Alpine jade lost its importance (Klassen *et al.* 2012). The technology of production of this important artefact changed, but the landscape technology and production processes practised with the axes remained.

The special social role of axes and adzes in prehistoric societies is underlined also by the fact that they are always the first heavy copper items across variable ecological zones in Europe, Egypt, Anatolia, the Levant and Mesopotamia. For the southern Levant, Florian Klimscha also concludes that the transition from flint to copper axes lacked any functional advantages for tree cutting and woodworking and clearly stresses the social significance of copper axes for regional interaction networks (Klimscha 2017). The ability to manage the landscape and produce (wooden) mobile and immobile artefacts was again symbolized by artefacts without utilitarian function.

Conclusions

The idea of using an axe or adze for tree felling and woodworking has survived to this day. Although the materials and the way of use changed several times, this technology seems to be an important legacy of Neolithic societies. The ability to modify the woodland within the landscapes and the expansion of wooden material culture played a crucial role in prehistoric societies, which was reflected in depositing

hoards, in burial rites and interactions among a wide range of European regions. Thus the social significance did not originate in the artefact itself, but in the practices performed in reality or symbolically. Therefore we cannot separate the research into prehistoric societies, their technologies and landscapes. This is important for archaeology as well as for palaeosciences. Artefacts as parts of technologies symbolized in several contexts the landscape changes or the power over them, which was perceived positively and was possibly connected with prestige, similarly with warfare. In contrast to warfare, the social significance of woodland management and woodworking in prehistoric societies has received much less research attention. This needs to change in landscape archaeology, social archaeology and palaeoecology, preferably through a transdisciplinary approach.

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'If we want things to stay as they are, things will have to change': the case of Trypillia

*Bisserka Gaydarska**

Abstract

This famous quote from G. de Lampedusa's novel 'The Leopard' conveys very well the conundrum of the longevity of the vast Cucuteni-Trypillia prehistoric network. On the one hand, the deep-time continuity in the *habitus* and the Big Other is expressed in many aspects of Trypillia technology – house-building, house-burning, the spatial arrangement of houses, house sizes, low-level agricultural technology, the continuity in faunal exploitation, and more pronounced local change in the shape and decoration of pottery and figurines. On the other hand, there was massive settlement agglomeration, with attendant scalar social transformations that seem to have no effect on houses, practices and material culture.

This paper will explore this central disjunction in Trypillia archaeology by looking at two levels where social transformation may occur – revisiting the consumption of figurines at the network level, and 'zooming in' to a site level using visual graph analysis (VGA) of architecture and spatial order at Nebelivka (Novoarkhanhelsk Raion, Ukraine).

Keywords: figurines, Cucuteni-Trypillia, social change, habitus, Big Other, proxy data, VGA

Introduction

This famous quote from G. di Lampedusa's novel 'The Leopard' (1960, 40) encapsulates the paradox that is the prehistoric Cucuteni-Trypillia network. This is the longest lived prehistoric network in Europe (5200-2700 cal BCE), probably one of the largest and, although by all means heterogeneous and consisting of subsets of local pottery groups, there is no modern scholar who would question the integrity of this vast prehistoric entity. The paradox lies not in the successful integration of general and local principles so that material traits can unquestionably be recognized as Cucuteni-Trypillia but in the longevity of such traits over a vast area that

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remained unchanged even in the face of serious scalar transformations. Confronted with such unprecedented stability, the questions arise 'How do modern scholars understand change and how is it measured?' For the many excellent recent archaeological studies of social, economic or technological *changes*, what constitutes change is often intuitive, rather than clearly defined as in older studies – for example, the change from the Copper Age to the Bronze Age is based on the introduction of a new metal or the transition to state formation in the Near East is defined by a completely different pottery assemblage (Wengrow 1998; 2001).

Proxy evidence for social change

A change in the way that palaeoecologists viewed the evidence for environmental change came about in the 1970s, when increased computational power enabled better modelling of biological data (pollen diagrams, speleotherms) which were viewed as proxies for change rather than the somewhat intuitive sense of change itself (Imbrie and Kipp 1971). The advantages of multi-proxy data for palaeoclimatic reconstructions were increasingly felt from the 2000s (*e.g.* Bigler *et al.* 2002). Now, it is recognized that most biological palaeoclimatic proxies do not respond directly, or even primarily, to climatic variables but rather to what ecologists term 'bioclimatic variables' (Huntley 2012).

The proposal here is that archaeologists may wish to take advantage of the 'proxy' metaphor for their own data concerning social change. An example is that the appearance of arsenical copper objects, realistic human images or model sledges are not in themselves evidence of change but proxies for social change, to be evaluated in the appropriate way, compared to the archaeological equivalent of 'bioclimatic variables' (? ‚sociocultural variables') and then, and only then, making their contribution to the overall story. There are two advantages to the consideration of archaeological evidence as proxies: firstly, this makes us separate the data from the changes and, secondly, it makes us aware of the limitations of each kind of proxy data through the routine application of source-critical analysis. Examples are given in the following paper.

The meaning of change

While I am no advocate of a war of definitions, it is important to establish the parameters within which meaningful changes can be detected, measured and explained, whether that be permanent substitution of one pottery temper for another, the introduction of a new raw material for ornament production or a radical rearrangement of settlement layout. Change takes place on multiple levels and, depending on the research questions, some changes will be more relevant than others. Each of these transformations would have been of varying importance for those who had experienced them, which is difficult to grade now, and they would be materialized in various ways but may also not have been materialized at all. Studying the various levels of transformation will provide different insights into the society in question. Thus, if we are interested in the collapse of world views – a very drastic social transformation indeed – then in the context of Balkan prehistory, there is no better candidate than the end of figurine use after millennia of continuous and stable incorporation of such images in daily social practices.

However, if we are interested in social change within a world view system utilizing figurines, then we need to 'zoom in' and explore the changing patterns of figurine production, consumption and discard. Thus changing figurine styles may indicate increasing gender tension or emerging and competing statements about personhood – a clear sign of social transformation. Such a transformation, however,

may or may not be accompanied by radical changes in the technology of figurine production. And where technological changes enhance the message conveyed by the particular figurine style, it does not follow that the former triggered the latter but that technology enabled the materialization of the already brewing processes.

In other words, my understanding of the core theme of this volume – 'the *habitus*' – is not characterized by causation but it is rather a dynamic set of principles that are shaped by people and are simultaneously shaping people. The topics of the volume revolve around technology and social change and what other factors may contribute to social change against the backdrop of human-environment interactions. Returning to the Cucuteni-Trypillia paradox, this paper will illustrate how, despite changes on various scales, changes in technology or indeed other factors, the most important of which being the scalar transformation of living on a small 1-ha site to a huge 200-ha site, seem to have had little effect on the form and content of the 'material package' unquestionably recognized as Cucuteni-Trypillia. Instead, scalar settlement change has affected the scale of this package. The analysis will take place on two levels[3] – figurines at the network level and architecture and spatial order at the site level at Nebelivka. I shall argue that the reason for the long-term stability of material culture is the nature of the Cucuteni-Trypillia symbolic social order epitomized by the concept of the 'Big Other'.

Before turning to the applicability of such a concept to the Cucuteni-Trypillia context, an important point should be made about *continuity* – a phenomenon that has received much less research attention than *change* (but see Knopf 2002). Trying to vindicate the role of continuity, McCorriston (2011, 5) has asked the question 'What made Mesopotamia recognizably Mesopotamian?' Her answer is the introduction of cultural meta-structures or 'ethno-epochs' such as Pilgrimage and Household that have outlived all political, economic and other social changes. If we paraphrase McCorriston's question as to what makes Trypillia recognizably Trypillian, the answer would be the persistence in combination and recombination of the basic elements of the Big Other that incidentally include the House (as the physical skin of the Household), and probably Pilgrimage (Chapman and Gaydarska submitted).

The habitus and the Big Other

Both the 'habitus' (Bourdieu 1977) and the 'Big Other' (Lacan 1988) are concepts borrowed from other disciplines that have been adapted for the purposes of archaeological enquiry. The *habitus* has received much wider attention, enjoying reception in various shapes and case studies, not least as practice theory, but it also has been criticized for its lack of explanatory potential of change (King 2000). Going back to the origin of the concept, a more relevant definition is that *habitus* is 'a relationship of ontological complicity with the world' (Bourdieu 1985, 14). What is borne out of this relationship is a certain understanding of the material and social world that is perpetuated by a set of social practices, that is to say, people are doing what they are doing because they do not know any other way of doing it. The *habitus* is arena of social power (Chapman 1991) and in his later works Bourdieu (1988) recognizes the potential to break free from the constant circle of beliefs (*habitus*) feeding into structures ('fields' in Bourdieu's terms) by 'symbolic struggles and specific knowledge' (ibid., 21). Thus social power is the power of 'world making'; crucially, to change the world means to change the ways of 'world making' (ibid., 22).

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3 The choice of what material/aspect of Trypillia to study at what level is entirely dependent on the quality and quantity of available data. For example, there are currently no high-precision plans (matching the quality of the Nebelivka plan) of representative number of Trypillia sites that would enable the study of such plans at the network level, followed by 'zooming in' to the Nebelivka plan.

The original notion of the Big Other is part of Lacan's perception of the world consisting of three registers – those of the Real, the Imaginary and the Symbolic. Although initially inspired by his training in psychiatry, Lacan's ideas disseminated mainly through his annual seminars had a lasting influence among philosophers, anthropologists and other social scientists alike. According to Lacan, the Big Other is a qua symbolic order and consists of fictional ideas of anonymous authoritative power and/or knowledge such as Law, Nature, Science, God, State, Ideology, and so on (Johnston 2013). An underpinning theme in Lacan's work is that the 'unconscious is structured like a language'. Without diluting the discussion by going into a Saussurian type of discourse, the important implication of this claim is that the unconscious, that is to say, the symbolic, is not chaotic and unruly but rather it is ordered and consistent. Žižek clarifies further the concept of the Big Other by discussing the efficiency of such a symbolic fiction. His examples demonstrate the role the Big Other plays in everyday life and ultimately its power (Žižek 1997; 2007a; 2007b).

Since most of the discussions of this concept take place in other disciplines (*e.g.* philosophy), its material component is somewhat unclear. This may explain why the notion is embraced by a mere handful of archaeologists (*e.g.* Kohring 2012, Chapman and Gaydarska 2018). Referring to the Bell Beaker phenomenon and the Big Other, Kohring posits 'the assemblage might have acted as a material/symbolic mediator for a whole network of shared conceptual structuring principles' (2012, 331). Our own insight of the concept relies more on the teasing out of the three components of the Big Other – the pottery, the figurines and the houses, although a general understanding is also offered – 'something which is sufficiently general and significant to attract the support of most members of society but, at the same time, sufficiently ambiguous to allow the kinds of localized alternative interpretations that avoid constant schismatic behaviour' (Chapman and Gaydarska 2018, 267).

The stumbling point for this concept seems to be how to differentiate it from the *habitus*. The elegant suggestion of Kohring (2012, Fig. 2) for the nature of their relationship has received undeservedly little attention but is considered here a major structural element in a relational analytical framework. The two concepts are nested in each other and complement each other. Although the Big Other is a material part of everyday life, it operates on a larger scale well beyond the level of one settlement or a single person. The *habitus,* on the other hand, is practice-based and therefore very much part of the personal, communal and intercommunal engagement of each person with the world on a quotidian basis. The interplay between these two realms may explain the paradox of the Cucuteni-Trypillia network – changes were happening at the level of the *habitus* but the pre-eminent symbolic order remained very much the same. Starting with the latter, let us turn our attention to the consumption of figurines in the Cucuteni-Trypillia network.

Figurines in Cucuteni-Trypillia: a proxy of social change

Apart from pottery, figurines are the most prominent Cucuteni-Trypillia class of artefacts. Anthropomorphic figurines are a common but infrequent find on most Cucuteni-Trypillia sites and some estimates put them up to 20,000 found so far (Monah quoted in Chapman 2000, 69). A more modest estimate is under 10,000 (Ţerna 2017). Unsurprisingly, they have been the subject of numerous stylistic and interpretative studies (among others Makarenko 1927; Bibikov 1953; Marinescu-Bîlcu 1974; Movsha 1975; Petrenko 1980; Yakubenko 2000), with two general accounts of the available corpus (Pogoševa 1985; Monah 2016). Despite this major research interest in figurines and their functions and activities (*e.g.* Burdo 2008), there is no sense of

what the intensity and regularity is with which these images were utilized. In the spirit of the above-mentioned plea for clarity of what constitutes change, quantifying consumption patterns will enable meaningful claims about production, popularity and deposition of figurines and any changes thereof.

Elsewhere, we have argued that figurines were one of the elements of the Trypillian Big Other (Chapman and Gaydarska 2018). The aim of this section is to explore whether there were any changes in the overall consumption patterns of anthropomorphic figurines that ultimately point to the (in)stability of social practices involving anthropomorphic images. The next step is to see how such patterns relate to a specific class of anthropomorphic figurines – the so-called 'realistic' images. This will establish whether or not a subset of this vast corpus has a different intensity of use.

A pioneering study of the frequency of figurine use has been undertaken by Ţerna (2017). As is necessary for all proxies, he has made a critical analysis of 65% of all known Cucuteni-Trypillia figurines, with discussion of possible caveats such as the context of discovery (*e.g.* dwellings vs pits) or the standard of publication. In order to compare the density of figurine distributions across time and space, Ţerna standardized the number of figurines found in 100 m^2 of excavated area.[4] His overall conclusion is that the average density is five figurines per 100 m^2, while various contexts and sites deviate from this norm. Crucially, he notes that the density of figurines drops with time and megasites have a lower than average figurine consumption in comparison with smaller sites.

The densities for the Ukrainian sites from Ţerna's data set were plotted against their site size (where such information was available, n = 32), which confirmed Ţerna's observations. The overall density decreases with increasing settlement size (Fig. 1a), while a chronological division into different stages shows it increases with growth of site size in Trypillia A (Fig. 1b), stagnates in Trypillia B (Fig. 1c) and decreases in Trypillia C (Fig. 1d). The implications are a stable Big Other, shown by the stable consumption of figurines, with a slowing towards the end of the network, when the Big Other is increasingly successfully challenged by other world views.

Once the general pattern was established, the next step was to find out the frequency of 'realistic' images. These images are an intriguing part of the overall figurine making in Cucuteni-Trypillia, since the overwhelming majority of anthropomorphic figurines (almost 99%) are stylized and/or lacking any individualization (Fig. 2c, e-h). Despite their stylistic differences, the practices in which they were utilized did not require a likeness to a human face, and in this sense they were broadly interchangeable. In contrast, the creation of miniature human images with a realistic expression is not only a deliberate choice to make something very different but also such figurines are hardly interchangeable between themselves. The relationship between personhood and the making and breaking of figurines has been argued elsewhere (Chapman and Gaydarska 2007); here, this is extended to the consumption of realistic images in Trypillia.

These images have attracted a lot of research attention, summarized by Burdo (2013). Their definition is also discussed at length there (Burdo 2013) and it is accepted for the purposes of the current study. It can be summarized as a detailed rendering of the head conveying a relief expression of the face, chin and neck, as opposed to a schematic or flat facial expression (Fig. 2a, b, d). Realistic depictions of hands and gestures lacking the above facial characteristic are not considered realistic images.

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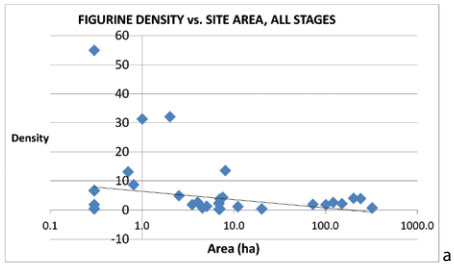
4 This parameter is achieved by dividing the total number of figurines by the total excavated area, in turn multiplied by 100.



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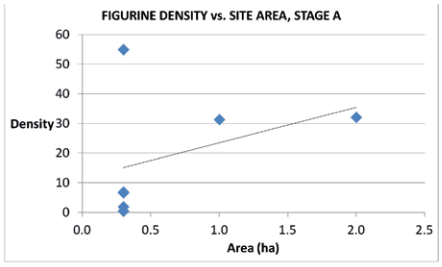

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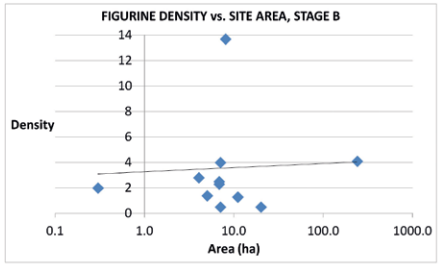

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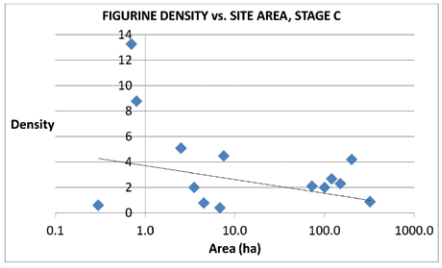

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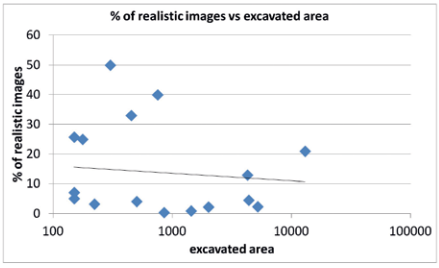

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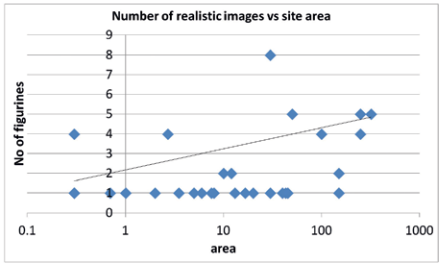

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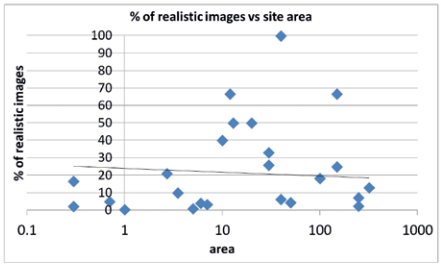

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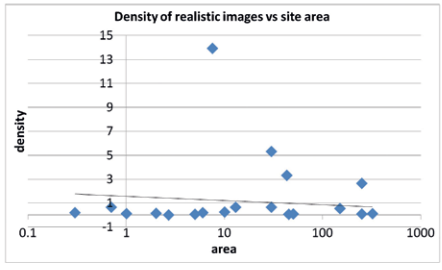

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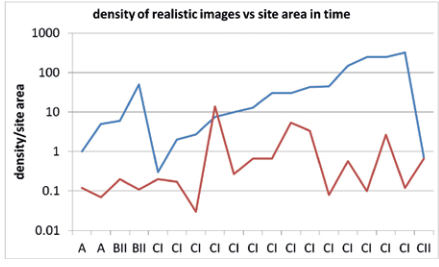

i

Figure 1. Figurine density as estimated by Ţerna (2017) (see text) versus site area, all. (a) Figurine density as estimated by Ţerna (2017) (see text) versus site area for Trypillia phases A, B and C. (b-d) Percentage of realistic images from all figurines from a given site versus excavated area. (e) Absolute number of realistic images versus site area. (f) Percentage of realistic images from all figurines from a given site versus site area. (g) Density of realistic images estimated by following Ţerna (2017) (see text) versus site area. (h) Density of realistic images estimated by following Ţerna (2017) (see text) versus site area in time (i).

There are currently 38 sites with realistic images from the Ukraine (Burdo 2013). Six[5] of those are stray finds and cannot be included in an analysis involving site size and excavated area. The published information for the remaining 32 sites is incon-

5 There are also numbers of figurines deriving from excavated sites (*e.g.* Volodymirivka) that have been classified as stray finds (Burdo 2013), since they are not found during the excavations. For the purposes of this study, however, they are included in the total number of figurines deriving from the respective site.

sistent in terms of total number of figurines found, total excavated area and site size (Table 1). Depending on the available information, various subsets of sites were used for different analyses and the sample size varies between 44% and 83%. Although such a sample size is not ideal, it still gives an indication of general trends. Future investigations based on a full set of data will undoubtedly increase the precision of such types of studies and may give different results.

The majority of sites have just a single realistic image but more revealing for the significance of these images is their percentage of all anthropomorphic images from a given site. Such information is available from 26 sites: the realistic images vary from 0.37% to 100%[6] of all images. When this is plotted against the excavated area, the trend distribution shows a slight decrease with enlarged investigated area, suggesting that the sample is not biased by sites with larger excavations (Fig. 1e).

The absolute number of realistic images shows a tendency to increase with increased site size (Fig. 1f). However, if taken as a percentage of the total of all figurines, then there is an obvious trend of limiting realistic images to a quarter of all anthropomorphic images. This suggests that larger sites do not produce more realistic figurines (Fig. 1g). All but one of the sites with more than 25% of realistic images have a small sample size (*e.g.* one realistic image out of four figurines in Dobrovody (Uman Raion, Ukraine)) and should be viewed with caution. The exception is Kocherzhyntsi-Pankivka, where eight of 31 figurines have realistic traits and although they are classified as 'stray finds' such a high concentration (the highest so far known from Trypillia sites) must betoken a deliberate choice – a 'hot spot' for the making and deposition of realistic images. These trends in the figurine proxy data suggest that, if a realistic image is a sign of a different kind of personhood, then limited numbers of people betokened that personhood on smaller as well as larger sites.

Although the overall trend is for the density of figurines to drop with time and increasing site size, there are always exceptions to such a trend (Figs. 1a, 1g). This may be due to a genuine increase in figurine consumption but also to the type of investigations, the type of excavated contexts, the standard of publication, and so on. The situation is the same with the more specialized proxy data set of the density of realistic images that is more or less stable across small and large sites, with the exception of four sites that have much higher densities (Fig. 1h). One of them is the already mentioned Kocherzhyntsi-Pankivka, confirming once again the special status of this site in terms of realistic images. The other three are Pekari II, Vasil'kove and Chychyrkozivka, where the limited excavations (up to 250 m^2) and multiple surface surveys may mean that the high density may be a function of the type of investigations.

Another interesting tendency in this proxy data could be noted through time: the density of realistic images not only does not match the fluctuating site areas but some of the CI sites have lower figurine densities than A and B sites. As mentioned above, the study of Trypillia figurines rarely quantifies their consumption and currently there is an impression of increased consumption of realistic images in the CI phase based on the high proportion of these images (40%) coming from that period (Burdo 2013, 25). Such figures are the result of investigation bias towards this phase of the Trypillia network, which is evident (Fig. 1i) from the number of CI sites with realistic images (n = 14) as opposed to the earlier phases (n = 2 for both A and B). The results of the current study counteract the impression of increased consumption in CI and confirm that density, which ultimately means the requirement for realistic images, is not dependent on the chronology or the size of the sites but on an underlying

6 100% is rare (n = 2) and appears in cases where the realistic image is the only figurine found at that site.

Site	Stage	Area ha	Excavated area in m2	No of figu-rines	No. of realistic images	% of all figurines	Frequency of realistic images
Luka Vrublevtskaya	A	1	850	267	1	0.37	0.12
Olexandrivka	A	5	1433	107	1	0.9	0.07
Ozaryntsi	BI	0.3			1		
Zalishchyky	BI-BII	0.3		6	1	16.6	
Nemiriv	BII	6	500	24	1	4.1	0.20
Volodymyrivka	BII	50	4350	110	5	4.5	0.11
Krinichki	BII			23	2	8.7	
Valyava	BII	40		16	1	6.25	
Polonyste	BII	16.6			1		
Kvitki 2	BII-CI	20		2	1	50	
Vasil'kove	CI	36-50	30		1		3.33
Kolodyazhnoe	CI		80		1		1.25
Chychyrkozivka	CI	250	150	56	4	7.1	2.67
Kocherzhyntsi-Pankivka	CI	30	150	31	8	25.8	5.33
Dobrovody	CI	150	176	4	1	25	0.57
Pekari 2	CI	7.5	222	31	1	3.22	13.96
Zelena Dibrova	CI	13	300	2	1	50	0.66
Vyl'shana I	CI	30	450	3	1	33	0.66
Cherkasiv Sad 2	CI	2	600		1		0.17
Krutuha-Zholob	CI	10	750	5	2	40	0.27
Blyshchanka 2	CI	45	1178		1		0.08
Koshilovsti-Oboz	CI	0.3	2000	180	4	2.22	0.20
Talyanki	CI	320	4262	38	5	13	0.12
Majdanetske	CI	250	5200	218	5	2.29	0.10
Kolomiischina 1	CI	2.7	13000	19	4	21	0.03
Sushkivka	CI	100		22	4	18.2	
Trypillia	CI	12		3	2	66.6	
Tomashivka	CI	150		3	2	66.6	
Rezino	CI			1	1	100	
Roskoshevka	CI			1	1	100	
Hmel'na	CI	8			1		
Grimiyachka	CI				1		
Kalagarovka	CI				1		
Malaya Mogulka	CI				1		
Molodetskoe	CI				1		
Pavoloch	CII	0.7	150	20	1	5	0.67
Mayaki	CII	3.5		10	1	10	
Sushky	CII	0.3			1		

Table 1. Sites with realistic images from the Ukraine, showing available information for the analyses. Sites in bold belong to the so-called Eastern Trypillia Culture (see text).

Quarter/size	Stage	Model A: no. of houses	Model B: no. of houses
B (20.1 ha)	1	30	47
	2	52	48
	3	28	46
C (11.6 ha)	1	26	33
	2	41	34
	3	27	26
I (16.4 ha)	1	20	34
	2	36	32
	3	20	35

Table 2. Number of houses by Model and Stage of Model for three Quarters, Nebelivka megasite.

world view necessitating the appearance, and in some cases concentration, of such images in the negotiation of symbolic order.[7]

There appear to be two reasons for the decline in human images: the scalar transformation of social relations on larger sites and the attraction of competing world views on later sites.

The built environment in Nebelivka

The second kind of proxy data concerns the diachronic analysis of the spatial patterns in three quarters – B, C and I – at the site of Nebelivka. The site and its surroundings were extensively and intensively investigated by various methods over several seasons by an Anglo-Ukrainian expedition (Gaydarska 2019; ADS https://doi.org/10.5284/1047597). The high-precision geophysical plan (Chapman *et al.* 2014) was divided into 14 quarters on the basis of eight criteria (Chapman and Gaydarska 2016) and Buchanan (2019) scrutinized three of these quarters for changing spatial patterns according to two contrasting models. They both operate with different numbers of houses in three subsequent phases (Table 2). The rationale behind these models have been argued elsewhere (model A – Nebbia *et al.* 2018; model B – Gaydarska, submitted), both of which are trying to reconcile the high total of 1,445 burnt houses with minimal traces of human impact by looking at seasonal or scaled-down permanent occupation. In brief, model A stipulates a small core of permanent occupation seasonally enlarged in their thousands by visitors gathering for a regular assembly meeting with multiple aims – from meeting friends and relatives to renegotiating the social order by feasts and ceremonies. The incremental growth of the settlement is spread across five 30-year generations, whereby several new quarters were settled in each generation with a population maximum in the fourth generation but no new builds in the fifth. In contrast, model B considers permanent occupation of around 400 houses at any given time. In order to achieve the final footprint of 1,445 buildings, seven to ten houses were burnt annually, and the same number of newly built dwellings would have appeared within the same year. These dual processes would have happened simultaneously across the site rather than consecutively in quarter after quarter.

For the purposes of this study, a visibility graph analysis (or VGA) was performed (Buchanan 2019). VGA was originally designed to explore the visual characteristics of architectural space (Turner *et al.* 2001) and as such is rooted in concepts and

7 However, a cautionary note should be added that the seven sites from the so-called Eastern Trypillia Culture (ETC) are believed to follow the early Trypillian tradition of relatively low figurine consumption (Tsvek 2006).

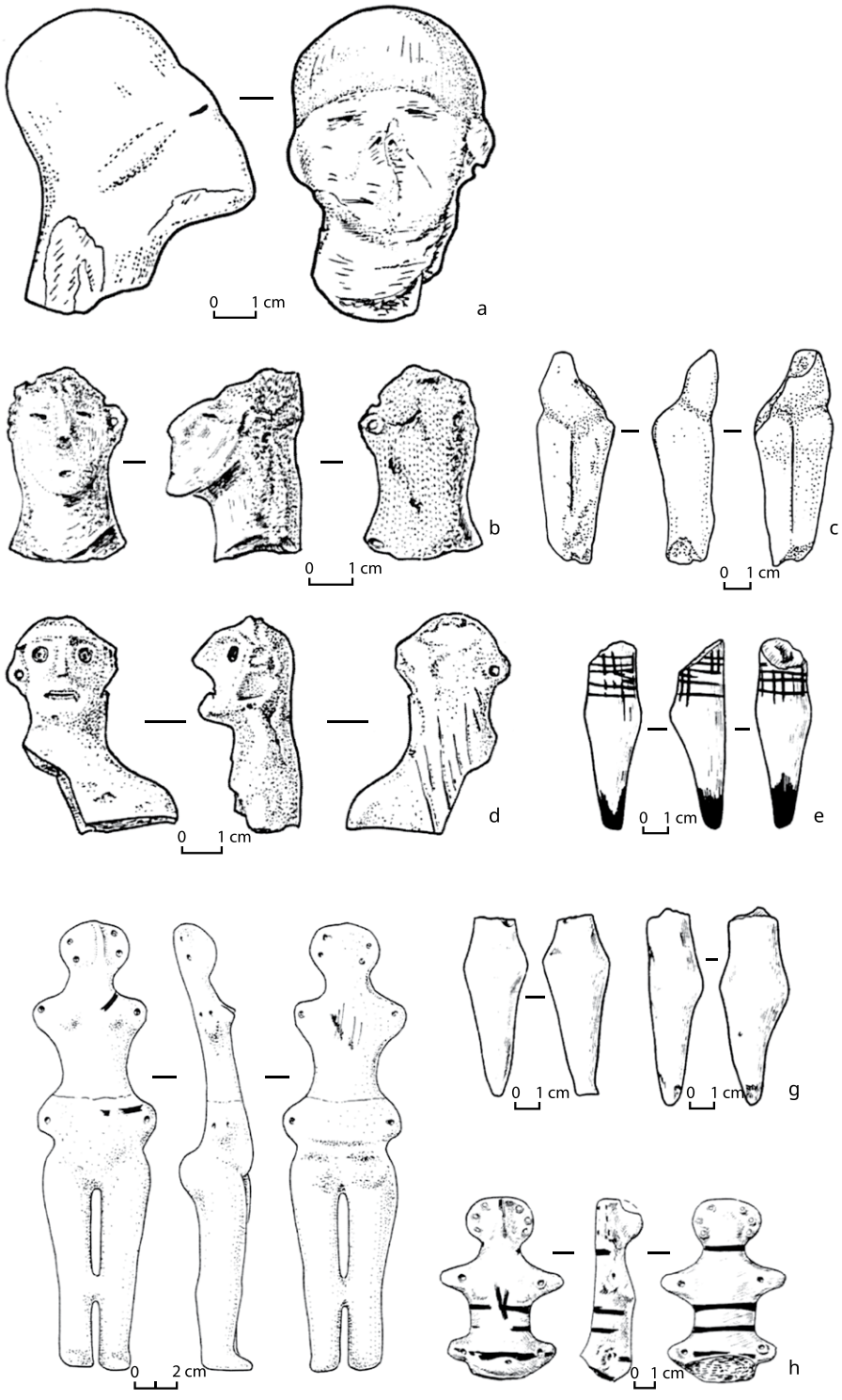

Figure 2. Trypillia figurines (after Ovchinnikov 2014). (a, b and d) Realistic images. (c, e-h) Typical examples of stylistic images.

theories (like space syntax theory) that have been borrowed and long discussed by archaeologists (from the Glasgow TAG 1982 conference onwards). A parallel discussion, with multiple practical applications, concerned the now-standard GIS viewshed analysis (Conolly and Lake 2006; for Trypillia viewshed analysis, see Ohlrau 2015). However, a crucial oversight in the employment of this undoubtedly very useful tool at landscape level is its unsuitability for intra-site analysis in a built environment of houses, fences and palisades (Buchanan 2017). This is a good example of a proxy

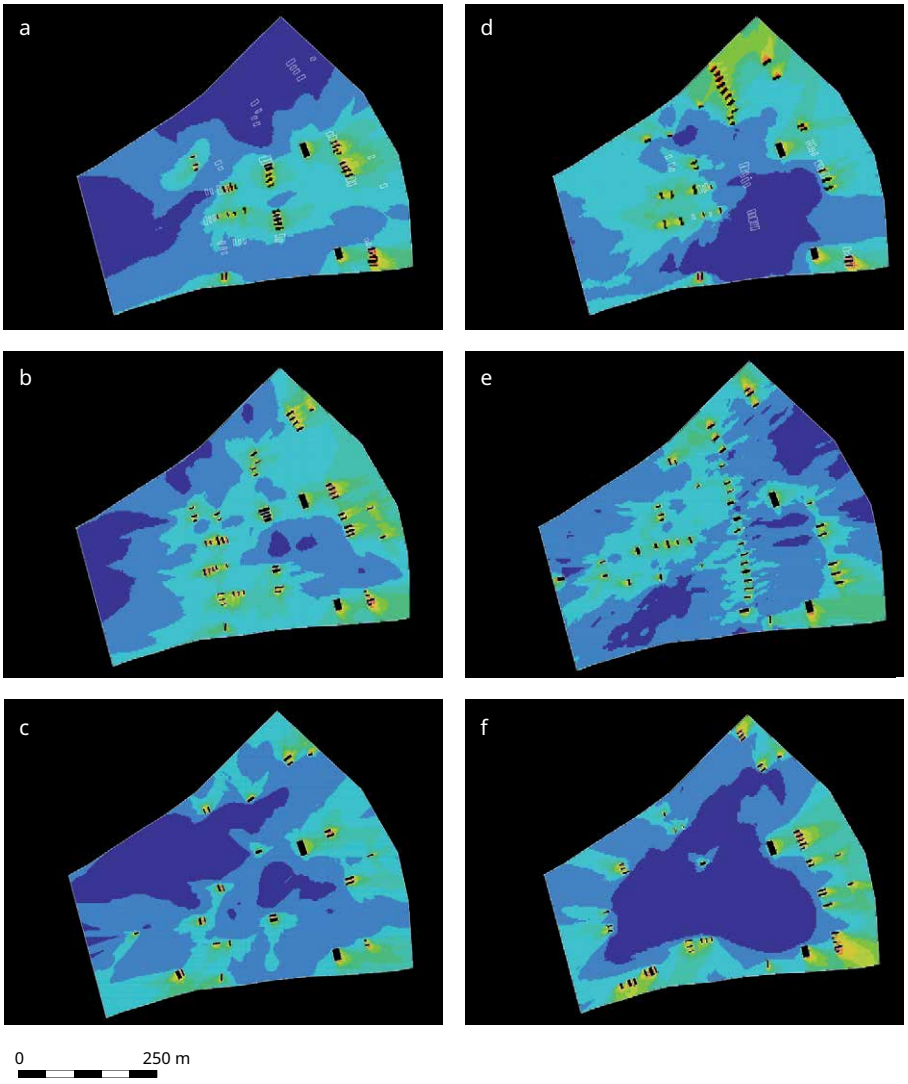

Figure 3. Nebelivka – mean depth quarter B (a-c) model A; (d-f) model B.

data set that was not fit for purpose. VGA mitigates the theoretical and computational shortcomings of viewshed analysis and offers a powerful alternative tool to study social space hand in hand with visibility. The basic premise of this approach is that visually better integrated space has greater chances of attracting human movement. This means not only that wide well-lit streets would be preferred to dim narrow alleys but it also quantifies the relationship between public and private space by introducing a series of intermediate spaces. A pioneering application in archaeology has been made by B. Buchanan (2015; 2017) with wider interest gathering pace (*e.g.* Brookes *et al.* 2017). B. Buchanan[8] is also the author of the maps used in this study (ADS https://doi.org/10.5284/1047597, Figs. 3-8), while their interpretations are mine based on our intensive discussions of the method in general and the Nebelivka case study in particular. An advantage of VGA that is germane to the study of Trypillia megasites is its comparative capabilities, in this case between quarters. The wealth of information generated by the recent high-precision geophysical plans (Chapman and Gaydarska 2016) is somewhat underused but it is ideally suited for analysis of built environment and inhibitions to visibility as VGA. Thus not only questions

8 Currently an associate professor at Eastern Washington University, USA. The maps for this study were produced while he was a postdoctoral research assistant at Durham University, UK.

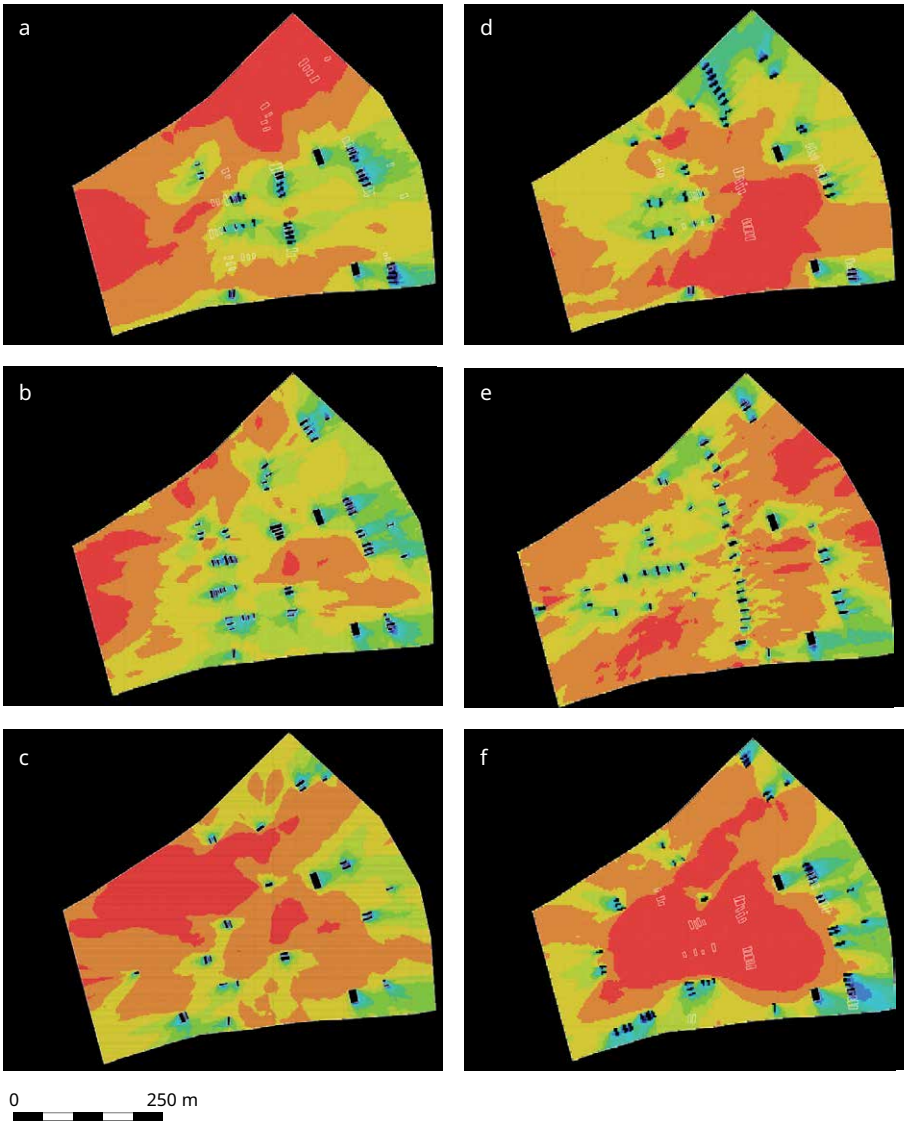

Figure 4. Nebelivka – connectivity quarter B (a-c) model A; (d-f) model B.

about the origin and formation of the site as a whole can be asked but also development through time could be compared on the more intimate level of the quarter.

The comparison of the VGA results for the three quarters in Nebelivka was conducted in three ways – a) from stage 1 to 3 within each model; b) between stages 1 to 3 of each model; and c) between quarters. The number of buildings in each stage of the models in all three quarters is given above (Table 2).

Such numbers with their corresponding number of inhabitants (an estimated six per house) fit well with the somewhat wide range of current estimates for population number at small (0.3-2 ha) to middle-sized (up to 35 ha) settlements. The only difference between the Nebelivka quarters and other small sites is the reduced density of occupation at the megasite (as already noted by Diachenko 2016). Counterfactually, nothing really changed much with the emergence of the big sites. Space prevents a detailed discussion of the multiple consequences of many people living together, such as logistical issues, environmental pressure, decision making, conflict, waste management, and the like, and their social and practical implications (but see Gaydarska 2019). For the purposes of the current study, it is noteworthy that the coping mechanism of dealing with the potential scalar stress was to dwell in smaller, more intimate units within the megasites – spaces with which people were familiar

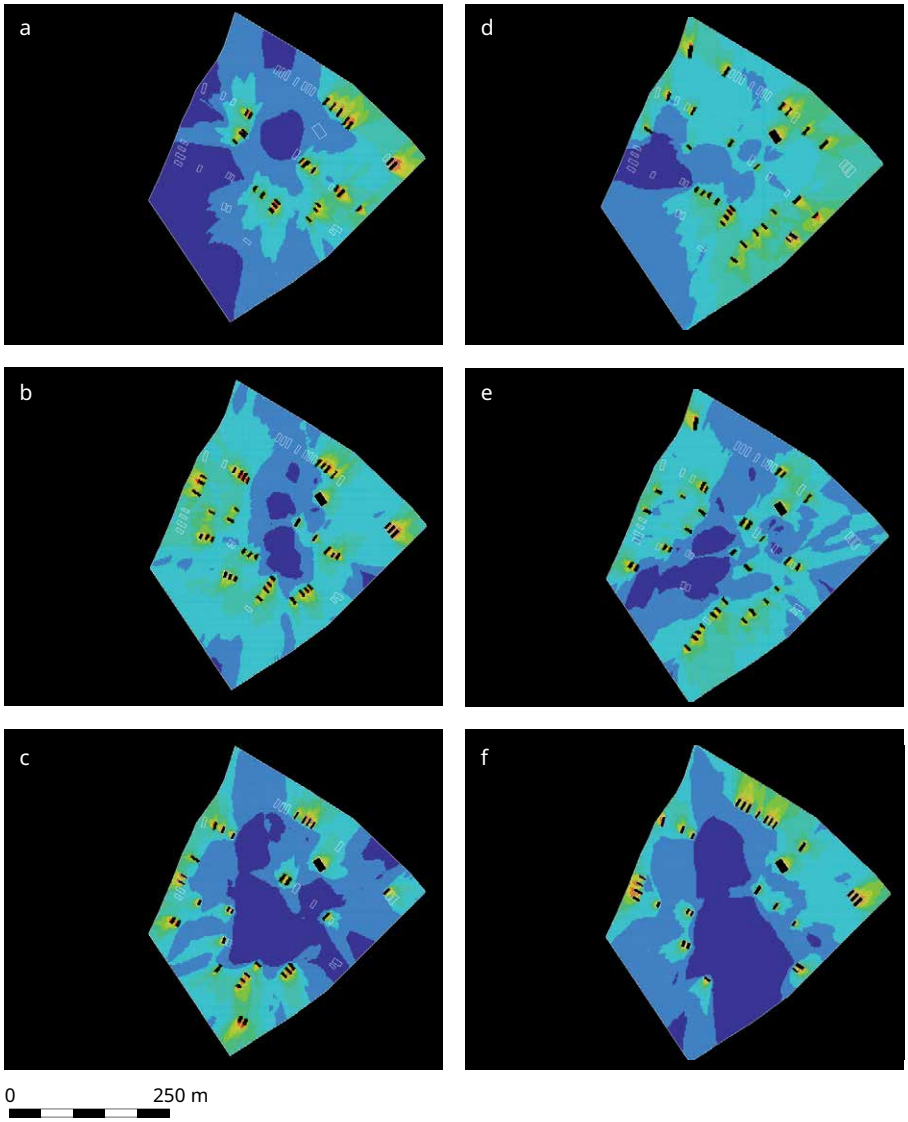

Figure 5. Nebelivka – mean depth quarter C (a-c) model A; (d-f) model B.

and could function within their changing *habitus*. The quarter would be probably larger than a 'normal' site but only a fraction of the size of a complete megasite. That may explain the lack of scalar stress at the megasite – the operational level of the quarter would not differ significantly from a small Trypillia site. Although there was scalar transformation in the total settlement size, there was no transformation in the scale of operation since the whole site was not in coeval use.

The detailed observations of two types of VGA maps (Figs. 3-8) are summarized in Table 3. The set of maps for each VGA analysis has ten plots but, due to limits of space, only two are presented for the current study – mean depth and connectivity. The full set of maps can be found at ADS https://doi.org/10.5284/1047597. Ideally, such maps should be produced for each of the 150-200 years of Nebelivka occupation, which would enable a detailed analysis of spatial and visual development. In practice, however, this is hardly possible due to computational resources and storing and presentation of such data. Accepting that, for pragmatic reasons, only three 'slices of time' are presented, it is clear that the annual spatial dynamic was much more nuanced than the composite generations illustrated here.

There are differences in embodied movement between the two models – in model A, it would have lasted for a month each year, while in model B it would

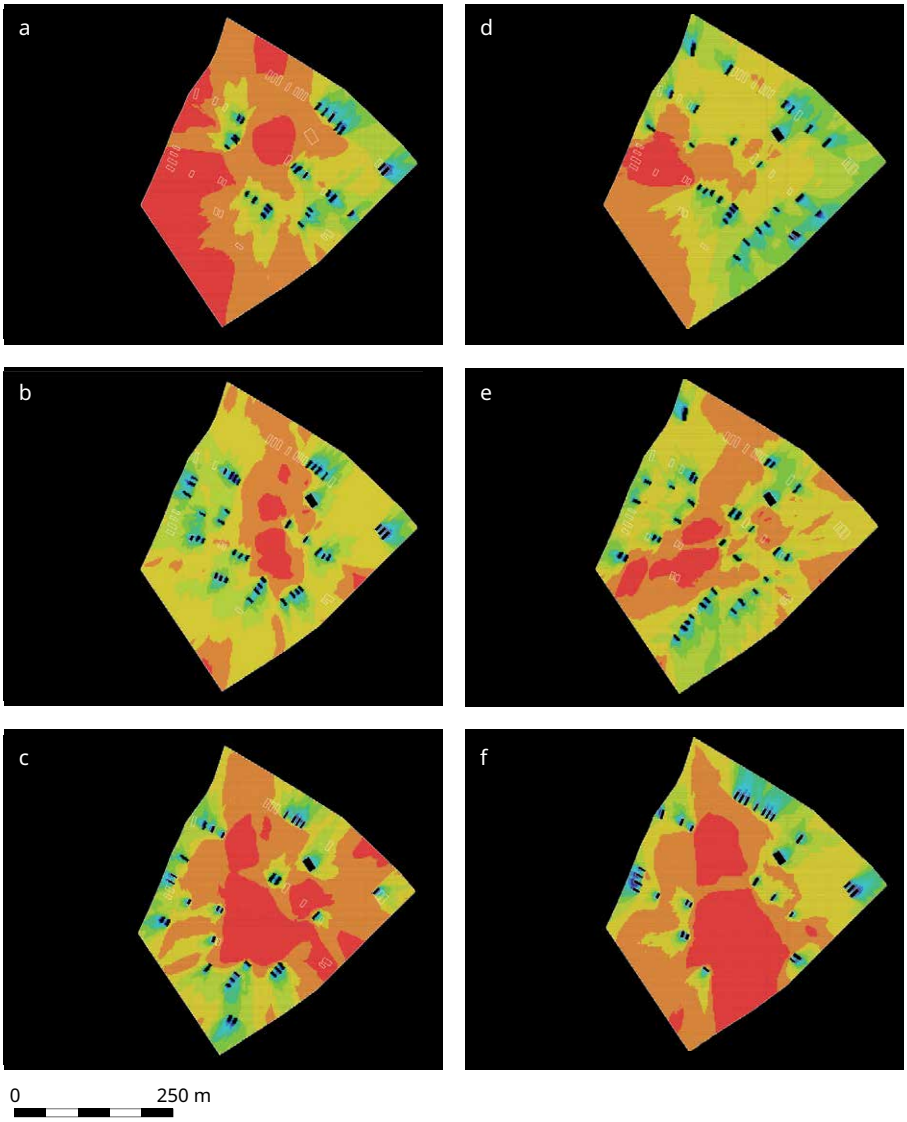

Figure 6. Nebelivka – connectivity quarter C (a-c) model A; (d-f) model B.

have been a daily practice till the next burning and building took place, perhaps within a year. Since this is the only significant difference, comparison between the stages in the two models is valid in establishing general patterns. It is hardly surprising that the different locations of standing and burnt dwellings which define the two models would produce different patterns of visual and spatial integrity! More meaningful is the comparison between stages within a model as they point to accumulated differences in experience through time. What is important here is that these maps present snapshots – moments in time of a gradual process that for the Trypillia people was a lived experience. The built environment affected their daily routines, their vistas and shaped their social relationships with neighbours, kinfolk and non-relatives alike.

Figures 3-8 portray three kinds of space and therefore the possibilities of movement: public space, with easy movement across it equivalent to high permeability; private space, with its low permeability and limited possibilities for movement; and, between public and private, intermediate space/movement. The analyses represented here show the main recurrent patterns of space usage (*e.g.* Pattern A) which we infer as originating in a particular kind of spatial practice (Process A). The main patterns are identified and explained in the Key Table 3 (and Figs. 3-8) –

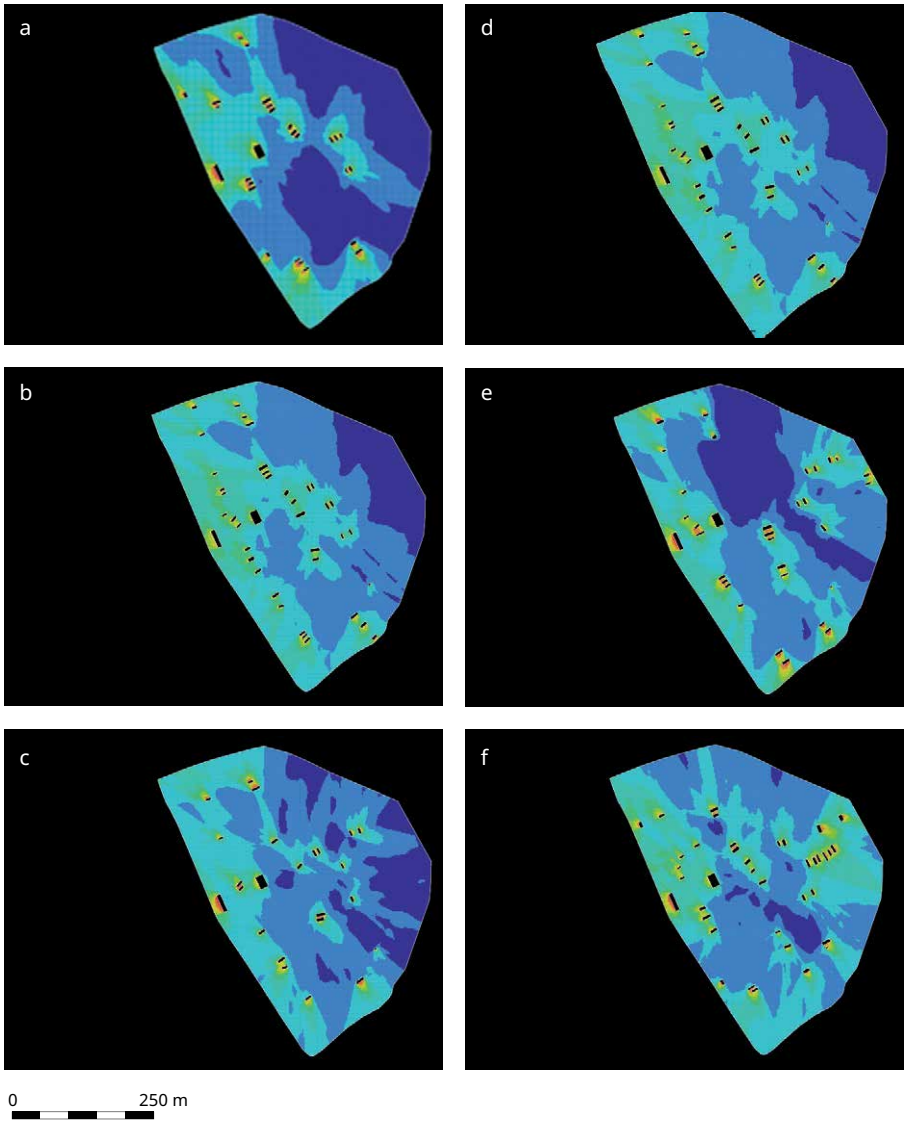

Figure 7. Nebelivka – mean depth quarter I (a-c) model A; (d-f) model B.

segmentary, zonal, corridor and concentric ring. The following is an example of the processes which we infer as having spawned the patterns shown in Figure 5 a-c for the parameter of mean depth in quarter C for the three stages of Model A.

In Stages 1 and 3, few houses have been built and each has a small attached area of private space, sometimes expanded outwards, which residents controlled. Elsewhere, all persons would have found it easy to move around the quarter. The main difference between these two Stages is in the areas where most houses were built. Stage 2 stands in contrast to the other two Stages, with the increasing number of houses confining people's easy movement in two ways: to a central zone of easy movement, through which people can move from the Outer Zone to the Inner Zone and to two segmentary spaces on the NW and SE sides of the Quarter, where the presence of some houses impacted on free movement.

The patterns summarized in Table 3 can be interpreted in the way illustrated above, with single houses hardly creating barriers to movement but with rows of houses (in neighbourhoods) often blocking mobility across a quarter and unbuilt spaces offering the potential for easy access across the site. These negotiations of movements probably occurred on a regular basis. Through time, an increasing proportion of houses in all quarters fell into disuse or were burnt down. The lack

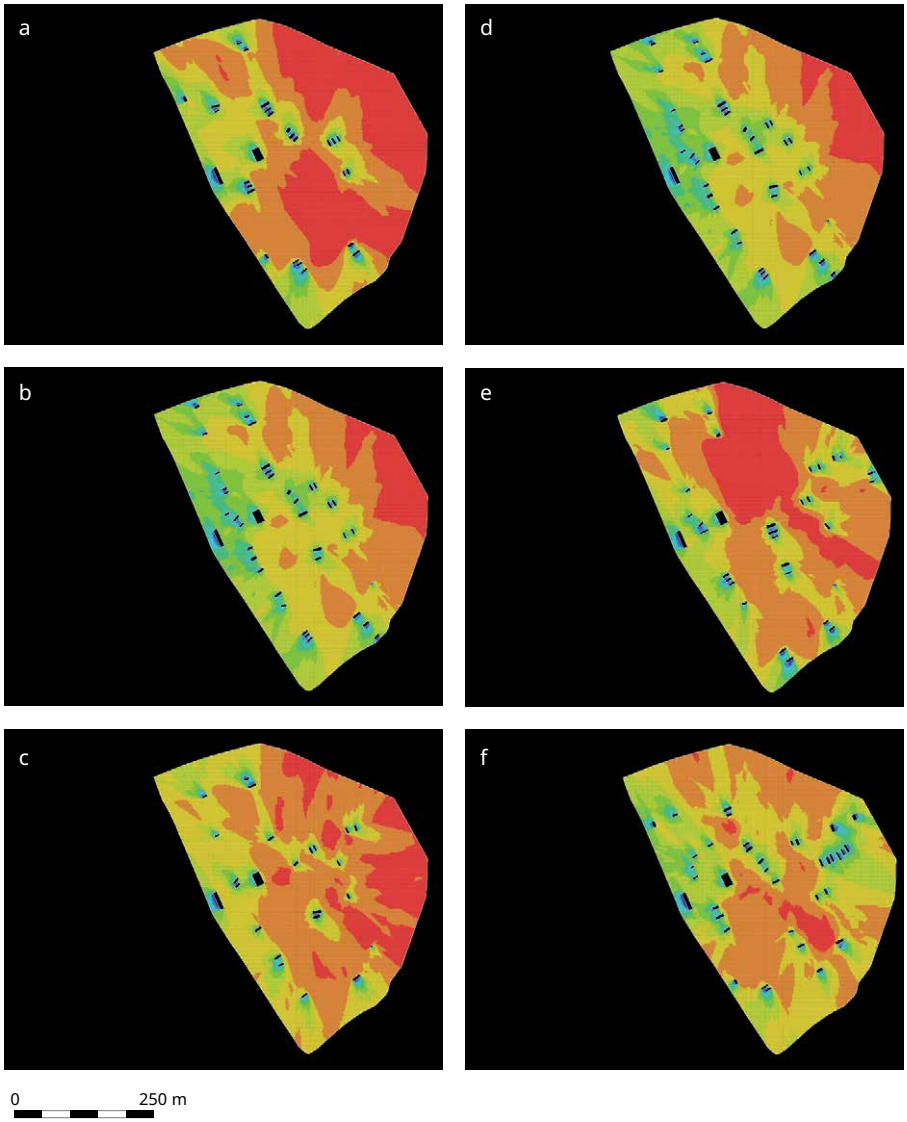

Figure 8. Nebelivka – connectivity Quarter I (a-c) model A; (d-f) model B.

of overlapping buildings points to a spatial awareness of where houses once stood and a respect for, and appreciation of, ancestral space. Such spatial awareness was enhanced either by the house mounds formed by burnt debris (Nebbia *et al.* 2018) or by cultural memory, perpetuated by stories about the people who once occupied the burnt houses, or most probably both. Either way, powerful mental maps were created in which ancestral space, public space, intermediate space and private space emerged as the major components of the overall settlement planning. It is important to remember the increase in the number of memory mounds through the life history of the Nebelivka megasite, which gradually transformed the megasite from a dwelling site into a dwelling and ancestral site.

Discussion

How can we interpret the patterns in the proxy data sets of figurines and houses from the Trypillia world? First, we note that both proxy data sets have been subject to careful source-critical analysis before any interpretation was offered. The analyses we have made form a concrete reply to the question of how change is to

be measured and defined. Figurine consumption showed little change through time, with a slight decrease toward the end of the network. The realistic images confirm this pattern and are perceived here as the ever-present, if not growing, tendency towards individualization in most known corpora of anthropomorphic figurines (Chapman in prep.). In the Cucuteni-Trypillia context, they are viewed as sacred personifications (Burdo 2013, 18) or deities (Monah 2016) – interpretations which correspond to the culture-historical tradition to equate all things symbolic with religion and the sacred. The concept of the Big Other advocated here is much more flexible and encompassing, allowing for symbolic renderings to be linked with all aspects of social life, not exclusively to cult and religion. Thus the realistic images may have been portraits of real people with local significance, like chiefs or healers; or they may have been artistic expressions; whichever interpretation is preferred, portraits may indicate rare but certainly present individual personhood among the overwhelming evidence for distributed personhood[9] (Chapman and Gaydarska 2007; 2011; Monah 2016). In any case, the pattern of their consumption is not in stark contrast with the overall utilization of anthropomorphic figurines, suggesting that, from the inception of the Cucuteni-Trypillia network, these images formed an integral part of the Big Other that easily accommodated and permitted competing perceptions of self – that of individuals and dividuals. Whatever social negations and transformation were taking place, whether at household, neighbourhood or quarter level, they hardly transgressed the agreed symbolic order.

The patterns in social spaces shown in Figures 3-8 come from time slices, which naturally lend themselves to the impression of visible contrasts. But, in reality, the changes would have been gradual, linked with annual house-burning and building, which created ancestral places at the sites of once living houses and filling once empty spaces with newborn houses. The movement across this space would have triggered memories driven either by mental maps or by physical traces of memory mounds. The strong component of ancestral presence may well have made a contribution to the stability of the Big Other. Changes in the physical layout of a built environment created new opportunities but also evoked tension, whether by forging new relationships with neighbours, negotiating space for gardens, pits and access routes to an assembly house or by managing encounters between neighbours and near strangers. Thus social negotiation would have taken place at all stages. While social order may have been reproduced at the level of the Big Other, social transformation would have taken place at the level of the *habitus*. People are never the same before and after certain events – burials, house-burnings, feasts or marriages. Such events created shared memories, enriching the participants with particular experiences; some may have reinforced the social and symbolic order (*e.g.* feasts), while others may have rearranged and challenged such order (*e.g.* burials). Changes in the built environment certainly constitute one such event – people would have to learn to move around in a different way and would have a different visual experience.

Key-zonal distribution: similar spatial characteristics in one zone across the grain of the quarter; concentric ring distribution: same as with zonal distribution but nested concentric zones; corridor structure: narrow band of similar spatial characteristics, often leading towards the inner open space; segmentary structure:

9 As mentioned above, the link between deliberate fragmentation and dividuals (*i.e.* distributed personhood) has been argued elsewhere (Chapman and Gaydarska 2007). The lack of quantification in Trypillia figurine studies makes it difficult to put an exact number of broken figurines from the entire corpus but an estimate of 80% is probably an acceptable guess. There is also patchy information about refits of fragments between dwellings, between pits and within pits (*e.g.* Shmaglji and Videiko 2002-3, 104); the overwhelming majority, however, is of 'orphan' fragments – the significance of these refits and orphan fragments has been discussed in Chapman and Gaydarska (2007).

STAGE	MODEL A – MEAN DEPTH, QUARTER B	MODEL B – MEAN DEPTH, QUARTER B
1	Segmentary pattern of space organization, from outside the Outer Circuit to inside the Inner Circuit; easy movement dominant on north side, not necessarily around the assembly houses.	Segmentary pattern of space organization, from outside the Outer Circuit to inside the Inner Circuit; easy movement dominant on south side, not necessarily around the assembly houses.
2	Weaker segmentary pattern; less easy movement, with assembly houses still playing a minor role; large area of intermediate movement.	Weaker segmentary pattern; less easy movement with assembly houses still playing minor role.
3	Small increase in space for easy movement, with reduced space for intermediate movement; more important role for assembly houses in zones of easy movement.	Dominant space for easy movement, with reduced space for intermediate movement; more important role for assembly houses in zones of easy movement.
	MODEL A – CONNECTIVITY, QUARTER B	MODEL B – CONNECTIVITY, QUARTER B
1	Dominant areas of public space wherever there are no buildings, including some corridors, mostly on north side; intermediate space of lesser importance, with private space usually confined to houses and house rows.	Dominant areas of public space wherever there are no buildings, mostly on south side; intermediate space of lesser importance, with private space usually confined to houses and house rows.
2	Similar to Stage 1 but less public space, more often organized in corridors.	Similar to Stage 1.
3	Public space even more dominant than before, with a decline in intermediate space.	Public space even more dominant than before, with a decline in intermediate space.
	MODEL A – MEAN DEPTH, QUARTER C	MODEL B – MEAN DEPTH, QUARTER C
1	Dominance of areas of easy movement, inversely correlated to number of active houses; importance of intermediate space.	Important space for easy movement but intermediate space is dominant, with some corridors.
2	Segmentary pattern of space for easy movement, with increasing importance of intermediate space.	Increasing importance of space for easy movement, with segmentary pattern of space.
3	Dominance of areas of easy movement, inversely correlated to number of active houses; decreased importance of intermediate space and decline in segmentary space.	Dominance of areas of easy movement, inversely correlated to number of active houses; decline in segmentary space.
	MODEL A – CONNECTIVITY, QUARTER C	MODEL B – CONNECTIVITY, QUARTER C
1	Importance of high permeability space, especially on nest side, with low permeability space related to houses and house rows.	Moderate importance of high permeability space, with low permeability space related to houses and house rows.
2	Emergence of a concentric ring structure of space, still with little high permeability space and low permeability space related to houses and house rows.	Dominance of a corridor structure, with more high permeability space and low permeability space still related to houses and house rows.
3	Consolidation of the concentric ring structure, with expansion of high permeability space and same low permeability pattern as before.	Structural elements mixed, with the addition of a concentric ring structure to the basic corridor pattern; even more high permeability space, with the same low permeability pattern.
	MODEL A – MEAN DEPTH, QUARTER I	MODEL B – MEAN DEPTH, QUARTER I
1	Zonal distributions across the grain of the quarter, with hardly any corridors of space; areas with intermediate movement mostly outside the Outer Circuit.	Zonal distributions across the grain of the Quarter, with hardly any corridors of space; areas with intermediate movement mostly outside the Outer Circuit and between Circuits.
2	As the previous stage but with decreased space for easy movement.	As the previous Stage, with areas of easy movement more to north side
3	As the previous stage	As the previous Stage but with declining space for easy movement.
	MODEL A – CONNECTIVITY, QUARTER I	MODEL B – CONNECTIVITY, QUARTER I
1	Public space concentrated inside the Inner Circuit, often the innermost parts leading to the open central space; intermediate space mostly outside the Outer Circuit or between the Circuits; private space mostly close to houses.	Public space concentrated inside the Inner Circuit, often the innermost parts leading to the open central space; intermediate space mostly outside the Outer Circuit or between the Circuits; private space mostly close to houses; zonal structure clearest in this Stage.
2	As the previous stage but with a stronger zonal structure.	As the previous stage but zonal structure less significant.
3	As Stage 1 but with a stronger zonal structure.	As the previous stage but area of public space moved closer to Inner Circuit.

Table 3. Summary of results of VGA Mean Depth and Connectivity analyses of all Stages of both Models, Nebelivka.

segments of similar spatial characteristics shared between the outer, the central and the inner zones.

There was an interesting dynamic between public and private space through time in the megasites. Initially public (unbuilt) space turned into private space through house-building but, once the house was burnt, it turned into an ancestral place which was, at the same time, a public space again where folk could meet and commemorate the people once living there. By contrast, there were two major spaces that remained public and with relatively easy access throughout the megasite occupation – the central empty area and the area between the two house circuits. Maintaining these public places was obviously important and impinging on that space at Maidanetske may be an indication of radical change in the perception of social space. The loss of the inner open (sacred?) area dramatically narrowed the possibilities for large-scale public assemblies, which was one of the reasons for the emergence of megasites in the first place. This is the kind of change at the level of the Big Other which, once introduced, may have contributed to the demise of the megasites, that in turn may have been a part of the decline of the Cucuteni-Trypillia network itself. To reiterate the main point, transformations occurred at the level of the *habitus* where social space was changing BUT not at the level of the Big Other, where the ancestral principles of concentricity, house circuits, inter-circuit space, empty central space were followed and allowed the interplay between public, private and ancestral places. The breakdown of those ancestral principles at Maidanetske marked the beginning of the challenges to the Big Other that ultimately led to the abandonment of the megasites.

Conclusions

In this chapter, I have suggested that we consider archaeological data sets as proxies for social change, with various advantages accruing to this procedure. I have used two examples of proxy data sets – Trypillia anthropomorphic figurines and house layouts at the Nebelivka megasite.[10] Both of these data sets form part of what I have defined as the Trypillia Big Other – the pre-eminent symbolic order that in Trypillian context was materialized in the figurines, the pottery and the houses. Although multiple changes took place, underpinned by different choices, agencies and successful or unsuccessful social negotiation, they could be absorbed by the core symbolic order. The Big Other was able to incorporate incised and painted decoration, stylized and realistic figurines and seemingly even scalar transformation.

The different material facets of the Big Other were so well integrated that Trypillia people were able to resist alternative world views for many centuries. The key element was a communitarian ideology inimical to personal or household accumulation. Moreover, the longer the Big Other developed, the fewer were the alternatives for most Trypillia communities.[11]

Overall, social practices involving figurines were consistent throughout the duration of the network, unaffected by excavation area or settlement size. If anything, the larger sites – the so-called megasites – had a lower than average consumption of figurines. The subset of realistic images within the figurine assemblage confirmed the overall pattern, suggesting a stable but also flexible Big Other. The explanations for the lower level of megasite deposition of figurines may well relate to the megasites' specific roles, as addressed in the three models of their functioning. For example, in the assembly and pilgrimage models (Champan and Gaydarska submitted; Nebbia et. Al 2018), visitors

10 Since a wiggle in the calibration curve prevents the development of an internal chronology for Nebelivka (Millard *et al.* 2019), the trajectory of house-building and burning has been modelled in three ways – two of which are presented here.

11 The TINA Principle – 'There Is No Alternative'.

may well have taken figurines made in their own settlements back to those settlements, now sanctified by the experience of participating in megasite ceremonies.

To return to the question of change, it seems that neither technological innovations nor environmental change[12] caused the abandonment of the megasite form but, rather, challenges to the Big Other which were manifested in breakdowns in the traditional use of social space. The abandonment of the key integrative element of the assembly house at Talianki megasite (Rassmann *et al.* 2016) and the invasion of the sacred inner open space – hitherto the heart of each megasite – by columns of radial streets at Majdanetske changed the way in which the megasites could operate – the social practices central to megasite lifeways. Fewer assembly houses meant the burden of communitarian ideology was shifted to dwelling houses, opening the door to the possibilities of household differentiation, perhaps even differential accumulation. The reduction of the sacred inner open space destroyed the potential for the massive assemblies which were key to such massive sites, forming another attack on the communitarian ideal and fragmenting social practices at the Majdanetske megasite. At the same time we see the internal weakening of the Big Other. There is also another challenge: the prolonged exposure to a different lifestyle that favours minimal settlement formalization but an investment in monumental burials. Ironically, Gimbutas may be proved right that the steppe nomad people put an end to the Cucuteni-Trypillia network – not with fire and sword as she thought but rather by challenging the core of the Cucuteni-Trypillia world view. In the Trypillia CII phase, the appearance of formal burials and cemeteries in the North Pontic zone resonate as a clear indication of changing world views, influenced by neighbouring networks dominated by the monumental mortuary zone.

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12 There is no evidence for environmental change in the middle part of the Nebelivka 1B core – the part coeval with the occupation of the megasite (Albert *et al.* 2019).

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Does the social field cause or accelerate social and cultural changes? The case of Eneolithic Cucuteni-Tripolye cultural complex

*Aleksandr Diachenko**

Abstract

This paper examines the relationship between social fields, population size, carrying capacity, migratory behaviour, social organization and cultural modifications of the Cucuteni-Tripolye complex with a focus on its component, the Western Tripolye culture between the Dniester and the Dnieper. The presented analysis questions the correlation between the peripheral location, migratory behaviour and (almost) unbounded possibility for territorial expansion as the main parameters of the social fields of the Cucuteni-Tripolye populations, major environmental shifts, economic and demographic transformations to the east of the Carpathians *c*.5000-3000/2950 BCE and major cultural transformations within the cultural complex. The related results are considered within a framework of the peripheral social and cultural landscapes.

Keywords: social fields, periphery, cultural transformations, migrations, Cucuteni-Tripolye cultural complex

Introduction

Introducing the term *habitus*, P. Bourdieu defined it as 'the past position in social structure, reproduction and structuring future' distinguishing the *hexis* and mental habits, schemes of perception, classification, appreciation, feeling, and action (Bourdieu 1977; 2000). The latter set is not exclusively shaped and shared by a single society, but is also framed by social fields of the large-scale population groups under the impact of similar factors (Kohl 2008). Arguing that the number of parameters making the social fields is significantly limited, this paper concerns the mental habits, schemes of perception, classification, appreciation, feeling, and action of the peripheral populations through the case study on Cucuteni-Tripolye populations of Eneolithic south-eastern Europe *c*.5000-3000/2950 BCE.

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Figure 1. The maximal territorial expand of the Cucuteni-Tripolye cultural complex.

Cucuteni-Tripolye social fields are considered according to the three parameters – the peripheral location, migratory behaviour and (almost) unbounded possibility for territorial expansion – which are assumed to frame the past position in social structure, reproduction and structuring future of these prehistoric populations. The following analysis questions the correlation between the listed parameters and 1) major environmental shifts, economic and demographic transformations to the east of the Carpathians *c*.5000-3000/2950 BCE, 2) major cultural transformations within the Cucuteni-Tripolye complex in the same time range, and 3) synthesizing the related results in a framework of the peripheral social and cultural landscapes. Let us, however, begin with the brief introduction of the cultural complex.

Cucuteni-Tripolye cultural complex: a brief overview

The Cucuteni-Tripolye cultural complex (hereinafter CTCC) was formed at the north-eastern periphery of the Neolithic and Eneolithic cultural complexes of the Balkans and Danube region, and more precisely in the Siret, Prut and Dniester river valleys *c*.5000-4800 BCE (Fig. 1). At the complex's maximum expansion, its westernmost border was located in the Carpathian Mountains, while the eastern bank of the River Dnieper marked its easternmost border. The northernmost sites were situated in the Ukrainian forest region, whereas the southernmost settlements and

cemeteries were located in the North Pontic region. Archaeological sites are mainly represented by settlements – cemeteries and isolated burials are not numerous and mostly represent the Late Tripolye (*e.g.* Kruts 1977; Patokova 1979).

The understanding of the spatial-cultural distribution of the Cucuteni-Tripolye has been refined. Romanian archaeologists view the Ariuşd assemblage in Transylvania as a separate culture. In Ukraine, the 'Tripolye' part of the cultural complex was divided into two cultures. Tsvek (2006) distinguished the 'Eastern Tripolye culture' (ETC), which includes the settlements with ceramics mostly characterized by incised ornamentation. For those settlements of the Tripolye complex characterized by painted ceramics, Ryzhov (2007; 2012) has proposed the use of the term 'Western Tripolye culture' (WTC). Hence the 'Cucuteni-Tripolye' is now understood as the 'Precucuteni-Ariuşd-Cucuteni-ETC-WTC' cultural complex. Cultures within the CTCC are subdivided into local groups (*e.g.* Ryzhov 2007).

One of the first periodizations of the Tripolye sites was advanced by Passek (1949) in the 1940s, identifying three distinct periods (with subsequent subdivisions): Early (A), Middle (B), and Late Tripolye (C). Dumitrescu (1963), basing his argument on ceramic seriations, proposed the separation of the Precucuteni and Cucuteni-Tripolye cultures within the same cultural complex, viewing the latter (Cucuteni-Tripolye) as a separate cultural entity. The development of Cucuteni was subdivided into periods 'A', 'AB', 'B', and Horodiştea-Folteşti type. Vinogradova (1983) separated the Tripolye BI-II period, which was assumed to be contemporaneous with Cucuteni AB. Tkachuk and Ryzhov, considering different issues with the transition from Tripolye CI to Tripolye CII (after Passek), used more neutral terms like 'late Tripolye CI – early Tripolye CII sites' or 'Tripolye CI-II' (Ryzhov 2007; 2012; Tkachuk 2005; 2011). To some extent, these neologisms were caused by different rates of development of the material culture in different regions of the CTCC.

Besides the geographical location and formation process, the peripheral position of the WTC and ETC is notable in the delay of development of material culture between the Cucuteni and Tripolye components of the cultural complex (*e.g.* Dumitrescu 1963; Mantu 1998; Ryzhov 2007; Tkachuk 2014). The synchronization of sites is often represented as Precucuteni = Tripolye A, Cucuteni A = Tripolye BI, Cucuteni AB = Tripolye BI-II, Cucuteni B = Tripolye BII and CI, Horodiştea-Folteşti = Tripolye CII. Meanwhile, relative and absolute chronology and mathematical simulations confirm the Tripolye delay in development relative to Cucuteni (*e.g.* Chapman and Gaydarska 2016; Lazarovici 2010; Ryzhov 2007). Moreover, the delay in development between the eastern and western parts of the WTC is estimated at 150-200 years (Diachenko and Menotti 2015). Table 1 presents the approximation for the later synchronization.

Spatio-demographic differences within the CTCC are also evident. Approximately a half of the known Cucuteni-Tripolye settlements are located in the territory of modern Romania and Moldova, while another half is located in modern Ukraine,

	Tripolye CII
Horodiştea-Folteşti	
	Tripolye BII and CI
Cucuteni B	
	Tripolye BI-II
Cucuteni AB	
	Tripolye BI
Cucuteni A	
	Tripolye A
Precucuteni	

Table 1. The approximation for synchronization of Cucuteni and Tripolye assemblages.

indicating the higher density of sites in the Cucuteni part of the cultural complex and the decrease in density of sites from the west to the east in its Tripolye part (*e.g.* Kruts 1993). The latter provided a possibility for migrations and decrease in the population pressure. At the same time, the west-east direction of migrations may be considered potentially preferable due to the high amount of no man's land and environmental conditions supporting the agricultural activities. The Paraneolithic sites synchronous with Tripolye settlements are evident only on the eastern bank of the Dnieper. However, even if we assume hunter-gatherer groups to the west of the Dnieper, one could argue exclusively for low-density dispersed populations. The northern direction of migrations probably met the concurrence of post-LBK communities partly inhabiting the Upper Dniester region and Volhyn (Kadrow 2013). Migration to the south-east, that is, into the steppes, required significant transformation of subsistence strategies and, from the middle of the 5th millennium BCE, could have met a concurrence from the local agro-pastoralist population (Anthony 2007; Dergachev 2007; cf. Rassamakin 2004; Manzura 2005). Well-developed typo-chronologies accompanied by the ethnographic analogies and radiocarbon dating led to the conclusion that a single settlement existed over a period of about 50 years (Markevich 1981; Kruts 1989; cf. Chapman and Gaydarska 2016; Müller *et al*. 2016). Intensive agriculture and availability of wood are assumed to be the main pushing factor for the population movement (Harper 2013; Kruts 1989). The listed factors predetermined migrations to the east along the forest-steppe zone.

How were the peripheral location, migratory behaviour and territorial expansion correlated with the major environmental shifts, economic and demographic transformations to the east of the Carpathians, *c*.5000-3000/2950 BCE? The following section addresses this issue.

Environment, economic and demographic transformations

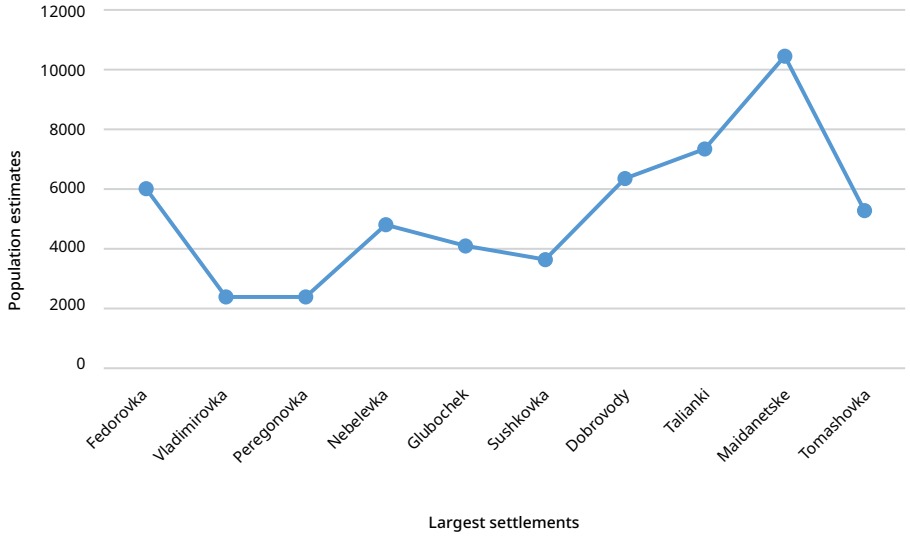
Periodization and chronology of the CTCC correlates with the chronology of major environmental changes. Precucuteni and Cucuteni AB1-2-Tripolye A (*c*.5000-4300 BCE), Cucuteni B2-Tripolye C1 (3800-3600 BCE) and Horodiştea-Folteşti-Tripolye CII/2 (3350-3000/2950 BCE) is associated with a more humid climate, while Cucuteni AB and B1-Tripolye BI, BI-II and BII, Cucuteni B3-Tripolye CI-II and CII are correlated with the more arid climate (Anthony 2007; Diachenko 2012; Harper 2016). Differences in spatio-demographic organization of the populations are also evident for the listed time ranges. Let us take a more precise look at the development of the CTCC.

Environment, economic and demographic transformations in the time span of 4300/4200-3800 BCE

Starting from 4300/4200, significant climate changes framed the economy and spatio-demographic organization of the populations of south-eastern Europe. Cold and arid years between 4120 and 4040 BCE were followed by the relatively long-lasting arid period dated to the time span of 3960-3821 BCE (Anthony 2007). Spatio-demographic transformations within the CTCC are also notable for the time span of 4300/4200-4100 BCE. If the sites dated to 5000-4300/4200 BCE were located in the river valleys, the set of settlements dated to 4300/4200-4100 BCE was located at high elevations. A number of those sites also had fortifications, that is to say, ramparts and ditches, while the number of weapons significantly increased (Dergachev 2007). The related expectation of military conflicts is usually linked with invasion from the steppes or tensions between different Cucuteni-Tripolye groups (*e.g.* Antony 2007; Dergachev 2007; Manzura 2005; Rassamakin 2004).

Besides the formation of the fortified sites, Cucuteni-Tripolye settlements significantly increased in size after 4300/4200 BCE (*e.g.* Shukurov and Videiko 2017; Videiko 2013). This indicates the economic transformations supporting the increase in population size and density. Changes in the topography of settlements and their size may be explained by the transition from horticulture in river valleys to field agriculture on elevated terraces (Bibikov 1965). This assumption is indirectly confirmed by technological changes. The decline of Danubian cultural complexes in the analysed period led to the reorientation of the Tripolye population from Danubian sources of copper to Tisza and Carpathian raw material. Moreover, if the Early Tripolye complexes mostly include copper ornaments, then numerous tools, including axes, represent the Middle Tripolye assortment of copper artefacts (Ryndina 2004). The new sets of tools ensured the possibility of wide colonization of the forest-steppe region of modern Ukraine to the west of the Dnieper.

Demographic growth expected from the economic achievements required spatial expansion, especially considering the aridification of the climate. During the time span between 4800 BCE and 4300/4200 BCE, demographic pressure in the Middle Dniester area was resolved by the migrations to the southern part of the Dniester and Southern Bug interfluve (see the location of sites in: Burdo 1989). However, the shift of the steppe-forest-steppe border in the northerly direction resulting from aridification caused the abandonment of the south-easterly direction of migrations



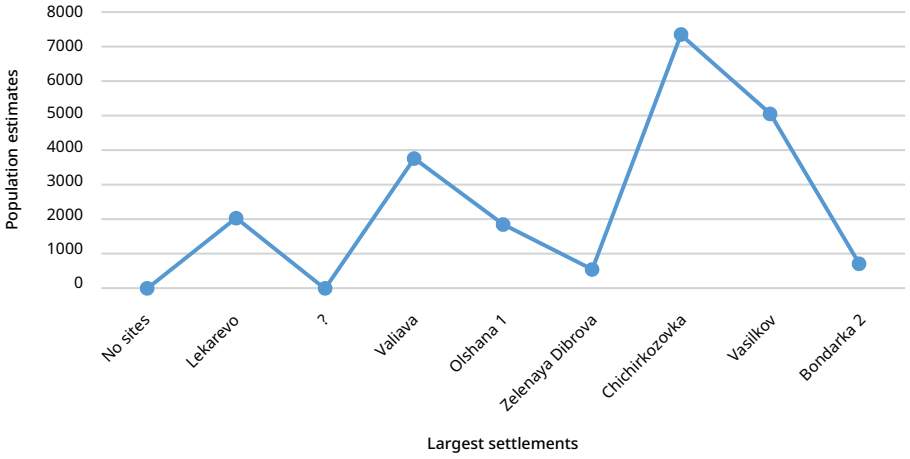


Figure 2. The size of the largest settlements of the Western Tripolye culture in the Southern Bug and Dnieper interfluve. a – western part of the region, b – eastern part of the region (based on Chapman and Gaydarska 2016; Diachenko and Menotti 2012; Rassmann 2014; Ohlrau 2015).

and stimulated the long-distance migrations from the Dniester to the east of the Southern Bug.

During the time span of 4100-3800 BCE, migratory behaviour was shaped into the formation of large WTC settlements (also known as mega-sites or giant-settlements) between the Southern Bug and Dnieper (*e.g.* Menotti and Korvin-Piotrovskij 2012; Müller *et al.* 2016). The resettling of the WTC populations in the western part of the Southern Bug-Dnieper interfluve runs as follows (the order expressing a chronology): Fedorovka – Vladimirovka – Peregonovka – Nebelevka – Glybochok – Sushkovka (Fig. 2), while the resettling of the WTC populations in the eastern part of this region runs as follows: Lekarevo (synchronous with Vladimirovka) – ? – Valiava – Olshana 1 (Diachenko and Menotti 2012). The large site Fedorovka and medium-sized site Lekarevo indicate the initial migration of the new population into the microregion. The abnormally high increase in population reflected in the formation of Nebelivka and Valiava suggests the migration of the new population. This is confirmed by the dramatic changes in the ceramic complexes of these sites noted by Ryzhov (2007; 2012). Settlements that chronologically replace the largest sites associated with migrations have smaller sizes, which marks colonization of the microregions.

Environment, economic and demographic transformations in the time span of 3800-3600 BCE

The short period of humidization between 3800 and 3650/3600 BCE is notable by the overall decrease in migrations within the Tripolye area, except for the beginning of this time range characterized by the new migration from the Dniester region to the Southern Bug and Dnieper interfluve and resulting in the formation of the mega-sites Dobrovody and Chichirkozovka (Diachenko and Menotti 2012). Meanwhile, the largest settlements of the western part of the Southern Bug and Dnieper interfluve, which are dated to this time range, that is, Dobrovody, Talianki and Maidanetske are characterized by a trend different from the previous one of demographic development (Fig. 2). If Talianki and Dobrovody demonstrate the natural population growth at 0.003 from the latter to the former, Maidanestke indicates a new migration from the west, which is visible in an abnormally high increase in the number of dwellings and numerous ceramics in the Chechelnitskaya group pottery style (*e.g.* Diachenko and Menotti 2012; Ryzhov 2007; Shmaglij and Videiko 2003; Tkachuk 2005; 2008).

Besides the climate change supporting the increase in agricultural productivity, the noted trend in spatio-demographic organization may be explained by technological innovations and, more precisely, the widespread introduction of sledges. Clay models of this mode of transport are mostly typical for the Tomashovskaya group of the WTC (Müller 2016).

It should be noted that populations controlled their size at *c.*40% of carrying capacity and therefore demographic pressure should not be directly viewed as increasing to the maximum population size that may be maintained within an area. Stabilization in growth was achieved through the migratory behaviour that suggests complex spatio-demographic mechanisms (Diachenko and Zubrow 2015). This includes both the long-distance migrations and the formation of small villages in the hinterland of the mega-sites. Hence the three-tiered settlement size hierarchy in the Southern Bug and Dnieper interfluve demonstrates a complex demographic behaviour rather than directly reflects any social hierarchy. Moreover, different types of social organization could 'cover' the deep non-linear demographic development (Hofmann *et al.* 2016; Diachenko and Zubrow 2015; submitted). This conclusion finds an agreement with the ideas of Feinman (2013), which have shown quite similar trajectories in the correlation between the population size and autocratic or collective social organization. Population size appears to be a weak proxy for the reconstruction of social organization, because certain population estimates may

correspond to its various forms. Different understanding of the socio-political organization of the Tripolye populations in the Southern Bug and Dnieper is rather discussed on a scale of arguments than a scale of direct evidence (see Gaydarska 2016; Menotti and Korvin-Piotrovskiy 2012; Müller *et al.* 2016; Ohlrau 2015; Videiko 2013). Since the recent simulations have shown stabilization of population much below carrying capacity, we may also argue for the weak correlation between population pressure and technological changes.

Environmental, economic and demographic transformations in the time span of 3600-3000/2950 BCE

A new period of aridization and deforestation is notable for the time frame of 3650/3600-3400 BCE. Probably, these environmental shifts were caused by both the climate change and extensive agricultural activities of the previous centuries. Economic response to the environmental shifts in south-eastern Europe was found in the increase in stockbreeding, which is demonstrated by the Baden complex and, after 3350 BCE, the Funnel Beaker-Baden horizon in south-eastern Poland and Cucuteni-Tripolye to the east of the Carpathians (e.g. Kruk and Milisauskas 2018).

Tripolye populations of the time span of 3650/3600-4300 BCE responded to environmental shifts in their usual way. Populations of the Bryzenskaya group of the WTC migrated to the western Volhyn and Southern Bug and Dnieper interfluve from the Middle Dniester region (*e.g.* Ryzhov 2007; Tkachuk 2014). In the Southern Bug and Dnieper interfluve, this migration resulted in the formation of the Kosnovskaya group mega-sites after a short chronological hiatus following the large settlements of the Tomashovskaya group (Kruts 1989). The ETC populations crossed the Dnieper and settled on its eastern bank (Kruts 1977; Tsvek 2006).

Changes in subsistence strategies are also notable for the time range of 3650/3600-3000/2950 BCE. Deforestation increased the importance of sheep and goats in European economies, in both the steppe and forest-steppe (Dergachev 2012). The bones of sheep and goats dominate the assemblages from Late Tripolye settlements located in different regions, for example Sverdlikovo in the Southern Bug and Dnieper interfluve and Chapaevka in the Middle Dnieper region (Kruts 2002; Zhuravlev 2008). Most probably further success of the economic shifts was ensured by humidization of the climate after 3400-3350 BCE. This even led to the colonization of the steppes in the south-western part of the Black Sea area by the populations of the Usatovskaya group of the WTC.

According to Bunyatyan (2003), the contradiction between the increased mobile stockbreeding and sedentary agriculture could be resolved by the territorial determination of these activities and subdivision of labour within the community. The stockbreeding component made the economy unstable, while at the same time allowing the accumulation of wealth – through the herd and its products (Pipes *et al.* 2013; Sherratt 1981). The economic and demographic risks for the populations could be resolved through the constant increase in economic potential (Bunyatyan 2003).

The spatial distribution of the fortified Horodiştea-Folteşti-Tripolye CII settlements notably corresponds to the proportion of sheep and goats in herds, allowing for an assumption regarding the similar locations of wealth and fortifications. According to Dergachev (2007), the ratio of fortified and unfortified settlements in the northern part of the Prut and Dniester region and Volhyn is calculated at 1:3.1. Sheep and goats predominated in the former region and reached second place after cattle in the latter area; the corresponding values are 57% and 28% (Kruts 2002). The proportion of sheep and goats in the Middle Dnieper region, estimated to be 37%, was even greater than in Volhyn (Kruts 2002).

Following the concept of Kristiansen and Earle, the economic transformations in the CTCC after *c.*3400 BCE were most likely accompanied by the transition from cen-

tralized chiefdoms to dispersed chiefdoms (see above whether the former were the case). Social stratification is confirmed by the data from cemeteries (*e.g.* Dergachev 1978; Kolesnikov 1993). The Late Tripolye chiefs could be responsible for the organization of community labour related to agricultural activities, control over pastures and control over the interregional prestige exchange (Earle and Kristiansen 2010). Commodities made of wool could be also involved in the exchange system (Earle and Kristiansen 2010; Pipers *et al.* 2013). The economic reality of semi-autonomous households resulting from the division of labour, which accompanied the increase in the transhumance component of the economy, contradicted the more centralized socio-political organization based on the agglomeration of people focused on agriculture. Decentralized staple production and a network-based exchange system made political control over large areas impossible (Earle and Kristiansen 2010). This could be reflected in the transformation of the spatio-demographic organization of the Tripolye CII/2 populations. Settlements were significantly reduced in size and population respectively. The new economic reality did not leave place for the mega-sites (Diachenko 2016).

How did the peripheral location, migratory behaviour and (almost) unbounded possibility for territorial expansion frame the development of material culture? The following section considers this issue, focusing on the WTC.

Major cultural transformations within the Cucuteni-Tripolye complex

Ceramics is the most numerous category of records at the Cucuteni-Tripolye sites. Pottery forms and ornamentation styles are not only a good marker of the culture changes over time, but also a good indicator of the interactions between 'Tripolians' and their neighbours. Hence the issue of cultural transformations within the cultural complex has two sides, its internal development and the adoption of influences from outside. Let us consider these aspects more precisely.

WTC ceramics: the internal development

The most general trends in the development of the WTC pottery assemblages may be traced through consideration of its local groups. This approach is justified by the following: despite the 'culture history terminology', these taxonomic units are the outcomes of a statistically measured degree of similarity in material culture (Dergachev 1980; Ryzhov 2007), while the site locations strongly correlate with their attribution to particular local groups.

Based on the degree of similarity between the ceramic assemblages, the CTCC sites are grouped into types. Several types of sites form local groups, which, considering the transformations in material culture over time, are combined into 'genetic lines'. 'Genetic lines' form five cultures of cultural complex (Ryzhov 2007). It should be noted that, in introducing the term 'genetic lines', Dergachev (1980) meant nothing but the evolutionary trajectory of material culture that characterizes the development of a certain population group over time. The time span and area increase along this taxonomic hierarchy, while the differences in material culture grow. Meanwhile, Western readers may be misinformed by papers that identify some groups based upon principally different criteria. For instance, the Northern group and Middle Dniester groups of the Late Tripolye identified by Movsha (1971) are not recognized by other experts anymore. The so-called Upper-Dniester group was identified by Konoplia based on the location of sites within a given area (Vasylenko and Konoplia 1985), and labelled a 'regional group' instead of a 'local group' by Kruts

and Ryzhov. In fact, this is a set of sites that belong to different local groups referring to different times (Kruts and Ryzhov 1997).

The aforementioned taxonomy, which is exclusively based on studies in material culture, is correlated with commonly accepted scales of spatial analysis. CTCC is associated with supraregions; cultures, 'genetic lines' and local groups are correlated with, respectively, macro-regions, regions and micro-regions (Dergachev 1980; Ryzhov 2012; Tsvek 2006), while types of sites probably correspond to spatial variations (Diachenko 2012; Ryzhov 2015). The latter may be found within local groups according to the same principles as those used to identify local groups within cultures.

At first glance, the correlation between the number of synchronous local groups can be explained by the 'isolation by distance principle' suggested by Shennan and co-authors (2015). Like numerous spatial models, it considers distance to be the primary parameter for reducing the intensity of interactions between population groups and hence decreasing the similarity in material assemblages (see Nakoinz and Knitter 2016 for the most recent overview). Meanwhile, is it in the case of the WTC?

Figure 3 graphically represents the change in the number of WTC local groups which are synchronous with each other over time (these data are summarized and analysed in Diachenko and Sobkowiak-Tabaka, submitted). The time span of 4300/4200-3000/2900 BCE was divided into periods of 200 years for the purposes of this analysis. Due to the limited knowledge of material assemblages of these sites, distinction of a particular group is assumed to be achieved in further studies (Ryzhov, personal comment). Only the local groups distinguished by the statistical approach suggested by Dergachev (1980) and Ryzhov (2007) were included in the analysis. The resultant graph is relatively close to a sigmoid shape (Fig. 3).

The number of local groups during the initial 400 years of the development of the WTC shows a good correlation with the isolation by distance principle, because the number of local groups increases with the significant increase in the occupied area. The following 200 years of the spatial increase and cultural dissimilarity represent a weak correlation between the territory and number of local groups. Spatial expansion is mainly associated with the migration of Nebelevskaya group populations to the east (Ryzhov 1993), while the number of local groups in general continues its relatively rapid growth (Fig. 3).

The change in the number of local groups during the following three time spans finds a weak correlation with the isolation by distance principle. Any significant spatial growth of the culture is not noted for the time of its highest cultural diversity, while the territorial increase during the last two time spans corresponds to the decrease in the number of local groups. Moreover, the Tripolye CII/2 period, which

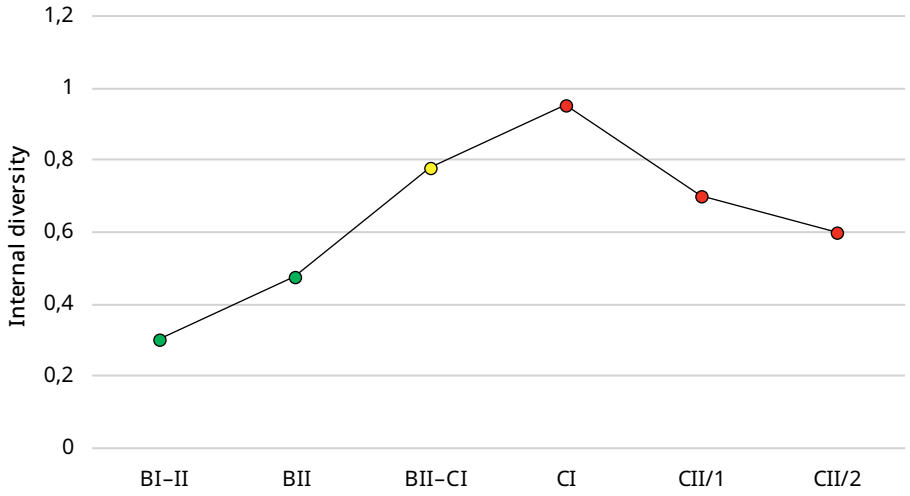


Figure 3. Territorial expand and cultural diversity of the Western Tripolye culture (based on Ryzhov 2007; Tkachuk 2005). Green, yellow and red circles represent, respectively, the strong and weak correlation, and the lack of correlation between the increase in territory and number of local groups.

is associated with the highest spatial increase in the WTC, is also characterized by the most rapid decrease in the number of local groups (Fig. 3). The level of similarity in ceramic assemblages of this time span allowed Dergachev (1980) to argue for the formation of the 'common Late Tripolye horizon'.

The observed trends fit the model which was recently developed by Drost and Vander Linden by inclusion of the waves of diffusion in Axelrod's (1997) earlier approach. Their model represents the sigmoid-shaped cultural behaviour resulting mainly from the population size and its spatial structure (Drost and Vander Linden 2018, Fig. 5). A similar explanation for these trends in spatial and cultural development may be found within the information theory. According to the latter approach, the number of synchronous local groups is considered the representation of the number of states of the WTC as a system, while both the changes in cultural diversity and territorial expanse are considered immanent properties of culture. This allows the conclusion on independence of the most general trends of cultural development from any external factors (Diachenko and Sobkowiak-Tabaka, submitted). However, how do the influences from neighbouring cultural complexes correlate with the economic and demographic development of the supraregion?

WTC ceramics: the external influences

Similarly to the ceramics of the vast majority of archaeological cultures, the WTC pottery styles indicate more intensive or less intensive influences from outside. Meanwhile, two periods demonstrate the significant impact from outside. These are the end of Tripolye BI-Tripolye BI-II and Tripolye CII/2 (Videiko 2008). The first of these cultural transformations is associated with the spread of the Tiszapolgár culture and the notable link between the reorientation of Tripolye metallurgy and the related sources of copper (Tkachuk 2007). The second indicates Baden influences on Tripolye pottery styles, manifested by, among other things, the widespread corded ornamentation of pottery (*e.g.* Rybicka 2017).

Both cases strongly link the introduction of economic advances to Tripolye, which had already spread to the west of the CTCC. Similarly to the decline of the Soviet Union, when the example of the more effective 'Western' economy also made 'Western' movies, music, clothes, and haircuts prestigious, the analysed modifications of Tripolye pottery style probably indicate the adoption of cultural elements following the adoption of economic advances or related technological innovations. It should, however, be noted that Tripolye traditions as well as the post-Soviet culture were not absolutely 'Westernized' as a result of the introduction of some cultural elements from outside (Diachenko 2016).

Conclusion and discussion: peripheral social and cultural landscapes

Analysis of the major environmental shifts, economic and demographic transformations to the east of the Carpathians *c*.5000-3000/2950 BCE and major cultural transformations within the Cucuteni-Tripolye complex in the same time span in their relation to the peripheral location, migratory behaviour and almost unlimited possibility for territorial expansion have shown a limited number of correlations.

Demographic increase expectedly followed technological and economic innovations, most of which were probably introduced from the populations of neighbouring cultural units. The migrations and territorial expanse of the CTCC populations find a strong correlation with the major environmental shifts allowing the populations to avoid significant demographic stresses, which is confirmed by the stabi-

lization of population growth far below the carrying capacity (*e.g.* Diachenko and Zubrow 2015; Harper 2016).

Climate change, weak population pressure and local technological advances such as the widespread introduction of sledges seem to be a good explanation for framing the past position in social structure and reproduction, but not structuring the future. The latter social transformations were impacted rather by external influences. Internal cultural development follows the complex trends, which appear to be independent of major environmental shifts, economic and demographic transformations. At the same time, significant cultural transformations were caused by the introduction of the traditions of neighbours following the related technological advances and economic innovations.

The presented analysis considers the 'periphery' exclusively from the perspective of geographical location. Meanwhile, its connotation is much wider and deeper. It assumes the delay in economic, social and cultural development in comparison with 'centres' and the one-way flow of major innovations from the latter to the former. Accompanied by the migratory behaviour as a significant component of social fields and (almost) unbounded possibility for territorial expansion, the peripheral location of the CTCC provoked a certain inertia in its development, allowing the replacement of intensification by continuity of the traditional (past) social structures within the increasing territory (Masson 1990; Saiko 1990). Intriguingly, these inertial processes appear to be scale-invariant. For instance, the delay in Tripolye pottery styles in relation to Cucuteni ceramics is notable along with the delay in development of the ETC in comparison to the WTC and the eastern part of the WTC in relation to its western part. Considering the appearance of significant economic and cultural advances among populations of the peripheral cultural units as the outcome of external influences, we may underline the openness to innovations as one of the major parameters controlling the rates of development and hence the *habitus* and social fields of such societies structuring their future. In this respect, social fields accelerate social and cultural changes at the periphery, but do not cause them.

It should, however, be noted that the specific, or even unique, forms of spatio-demographic organization of the peripheral populations should not be ignored. This notion may be exemplified by the WTC mega-sites. Taking the 'shapes' of urban development, the Tripolye giant settlements resulted from migratory behaviour. This reminds us of different underlining processes, which cause the formation of similar 'forms' in central and peripheral areas.

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The Maykop legacy- new social practice and new technologies in the 4th millennium BCE in the North Caucasus

*Sabine Reinhold**

Abstract

The last decade has opened up new advances addressing the fundamental transformations societies underwent at the transition from Neolithic to Bronze Age cultural systems. A transition once thought principally brought about by the use of new materials has revealed a whole spectrum of crucial shifts in technology, economic practices, social organization and probably belief systems.

The North Caucasus was one of the hotspots of new technologies that were developed in the 4th millennium BCE. Particularly the Early Bronze Age Maykop Culture was shaped by the co-emergence of new techniques and new social practices. During this epoch a new social transcript emerged based on asymmetric power relations. Central to this was a new way of visualizing death with huge monuments and the categorization of the deceased using material culture. The eponymous Maykop mound 'Oshad', one of the key archaeological complexes of Eurasian prehistory, integrates both aspects and will thus be central to the evaluation of social practices in the formation of a new hierarchical social order.

Keywords: innovation, Bronze Age, burial mounds, building, social practice

Introduction

In the introduction to the present essays on the impact of technology in the formation and transformation of social collectives, the question was raised as to what degree technologies have the potential to trigger social change. Societies are composed from various groupings with different conceptions and perceptions about how common interest is organized and translated into everyday practice. The anthropologist James C. Scott coined the term 'transcripts' (Scott 1990) for this complex set of issues. Some of them are 'public', that is to say, represent officially appropriate conventions; some are 'hidden' and related rather to private designs, sometimes in opposition to authorities or majorities. These transcripts are the social field from where individu-

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als and collectives draw legitimacy. To dominate the 'public' transcript therefore is an important factor in social competition and social change starts with conceptual shifts in the transcripts of a society.

Changes in technology have great potential to impact on social systems when generating disturbance in balanced webs of production and consumption. New products or new production techniques not only call into question handed-down knowledge, but also challenge socially appropriate forms of practice (Bloch 1967). Social transformation might result from new or adapted technologies offering new arenas for the use or the display of material culture. They can, as well create new webs of interaction, open new fields of competition. Social change, on the other hand, might conversely act as a trigger for technological change when new social or demographic configurations require new forms of material culture (Chapman and Gaydarska 2011, 36-37). Epochs with a tangible rise in new technologies have therefore been frequently linked with periods of social crisis, from where new cultural configurations arise (Mensch 1975).

Technology is the focal point of an ever-growing theoretical debate in archaeology on the role of material culture – that is, objects produced and used by humans – in the shaping of social relations (Dobres 2000; Hicks and Beaudry 2010; Stockhammer 2017 for an overview). Understanding material culture in its multifaceted nature not as a passive reflection, but as an active agent in the creation of inseparable and mutually constitutive social identities, persons and things is the legacy of post-processual approaches (*e.g.* Miller 1987; Meskell 1999; Fowler 2004; Miller 2005 and others). They opposed older essentialist notions of material culture reflecting directly ethnicity, cultural affiliation, social status or interaction. Based on theoretical debates of social practice (Bourdieu 1979; Giddens 1984), the concept of agency – that is to say, the means and constituents for individuals and collectives to engage with the world – became central to this debate (Dobres and Robb 2000).

In this essay I will discuss a case study in which the co-emergence of new technologies and new social practices provide an opportunity to investigate the interrelation of technological innovation and the formation of a new social or 'public' transcript. This will lead us to the North Caucasus Maykop phenomenon (or Culture) in the 4th millennium BCE. Grave assemblages of this epoch combine first-time ostentatious material culture in graves with a new form of highly visible funerary memorials, namely huge burial mounds. They offer an opportunity to inquire into the relevance of materiality in the display of social power and discuss the new types of monuments as focal points within the construction of social networks and related identities (Schülke 2016, 327-328).

Maykop is the first cultural formation to occupy the North Caucasian foothills with more than a handful of dispersed campsites and villages. The monuments belonging to the first third of the 4th millennium BCE – that is, the initial Maykop phase – represent not only a new social and cultural framework, but they are also a manifestation of an epoch of colonization of a widely pristine landscape.

An important aspect in this process is a new way of visualizing death with huge monuments and the presentation of accumulated artefacts at elaborate funerals. Most of the objects are produced using techniques unprecedented in this particular region and are related among others to a new level of metallurgy (Hansen and Helwing 2016; Helwing 2016). This includes a new set of metal tools and objects of precious metals including metal vessels, affecting a whole range of production processes through the implementation of these new tools. Technological change is evident also in other elements of material culture, such as ceramic or stone tools, likewise. These objects are among the earliest representations of their respective technologies and hint at the existence of a highly innovative environment in this epoch and region (Hansen 2011). But this essay is *not* about the technological aspects of this new group of objects. Detailed studies of technological practice have only

been started in Maykop archaeology (Hamon 2007; Iserlis 2019), which means it is too early to debate the wider social dimensions of production at the moment. I will therefore not address the production of the respective objects and their technological fields, but rather the 'production' of object assemblages (*i.e.* graves) through the use of things (*i.e.* grave goods) and the construction of corresponding contexts (*i.e.* burial mounds) as a medium of social integration. For this, I will adopt the idea of new types of 'persons' associated with new technologies, as outlined by Chapman and Gaydarska (2007; 2011), to reflect on old and new activities endorsing these funeral assemblages. This idea relates activities and social fields to persons – the production of ceramic vessels to 'potters', procuring of ore to 'miners', or manufacture of gold vessels to 'goldsmiths'–and discusses the role of embodied skills and knowledge which are produced and reproduced on different levels of society, forming individuals into larger collectives. In this model, social transformation results from tensions between different affordances of producing and consuming groups, interactions between different household levels and communities based on a concept of relational personhood and community structure (Chapman and Gaydarska 2007, 181-197; 2011).

Habitus, identity and memory: the formation of social collectives

'The key premise is that things embody cultural ideas and people's identities (and bodies) are shaped as they produce, experience, exchange, and consume those things' (Fowler 2010, 359). This introductory quote from Chris Fowler's essay on the relation of material culture and personhood points to two aspects that will be discussed below – namely, social practices and identities.

Pierre Bourdieu's (1979) 'theory of practice' has been one of the key concepts in this line of debate in archaeology since the late 1980s (Miller 1987; Dobres 2000, 137-138; Miller 2005, 6-7). His concept of *habitus* relates to the performance and repetition of socially approved practices as a cornerstone of social reproduction. Acquired during socialization and cemented in body and mind through learning, cultural norms, behavioral dispositions and their requirements become unconscious practices and generally remain unquestioned. For the study of materiality, the practical approach was decisive. 'Bourdieu emphasized the categories, orders, and placement of objects … Each order was argued to be homologous with other orders such as gender, or social hierarchy, and… emerged as a second nature or habitus' (Miller 2005, 6). The notion of *material habitus* (Meskell 2005, 3) entered the theory of technology due to the discursive and habitual nature of production processes in traditional societies (Dobres 2000, 137). The *chaîne opératoire* – that is to say, '… the technical chain of sequential material operations by which natural resources are transformed into cultural commodities' (Dobres 2000, 154), use, reuse and finally disposal – as well as the perception of technology as flexible networks with human and non-human nodes is the conceptual framework used in studying technology from this perspective. It is widely applied in the manufacture of commodities and other goods, but the *chaîne opératoire* structured by habitual performance following appropriate orders to negotiate social relations is similarly applicable to the production of artefact assemblages or the construction of buildings and monuments (*e.g.* Schülke 2016, 327). The inherent spatial order of material culture assemblages associated with social categories such as gender or social status offers arguments reconstructing them from recurring patterns of artefacts in archaeological assemblages (for burials: Ekengren 2013; Rebay-Salisbury 2016, 89-94).

Habitus is, however, a social totality and regulates not only the material aspects associated with an individual's lifestyle but similarly language, conduct, dress,

taste, and so on. As *habitus* is referential to other group members, social practice becomes the field in which expected behaviors are played out in order to maintain social positions. This rather conservative impetus operates against social change, even more so when *habitus* is condensed into *doxa*, when '… in the extreme case … there is a quasi-perfect correspondence between the objective order and the subjective principles of organization (as in ancient societies)' (Bourdieu 1979, 325). In this sense, Bourdieu's concept of *habitus* and *doxa* is a constraint within a debate on change when looking at more general aspects of social interaction.

The source used to study the formation and transformation of Maykop social organization and its materiality is graves. Even more pointedly than material culture, burial complexes have long been regarded as offering an unbiased reflection of the social identities of prehistoric people (*e.g.* Saxe 1970; for Maykop: Korenevsky 2004, 78-82). Post-processual mortuary analysis shifted the perspective here as well towards a focus on the performative aspects of funeral rituals as an important social arena (*e.g.* Parker Pearson 1999; Robb 2007; Ekengren 2013; Rebay-Salisbury 2016; Schülke 2016).

Graves are the remains of funeral processes incorporating aspects of personal mourning and social reconfiguration of the community after the loss of a member. They encompass equally the deceased in his/her physical remains and the person that once was. Funerals thus reconfigure the identities of the dead and the living through a complex system of separation and integration and the associated rituals (Van Gennep 1999). This designates the funeral as a principal arena of negotiating and renegotiating social positions and as a stage to act out social roles among the participants (Robb 2007; Jindra and Noret 2013; Rebay-Salisbury 2016, 14-15, 33-34). 'Preparing' the context for a grave, however, cannot follow mere habitual practice, but must also involve carefully chosen and intended activities to guarantee an appropriate changeover (Härke 1993). Nevertheless, *habitus* and agency of the different participants, including the deceased, might have been influential in the creation of specific assemblages, which ultimately define the archaeological record (Reinhold 2012, 83-85; Schreg *et al.* 2013). The materiality involved is *de facto* within the responsibilities of the collectives that perform the funeral and the related activities. It reflects and shapes equally the burial communities' capacities and cosmological construction of death.

On the other hand, funerals transfer the deceased and their social roles into another, immaterial form of existence. The new existence can be constructed differently: as powerful ancestors and social focal points, as beneficial or dangerous spirits, or as immaterial souls dependent on the care of their descendants (Scurlock 1995; Robb 2013, 451-453). The effectiveness of the constructs relies, however, on the remembrance of the survivors. In the long run, personal memory dovetails collective and cultural memories, in which the actual facts – a deceased person, a relevant moment in life or certain social configurations – fade more and more into mythical distance (Halbwachs 1985, 203-242). Rituals of remembrance and mnemonic auxiliaries are intended to work against oblivion and are important for the confirmation of appropriate conduct and practice (Assmann 1992, 52-56). In this way, burial monuments are important media to anchor remembrance of real or mythical persons at certain locations and integrate the deceased as active components into a social landscape (Furholt 2012; Schülke 2016 for a theoretical outline). The physical participation in rituals associated with the burials and the construction of memorials embeds in memory not only the principal motive for building but the collective experience as well (Connerton 1995; Cohen 2005, 45-98). Building becomes therefore another playground for social encounter. The building process as well as subsequent rituals can even be disconnected from the actual funeral and can include large participating parties (Furholt 2012, 118; Jindra and Noret 2013). Nevertheless, both are extraordinary activities, wherein people with different back-

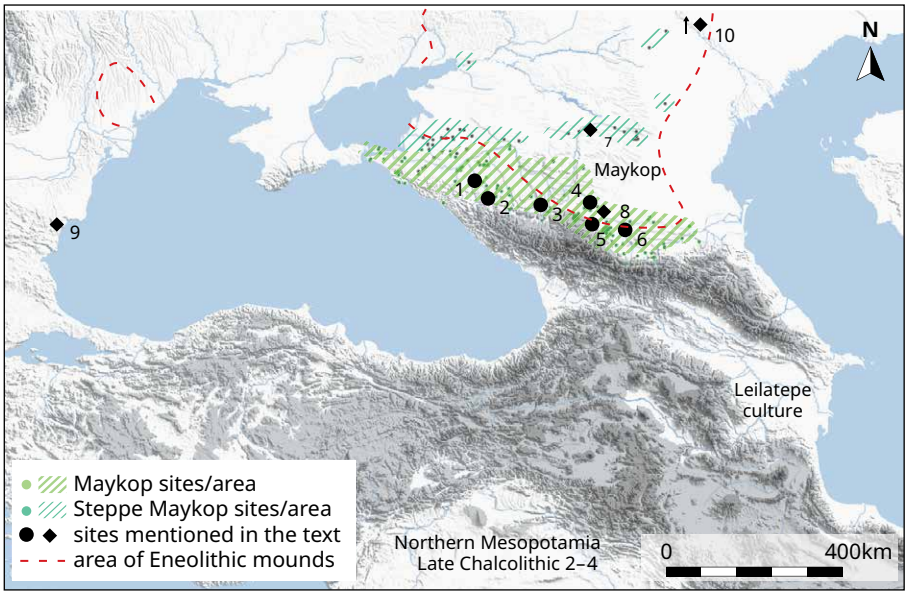


Figure 1. Maykop sites and related cultures in the Caucasus. Maykop sites – 1 Maykop-Oshad; 2 Klady; 3 Ust-Dzheguta; 4 Marinskaya; 5 Nalchik; 6 Brut & Zamankul; Eneolithic sites – 7 Aygursky 2; 8 Progress 2; 9 Varna; 10 Khvalynsk.

grounds, skills and knowledge are forged together in joint efforts (Holst and Rassmussen 2012, 270-275; Reinhold 2017, 177-180).

Habitus, the construction of personal and collective identity in a fluid process of interaction and the construction of memory as a performative process are key elements in the formation and transformation of social collectives. Materiality is integrated in most of these performances, starting from the fact that activities are performed by human bodies and reflect equally the social integration of producers and consumers. The social transcripts of the societies of the 5th and 4th millennia BCE in the North Caucasus represent profound change which was associated with a general reconfiguration of material culture at most levels of everyday reality.

The Maykop phenomenon: geographical outline, chronological and archaeological setting

The Maykop phenomenon is an archaeological culture spanning throughout major parts of the 4th millennium BCE. It is located in the North Caucasus, chiefly in the foothills and the piedmont steppe (Kohl 2009; Kohl and Trifonov 2015) (Fig. 1).

The area is situated at the interface of different environmental ecoregions, more precisely the mountainous zone of the Caucasus and its southern neighbours and the Eurasian steppe belt. Along this divide runs a substantial rupture line of cultures and populations affiliated with either the northern or the southern cultural spheres, particularly those of Northern Mesopotamia (Lyonnet 2007; Reinhold *et al.* 2017, 79-80; Wang *et al.* 2019). More than 50 radiocarbon dates from burials and settlement contexts date Maykop sites between 3900/3800 and 3000/2900 cal BCE. A tripartite development divided into early, middle, and late is implied by the radiocarbon dates, but for the actual argument a coarser division into an earlier and a later phase is more eligible. Maykop partly overlaps with the Trypillia Culture in the Pontic area and can be correlated with Late Chalcolithic 2-4 in Northern Mesopotamia (Helwing 2016). During the last decade, a new cultural formation named after the eponymous site of Leilatepe was outlined in Azerbaijan, which in many ways presents a link between Northern Mesopotamia and the Caucasus (Museibli 2015).

Like other archaeological cultures, the Maykop Culture was first defined with a set of 'typical' artefacts and archaeological features, such as burial mounds and

ceramic types and the like, suggesting a homogeneous and coherent society (*e.g.* Munchaev 1975; Korenevsky 2004). Recent debates on supraregional phenomena offer alternative models to such a traditional understanding, largely based on network approaches (Frachetti 2012; Helwing 2016, 54-56). The Maykop phenomenon can in this way be understood as a network of highly integrated local clusters linked by relations probably operated by more mobile parts of the communities, the elites or via recurrent personal or collective encounters. Maykop sites are distributed widely across the area of the North Caucasus foothills and the neighbouring steppe. Settlements, burials and ritual sites are present, and Maykop is regarded as a sedentary, agropastoral society (Korenevsky 2004, 71-77; Kohl and Trifonov 2015). Settlements and cemetery sites cluster in microregions with intermediate zones of uncertain occupation. Regardless of this, the material remains found in Maykop graves and settlements share considerable similarities. The pottery in particular is typologically and morphologically easily recognizable. This might be a superficial impression, as preliminary technological studies reveal differences in production at individual sites (Iserlis 2019).

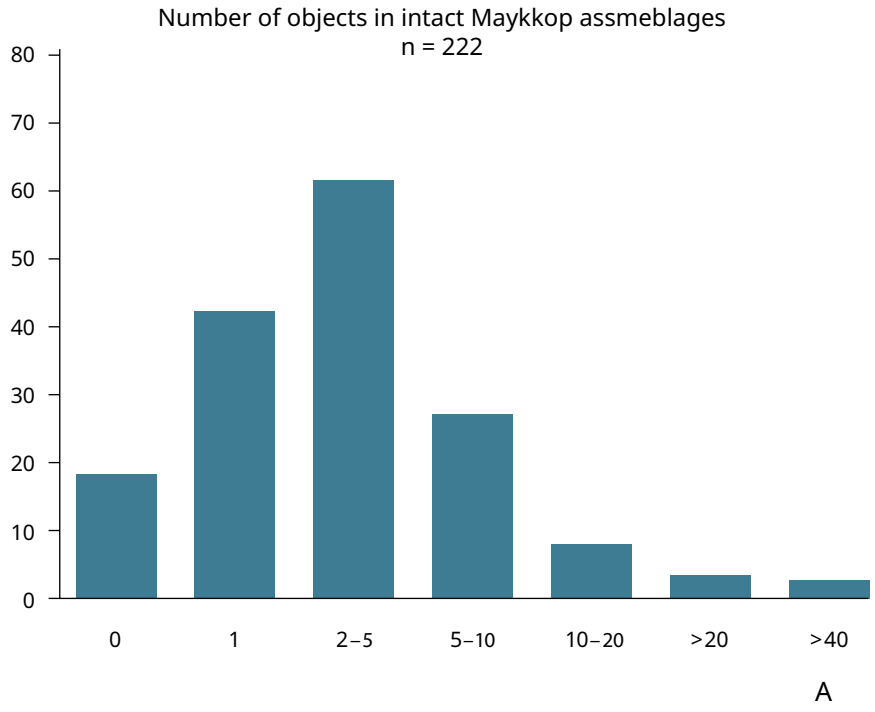
Maykop is the first epoch in which growing populations began permanently settling in large areas of the North Caucasus. Neolithic occupations are practically unknown, and an occupation of the foothills by small groups from the southern flank of the mountains only started during the mid-5t^{h} millennium BCE (Nekhaev 1992; Trifonov 2009). They established the first agropastoral settlements based on mixed agriculture with a pronounced rearing of pigs in the forests that advanced during the early Sub-Boreal period (Hambleton and Maltby 2016). The Darkveti-Meshoko Eneolithic groups of the 5th millennium BCE, however, remained small in numbers and were limited to the foothill zone (Reinhold 2019).

The steppe zone was frequented concurrently by other groups with a northern, steppe affiliation (Korenevsky 2012). They are related to a wider phenomenon of Eneolithic cultures in the steppe between the Lower Danube and the Middle Volga, which are characterized by inhumations of single or couples of individuals with specific burial practices, accompanied by grave goods (Govedarica 2004). Likewise, small in numbers, they left the first shallow burial mounds in the region (Fig. 1; 2, 1-6). Both groups did not interact much and remained likewise biologically separated (Wang *et al.* 2019). These groups persisted in the steppe zone during the 4th millennium BCE, finally merging into early Yamnaya formations by the late 3rd millennium BCE.

The first tangible Maykop sites in the foothills are dated to the first quarter of the 4th millennium BCE. Except along the River Kuban tributaries in the Northwest Caucasus, a chronological gap of about 200 years divides most areas of Eneolithic and Maykop occupations. This is probably the result of insufficient radiocarbon dating, but it significantly impacts on any idea of cultural continuity. Some of the earliest radiocarbon dates stem from huge burial mounds, which appear seemingly from nowhere over the entire area that was later inhabited by Maykop populations. One such location is the huge mound of Brut in North Ossetia, dated to 5020±30 BP (3933-3766 cal BCE), with a diameter of 80 m and a height of 8 m (Korenevsky 2010). An even larger mound with dimensions of a 135 m diameter and an original height of 35 m near Urvan in Kabardino-Balkaria dates only slightly later.[3] This mound is the centre of a necropolis of several mega-, midsized and small mounds, most likely with a similar date. The eponymous burial mound of Maykop-Oshad also belongs to these groups of early big mounds. It contained one of the earliest ostentatious sets of

3 The still unpublished radiocarbon dates from a modern robbers' trench are part of an ongoing project on a more precise dating of Maykop monuments using new stratigraphies and Bayesian modelling.

Figure 2. Eneolithic and Maykop burials from the North Caucasus piedmont zone. 1-5 Aygursky 2, mound 17, grave 6; 6 Progress 2, mound 4, grave 9 – Eneolithic graves; 8-21 Marinskaya 3, mound 1, grave 18. (1-5 after Korenevsky 2012, Fig. 7-8; 6 Archive Nasledie; 8-21 after Kantorovich and Maslov 2009).



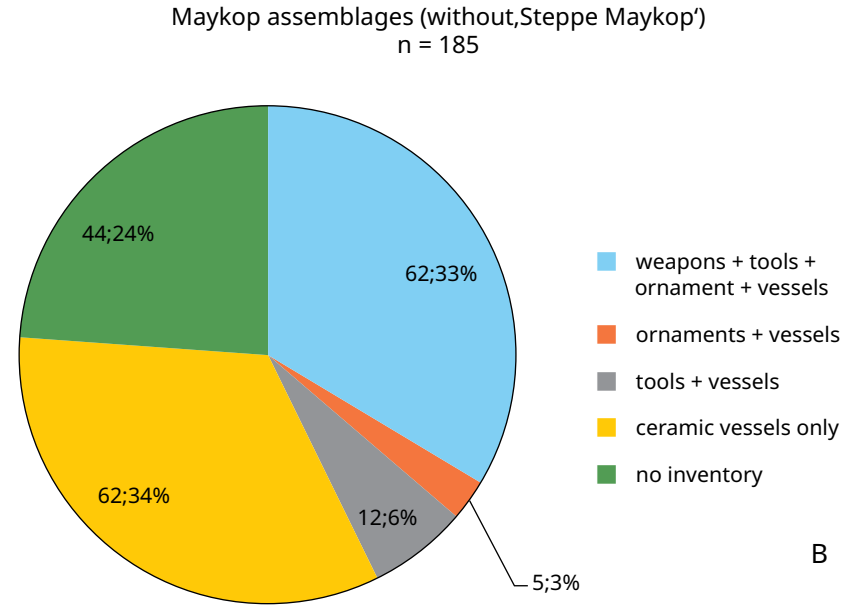


Figure 3. Statistics of Maykop burial assemblages. A Number of objects in intact Maykop graves. B Frequency of object combinations.

burial equipment and is to some degree the blueprint for complexes later characterized as 'princely' or 'royal' graves.

The burial mounds are exceptional monuments, particularly the big or mega mounds. Their characteristics will be outlined in more detail below. Maykop graves are generally inhumations in flexed positions in differently constructed burial chambers using wooden constructions and stone packages and equipped with grave goods (Fig. 2, 18-21). Currently, just over 400 grave inventories from 85 sites are available for analysis, yet the quality of information varies greatly due to early excavation and limited publication (Fig. 3).

Excavations of these burials have been edited poorly and only a handful of physical anthropological studies give insight into the demographic structures of these communities (*e.g.* Rezepkin 2000; Shishlina 2008, Table 1).[4] Of the 66 anthropologically or genetically sexed individuals, 20 are female, 29 male and 23 infants. Most but not all individuals with weapons are male (12 out of 29 males), but an individual in one of the lavish graves at the site of Klady, mound 30, grave 1, which included a set of weapons with daggers and a shaft-hole axe, was attributed to a 30-year-old female (Rezepkin 2000, 33). Conversely, only 6 female individuals out of 20 are associated with jewellery. From this fragile data, a correlation of sex and grave assemblages to explore gender or age affiliation in the assemblages is unrealistic. Nevertheless, it must be noted that such aspects might have played a role in the formation of the complexes as they were inseparable elements of the personhood of the deceased (Rebay-Salisbury 2016, 176-208).

Maykop burial mounds have been excavated unsystematically, which leaves us with only one completely excavated necropolis at the site of Novosvobodnaya-Klady with 17 explored mounds (Rezepkin 2000; Trifonov *et al.* 2015), and two microregions near Ust-Dzheguta and between Kishpek and Chegem where a larger number of mounds were excavated in the 1960s (Munchaev and Nechitaylo 1966; Nechitaylo 1978). Even fewer excavations have been conducted in settlements, and the excavated architecture is rather flimsy (*e.g.* Korenevsky 2004, 12-14, Fig. 3-21; Rezepkin and Lyonnet 2007). Surface collections at settlements suggests areas of up to 50 ha in the cases of Ust-Dzheguta (Nechitaylo 2007) or a settlement near Komsomolec. Some excavated sites at the lower Kuban are likewise rather large, but occupation density seems not to have been too high. At the moment, irregular agglomerations of round houses built with wattle and daub are known, each with considerably free space. Economic data for Maykop is likewise insufficient. Available information remains scarce for botanical remains (Antipina and Lebedeva 2005). Animal bone assemblages are better investigated; they suggest a shift from mixed animal husbandry to primarily cattle- and sheep-based herding during the Maykop epoch (Hambleton and Maltby 2016).

In essence, the present stage of research affords us few details on the polities involved in the processes, which will be discussed below, and even fewer on the individual households. The Ust-Dzheguta cluster might be a good prototype for a Maykop polity, and the low house density in the Kuban sites might be representative of habitation sites, but in both cases we struggle with a poor publication and lack of both dating and detailed investigation of the excavated materials.

Maykop burial mounds and grave assemblages: a playground of new social practice

Maykop grave assemblages are not the first to have introduced lavish materiality into the mortuary arena, that is to say, in the intellectual engagement with death in association with an accumulation of objects. The splendid graves of Varna (Bulgaria) were the prelude to an edifice of ideas linking some deceased individuals at their funerals with extravagant objects in specific settings to present them to a wider public (Chapman *et al.* 2006; Krauß *et al.* 2018). The cemeteries of Khvalynsk (Saratov Oblast, Russia) on the Middle Volga provide the eastern pole of this phenomenon, similarly with lavish grave assemblages, though without gold or silver

4 Basic research on bioarchaeological aspects including physical anthropology is currently going on in the BIOARCCAUCAUS project of the Eurasia Department of the German Archaeological Institute (PI S. Hansen), conducted by J. Gresky (Berlin), A. Buzhilova and N. Berezina (Moscow). I thank all team members for the possibility to use unpublished data.

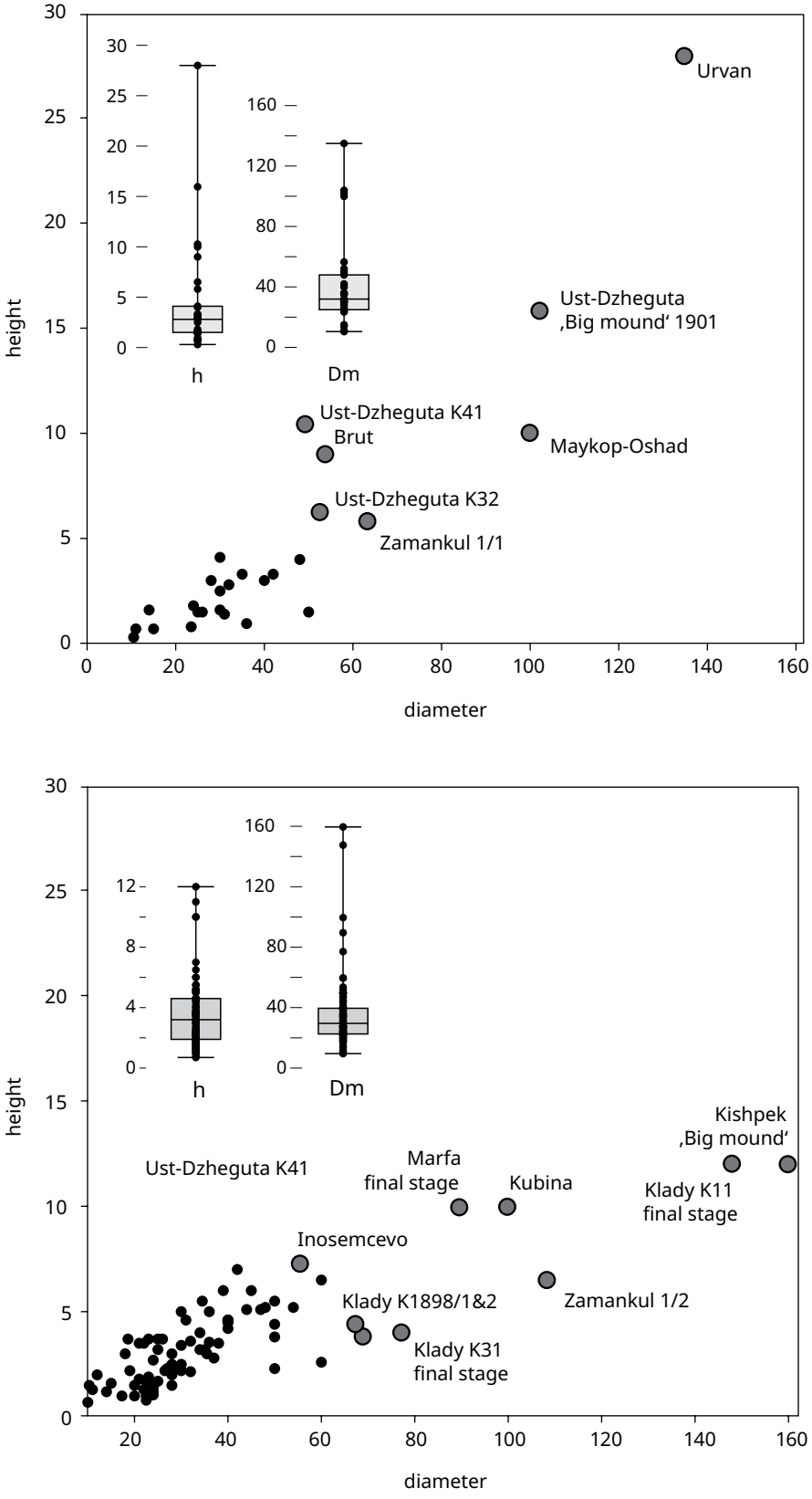


Figure 4. Size-height diagram for early and late Maykop burial mounds.

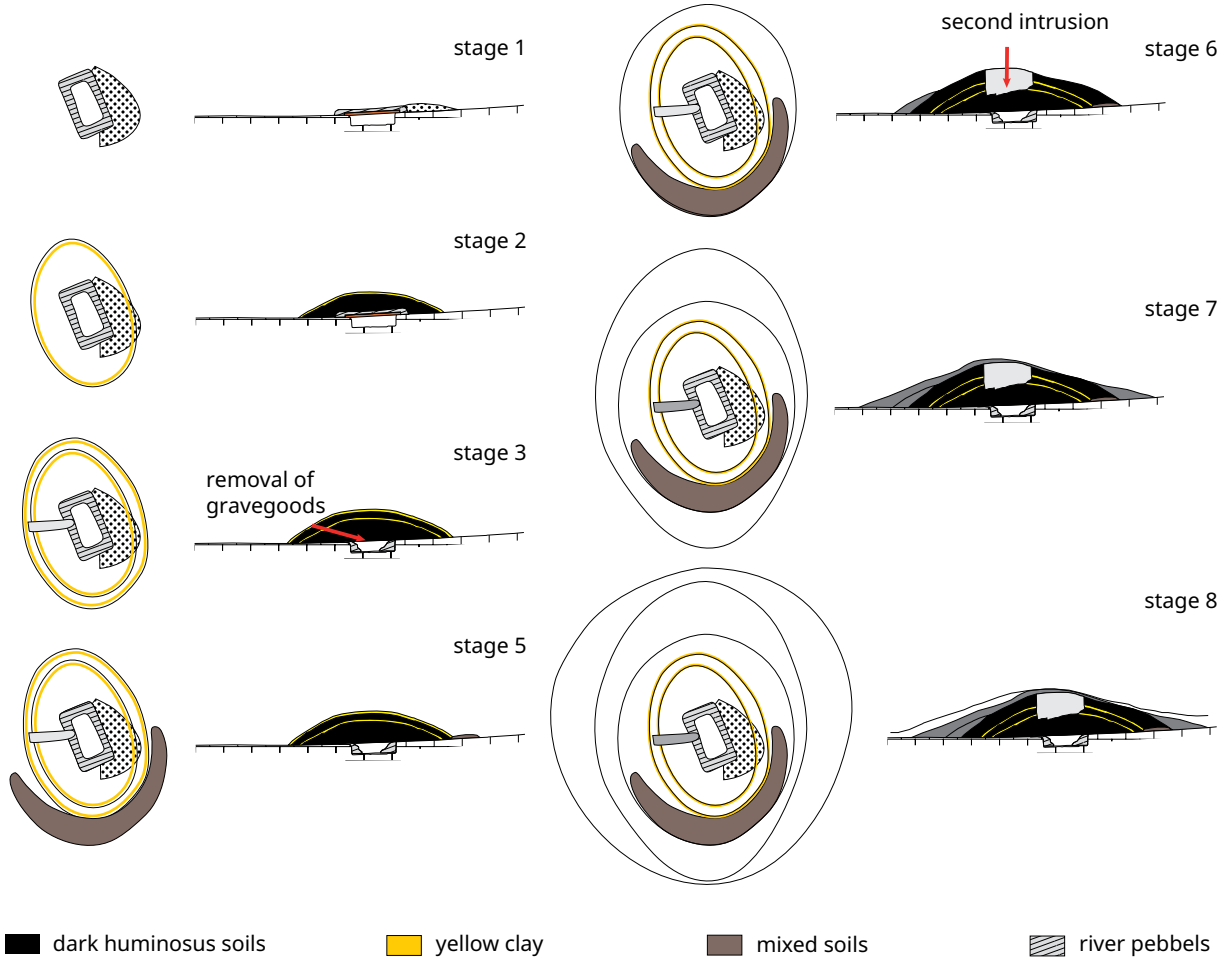


Figure 5. The building sequence of the big mound near Brut (adapted from Rostunov 2007, Fig. 15).

objects (Agapov *et al.* 2010). Maykop communities added, however, highly visible burial monuments to achieve effectiveness beyond the actual moment of the funeral to this teleological concept (Reinhold 2012, 97-99). These burial mounds, similarly, do not represent the first memorials built for deceased individuals in eastern Europe (Rassamakin 2011). The eastern branches of the Eneolithic cultures associated with Khvalynsk and Varna started to erect burial mounds atop graves as early as the mid 5th millennium BCE (Korenevsky 2012). These mounds marked single – rarely double – graves with earthen construction of limited size, 12-20 m in diameter and typically less than 1 m high, to be built by small groups in a few days.

Maykop burial mounds, in contrast, expose a noticeable increase in size and height, that is, in labour investment associated with the monument (Fig. 4). These constructions vary from 20 to 135 m in diameter and 1.8 to 35 m in height. While some of the later mega-mounds are the result of subsequent interments and new mound shells, all dated early constructions were built atop one grave and were not reused as burial sites until the very end of the Maykop or the Middle Bronze Age.

The best-studied mounds of Brut (Fig. 5) and Zamankul were sophisticated architectonic constructions (Korenevsky 2010). The big mounds were built in several stages atop burial chambers that were usually dug into the ground, fitted with wooden constructions, covered with a package of stones and with a diverse configuration of mound shells. Recent excavations have demonstrated that these mound shells were largely constructed using blocks and layers of specially prepared clay mixtures or strips of sods. The detailed *châine opératoire* of the building process will be discussed in a different context (Reinhold in preparation), but the mound

construction represents comprehensive experience in creating earthen architecture. It reflects likewise mathematical, spiritual and cosmological knowledge, as the mounds are built with soil components of different colours and mechanical qualities as well as respecting celestial configurations. Building mounds of that size involves larger work parties, most likely organized into work groups. Mats Kähler Holst and Marianne Rassmussen (2012) recently outlined the tasks and required skills for mound building in the Danish Bronze Age. Their scenario sketches a complex fabric of interaction between workers of different teams with different tasks and nested routines. Specialists organize the workflow with specific know-how, which possibly built on experience from earlier constructions or ritual expertise. The sophisticated building of the Maykop mounds including the preparation of the constructing material reflects different fields of activities, or following the idea outlined before represent 'carpenters', 'construction crew members', 'head men', 'master builders' and 'shamans/ritual specialists' alongside 'commissioners' and a broader field of individuals occupied with producing enough food and accommodation to manage such a construction site.

A specific element of early Maykop mounds is that the burials were regularly re-entered and emptied during the mound building process (Reinhold in preparation). Except for the eponymous Maykop-Oshad mound, all early Maykop mega-constructions were cleared out during or even before the construction of the mounds themselves (for details see Korenevsky 2010). Parts of the inventories survived only when collapsed walls sealed them off, as, for example, in Zamankul 1. This leaves us with only 28 out of 50 probably early Maykop inventories still intact. This practice – usually referred to as 'robbing' – can reflect a material interest in the valuable objects buried in the graves, but probably the actual objects had lost their function after the funerals and were later recovered to continue their circulation within the living society (for a discussion see Kümmel 2009).

The eponymous mound of Maykop-Oshad is one of the mega-mounds. Its reported size of 100 m in diameter and height of 10 m amounts to about twice the mass of the Brut mound. Unlike the big mounds, which were constructed in the central Caucasus foothills, the grave inventory of this mound was not cleared. It thus allows the sketching of some of the principles of early Maykop grave compositions and an overview of new technologies that are introduced to us by the remarkable objects in this complex. The mound excavated in 1897 was built with yellow clay with a stone circle at its base. Three individuals were found in the central grave, one of which is supposedly the main person as most of the precious materials have been associated with this individual (Munchaev 1975; Govedarica 2002; Piotrovsky and Bochkarev 2013). Two other individuals were placed in separate parts of the grave pit, divided by wooden constructions. This pit (5.3 x 3.73 m) was dug into the ground and paved with layers of gravel. In the corners and at the sides, remains of a wooden construction including posts are reported. A single secondary burial was added in the mound several metres higher than the central pit. According to the typology of the dagger associated with this individual, he was interred in a later phase during the Maykop epoch.

The complex is not dated independently, but radiocarbon-dated complexes with socketed adzes like the Maykop one fall into the first half of the 4th millennium BCE and together with correlations to Northern Mesopotamia (Lyonnet 2007) suggest a date around 3700/3600 BCE. Most of the objects in this complex are unpreceded. The sole comparative complexes with regard to expediture and methal technology are teh Varna complexes. They date, however, about half of a millennium earlier betwen 4400 and 4340 BCE (Krauß et al. 2018).

The major technological focus in the Maykop-Oshad complex (Tab. 1) is metallurgy. The grave goods figure among the earliest evidence of silver and gold metallurgy. Silver in particular is a rare raw material, as it requires a complex technique to

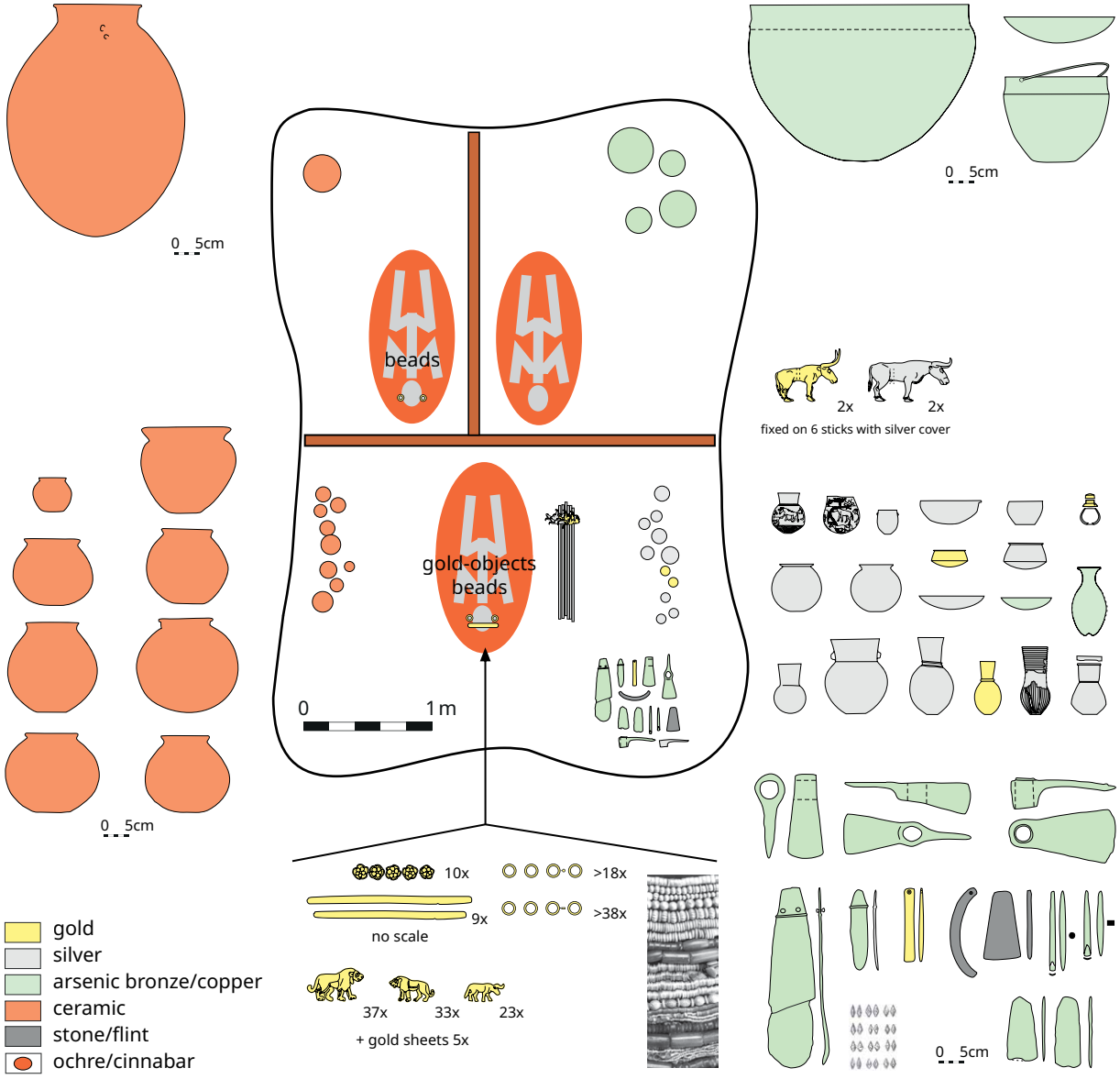


Figure 6. Schematic plan of the Maykop-Oshad grave (compiled from descriptions by Munchaev 1975; Korenevsky 2004; Piotrovskiy and Bochkarev 2013).

be extracted. The 14 silver vessels, beads, the poles and remains of silver sheets represent the largest quantity of silver objects and the broadest spectrum known so far from the early 4th millennium BCE (Hansen and Helwing 2016, 42-49). The metal vessels, some with figural decoration, represent the first metal vessels embossed from arsenic bronze, silver and gold. The ornaments are among the first high-quality gold jewellery (Korenevsky 2011, 94-108). The bull figurines from this complex, two cast in silver, two in gold, are the first complex objects cast in lost wax technique from precious metal (Hansen 2014). A set of functional metal tools crucial for high-quality woodworking was introduced as well. Multifunctional tools such as shaft-hole axes and daggers present new types produced with the new technique of copper alloying. These tools or weapons could be used effectively in activities such as warfare. The sophisticated gemstone beads confirm high skills in stone cutting and the pottery of the grave represents a new technology in pottery production, which, however, is widespread in early Maykop contexts (Nechitaylo 2007; Iserlis 2019).

When we resume the technologies and the production collectives represented in the Maykop-Oshad materials, we have to add to the 'mound builders' a broader

group of persons related to different activities in metal production. Raw materials are probably local. Gold and likewise carnelian and turquoise is found in the nearby mountains; as well as silver and copper minerals, even the precise sources of Maykop metals are still ill-defined (Ryndina and Degtyareva 2002, 97-98). A mountain scene on one of the silver vessels represents local mountain peaks, which renders local production in the central North Caucasian piedmonts most likely. The specialists who produced the Maykop metal objects were, however, integrated into a larger producer network. Together with communities from the South Caucasus, they developed a metallurgical tradition which is different form Mesopotamian, Iranian and south-eastern European ones through their own preferences in alloys (Helwing 2016). No metallurgical workshops are known so far from the North Caucasus apart from some clay *tuyères* at the settlement site of Vesely (Formozov and Chernykh 1964, 104). But Korenevsky refers to rather inexpressive workplaces and equipment for the production of precious metal jewellery and vessels in ethnographically documented situations (Korenevsky 2011, 116-122).

The cast bull figurines, the realistic representation of lions and cattle as well as the carved figural scenes on two of the silver vessels are pieces of art which reflect not only a high standard of craftsmanship, but also an artistic expression that crucially differs from the rather schematic clay figurines of the Eneolithic period. 'Artists' join the different craftspeople, and probably not only in metal production.

Creating differences by association – control? – of material culture is indicated as well in the spatial configuration of the Maykop-Oshad grave. This associates some of the objects with the individuals, but most of them are placed around the bodies with a clear separation. Gold earrings and a large collection of beads (gold, silver, carnelian, turquoise) were found by the heads and upper bodies of two of the individuals, the southern and the north-western ones. The southern individual was furthermore associated with gold stripes interpreted as diadems, golden rosettes and a large number of figural gold sheets illustrating lions and cattle. All individuals were packed in layers of red-coloured matter of different shades. Red colour is frequently found in Maykop and older burials (Fig. 2), also as wall paint. In this case, it was analysed as a combination of ochre and cinnabar (Trifonov *et al.* 2015). The latter mineral is not available on the northern flank of the mountains and the authors assume a specific ritual quality of this paint that required its procurement. Beside the ornaments, which were associated with the skeletons, the reported locations of the other objects were along the sides of the chamber or in front of the deceased. All ceramic vessels in the main chamber were placed at the back, while smaller gold, silver and bronze metal vessels representing flasks, amphorae, plates and beakers were placed in front of the southern individual. A large storage vessel was related to the north-western person and larger bronze vessels including a cauldron and a bucket were associated with the north-eastern individual. Likewise, in front of the southern person was a deposition of six ornamented silver poles, four of them with silver and gold figurines of bulls attached. A collection of weapons or multifunctional tools including axes, daggers and flint arrowheads and a set of woodworking tools including chisels, adzes and awls were found in the south-eastern corner of the main chamber. The spatial structure of the grave with the separation of the three individuals, the varying artefacts associated and the difference in material sends one central message: differentiation by quantity and quality of objects. It is the wilful creation of persons of higher and lower 'social centrality' by material culture (Robb 2007, 293).

The use of materiality to create differences is a central element in Maykop burials. This is evident in the Maykop-Oshad complex itself, but it is similarly evident at a regional level. If we compare the early complexes of the Ust-Dzheguta necropolis and replace the 'robbed' big mound of this necropolis by the Maykop-Oshad complex (Tab. 1), we see not only a gradual but also an exponential decline in burial

							multi-functional tools/weapons							tools /(wood-working, metallurgy)									ornaments								
site	complex	intact/emptied/disturbed	diameter	height	individuals	metal vessel	dagger	silex dagger	lance	shaft hole axe	stone hammer axe	silex arrow head	bone arrow head	nose ring	adze	socketed chisel	socketed adze	awl	hook	silex tool	bone awl	polishing stone	wheetstone	glod earring	gold/silver pin	bronze/bone pin	other gold objects	other silver objects	gem stone beads	bronze beads	stone bracelet	ceramic vessel
Maykop-Oshad	S	i	100	10		19+	2			2		12			3	2	2						2	2			xxx	xxx	xxx			8
Maykop-Oshad	NW	i			3																			2			x		x			1
Maykop-Oshad	NE	i				3																										
Ust' Dzheguta	K13 ZG	e	30	2,5	1?		1																3			1						11
Ust-Dzheguta	K45 ZG	i	24	1,8	2?													1									x					5
Ust-Dzheguta	K46 ZG	e	15	0,7	?													1														2
Ust-Dzheguta	K3 ZG	dis	50	2,3	?																										x	x
Ust-Dzheguta	K7 ZG	i	42	3,3	1																											4
Ust-Dzheguta	K12 ZG	dis	40	3	1																											x
Ust-Dzheguta	K10 ZG	i/e?	31	1,4	5																											5
Ust-Dzheguta	K11 ZG	e	30	1,6	1																											6
Ust-Dzheguta	K44 ZG	e	26	1,5	1																											x
Ust-Dzheguta	K8 ZG	i	25	1,5	1																											2
Ust-Dzheguta	K9 ZG	i?	24	0,8	2?																											≥1
Ust-Dzheguta	K43 ZG	i	11	0,7	2?																											1
Ust-Dzheguta	K27 ZG	dis	11	0,3	?																											

Table 1. Early Maykop inventories – Maykop-Oshad and Ust-Dzheguta.

equipment and investment of labour in mound construction; even the mounds were not small and the stone circles inside were built with high precession (Munchaev and Nechitaylo 1966, Fig. 4). None of the mounds were used for a second burial during the Maykop epoch, but beside the big mound at least 4, possibly 7 or 8, of the 13 early mounds were emptied or 'robbed'. Three mounds most likely were built on graves of couples, and in the central grave of mound 10 five individuals are reported. The skeletons were disturbed but five vessels were found between the bones (Munchaev and Nechitaylo 1966, 137-138).

The sequence of the excavated three big mounds in the Brut-Zamankul cluster adds a chronological aspect. These mounds are three out of eight with a diameter larger than 80 m in an area of 25 x 25 km. The oldest dated mound is Brut (5020±30 BP, 3933-3766 cal BCE), the second oldest Zamankul 1 (4820±70 BP, 3694-3521 cal BCE) and the latest Zamankul 2 (4670±35 BP, 3516-3372 cal BCE). Despite some blurring by plateaus in the calibration curve, the complexes do not overlap. This indicates that big mounds were not constructed frequently, perhaps one every second or even third generation. They were built as clusters of two or three big mounds associated by necropolises of smaller mounds, as the Ust-Dzheguta cluster indicates, and with considerable distances between these clusters.

The new Maykop social transcript – an area of power

When we contrast this overview of early Maykop burial characteristics to the initial question on social change, we notice significant discontinuities between the Maykop assemblages and contexts and both of the Eneolithic predecessor groups in the foothills and the steppe zone (Fig. 2). They must be regarded as a substantial transformation in the conception of sociality. The construction of the big mounds indicates the interaction of much larger collectives than represented by any of the archaeological contexts prior to Maykop. In both cases, we must, however, enquire about the missing dead, as it seems unlikely that the revealed complexes represent the entire population of the respective epochs.

The clear-cut ranking of deceased individuals using material culture and the size of the monument related to them is much sharper than the ranking of Eneolithic individuals by their grave ensembles of flint and bone tools. It is interesting to note that none of the excavated Maykop mounds in the piedmont zone were built on top of an Eneolithic mound. In the steppe zone, a few stratigraphies are known, but here as well mounds with Eneolithic and Steppe Maykop interments were rather separated. The Maykop communities seemingly did not want to place themselves in a line of continuity with the previous steppe-affiliated occupants of the piedmont zone. The new technologies represented in burial assemblages such as Maykop-Oshad finally argue for the formation of entire new fields of technologies with highly diversified skills and knowledge, possibly to supply outstanding burials, but with a presumable high impact also on everyday life.

The person or persons who were responsible for the accumulation in the eponymous Maykop mound and the disposal of the burial equipment united these fields to create three definite 'persons' substantially differentiated by material culture. The spatial organization of the objects is undeniably directed towards display and the entire composition is the formation of a sophisticated 'public' transcript charged with meaning. The persons in the grave should be perceived as different by the participants of their funeral, and the association of the southern, most 'central' person with the largest quantity and the broadest spectrum of new objects demonstrates that his/her household had control over all fields of production inherent in these objects. Most likely this group controlled as well the entire *châine*

opératoire and thus accumulated not only enormous factual wealth but likewise the power to destroy this wealth together with the deceased. The power of disposal by means of access and accumulation of capital is one of the most important steps towards asymmetric power relations (Earle 2002). We do not recognize much accumulation of staple goods, so probably a surplus of symbolic assets in the form of the mounds or the accumulation of portable wealth, that is, gold, silver, metal and so on, compensated for other forms of storable goods. Yet we know nothing about the cattle and sheep herd sizes of a Maykop polity.

The objects in the Maykop-Oshad complex associate the three persons with different fields of activity – real or fictive. The central person is associated with ceramic pots suitable for cooking or storing food. The extraordinary metal flasks and bowls at the other side represent drinking and serving paraphernalia. Like in later elite graves, this equipment indicates the consumption of food and drinks, that is to say, feasting equipment for a larger but not a very large group. The vessels associated with the two other individuals are larger and fit for storage of beverages or other foodstuffs.

The tool and weapon set in the south-eastern corner include multifunctional tools such as shaft-hole axes, daggers or arrowheads, which can be used for fighting, but similarly for hunting or other everyday activities. The tool set of chisels and adzes indicate woodworking. From the simple presence of such objects, it is difficult to recognize if the individual him/herself was using these tools or if they represent a symbolic power of disposal (Hansen 2002; Reinhold 2012, 100). The female from mound 30 at Klady with a lavish grave ensemble including the same spectrum of vessels, tools and weapons might be an indicator of this (Tab. 2). If this interpretation is correct, the southern individual in the Maykop mound was marked out as a central figure in a household, head of a big feast and in possession of military and economic power, that is to say, representing another new type of person, 'the great man or woman', while the others were marked out for different, less prominent activities.

These two less well-equipped individuals were for a long time discussed as female attendants of the main male person who followed him in death (Munchaev 1975, 222; Govedarica 2002, 785). This interpretation was certainly influenced by a phenomenon best known from the 'royal' cemetery of Ur where large assemblies of persons were buried together contemporaneously and with similar divergences in personal equipment and associated goods (Woolley 1934; Cohen 2005). As a phenomenon related to presumed kings and queens in Mesopotamia, the Maykop-Oshad complex seemed to reflect an early form of such a royal person. As the skeletons did not survive for anthropological sexing or palaeopathological study, this narrative is impossible to prove. In the Zamankul 1 mega-mound a 40 to 45-year-old male and a 20 to 25-year-old female were buried together (Rostunov 2007, 60). Burials of couples make up at least 10% of all intact Maykop graves, found equally in early and late contexts. They can be interpreted as founder couples, who would represent a female and male ancestor pair at the base of particular important lineages (Dafinger 1994), they can be interpreted as representing dependents killed as human sacrifices (Frangipane *et al.* 2001; Hasset and Sağlamtimur 2018), or in the more complex narrative of the *morts d'accompagnement* (Testart 2004). Susan Pollock (2007) discusses this phenomenon for Ur as an ideologically driven practice to demonstrate power by creating subjects which are loyal to their institution, in the Ur case the great households, beyond death. Others such as Bruce Dickson (2006) underline the coercive nature of human sacrifices evoking fear and obedience among those who are confronted with the death of others in a 'theatre of cruelty'.

Summing up, the messages of the Maykop-Oshad and other big burial mounds of the early Maykop epoch are on the one hand symbolic or ideological and on the other economic. With the funeral, the placement and the display of the persons in a carefully set arrangement of bodies and objects, a social transcript was created – or

re-enacted – that emphasized asymmetric power relations and associated materiality with one single extraordinary individual. The huge burial mound constructed on top of the graves memorialized this individual and equally the entire ritual process and the participating collectives. The Maykop mound, for instance, took up at least 13,000-15,000 working days to be built. This requires either a stable long-term team of builders, a sequence of building events or the accumulation of about 150 to 200 workers for about three months. A workload like this is beyond the capacities of small local communities, who furthermore had to organize accommodation and provisions. The construction of the big mounds could only be successful when concentrating larger groups on the participation.

The ideological core of the narrative which was constructed together with the funeral and the monument as a public transcript was based on the actual deceased, but it was targeted at a much broader audience. Competition and the struggle for prestige might have been a trigger in the second half of the 4th millennium BCE, when large mound shells were mounds built over existing constructions (Korenevsky 2010) (Fig. 4). In the first half of the 4th millennium BCE, these constructions must have been singularities in a large area each. The uniqueness, however, might have been an important attractor to partake in their creation.

Maykop was then a culture in the making with pristine landscapes still to conquer and a population with possibly heterogeneous origins. The mega-mounds might have been the nodes of the network that took shape with and through their construction. Monuments and material culture in the end formed what we today call 'Maykop Culture', but what was then perhaps a notion of Maykopness produced by taking part in the building programme of closer or more distant communities; or '… the large barrows in many respects constituted a new form of practical cooperation, which may have established a model for other types of interaction … and thereby play a role in the formation of social structures' (Holst and Rassmussen 2012, 270).

The Maykop elite habitus in the later 4th millennium BCE – from singularity to doxa

In the second half of the 4th millennium, the number of elite graves that mimic the onset of Maykop-Oshad increases. In all areas of the North Caucasus piedmonts, elite graves have been found, numbering over 30. Korenevsky classifies these complexes into six classes and concludes a categorical social ranking of Maykop society (Korenevsky 2004, 78-84; Korenevsky 2011, 125-16). With regard to an area of more than 650 km west-east and a distribution of sites in clusters, it seems difficult to accept one coherent ranked social organization for the entire area. The *habitus* concept, which offers a template for elite groups to express distinguished social positions, seems a better model for the structural integration of the Maykop-Novosvobodnaya elite graves.

At the site of Novosvobodnaya-Klady seven complexes can be classified as outstanding with respect to their inventories (Table 2).

Typologically and in composition, the assemblages are rather heterogeneous (Reinhold 2012, Fig. 11). Their message, however, is the same as outlined in more details for Maykop-Oshad – objects placed or displayed around the bodies presenting multifunctional tools or weapons, sets of woodworking tools, and gold earrings and jewellery as personal ornaments. New in comparison to the earlier complex is the shift from an abundance of ornamentation to an arsenal of arms. The military aspect certainly starts dominating and we see here for the first time a characteristic of Bronze Age elite *habitus* – over-equipment with arms (Hansen 2002). Thus, it is not surprising that one of the new technological aspects in the second half of the

4th millennium BCE is the transformation of the dagger into a sword, a more functional thrusting weapon (Korenevsky 2011, 60, Fig. 26-2-3). The broader spectrum of weapons reflects probably a differentiation in military technique, and a group of individuals with daggers but not much else might indicate the emergence of 'warriors' as a separate social group or class (Korenevsky 2011, 125-130). Metal tools in general seem to have been more widespread as well, since finds of adzes, chisels and other tools are reported now also from settlement sites (Korenevsky 2011, 80-84).

The only entirely new technology in Klady is represented in the model of a spoked wheel. The use of this wheel is symbolic, but it refers to one of the key innovations of the later 4th and the early 3rd millennia BCE – wheeled transport. The adoption of traction in a late Maykop context was recently discussed based on two case studies which date to the last third of the 4th millennium BCE (Reinhold *et al.* 2017). Starting from two contemporaneous complexes, the different trajectories in the appropriation of draught animals and wheeled transport among communities in the piedmonts and those of the steppe were discussed. The first complex revealed two bucrania and a possible yoke outside an emptied or 'robbed' late Maykop grave with looped nose rings still *in situ* (Kantorovich *et al.* 2013). The other complex presented the oldest dated wooden wagon so far, but no draught animals. This dichotomy refers to divergent forms of appropriation in societies with different conceptions of representation, one focusing on the display of power, the other on 'eternal' mobility. But among Maykop elites, the new field of driving seems not to have reached a prime position. The complexes with looped nose rings or bucrania never match the set required for a top Maykop position.

Conclusion

Is social change triggered by changes in technologies? The case study of the North Caucasian Maykop phenomenon, which is one of the central players in the innovation horizon that emerged during the 4th millennium BCE between Southern Mesopotamia, Iran, the Caucasus and Europe demonstrated the close entanglement of a new social display and the implementation of new technologies. The monopolization of these technologies can be considered one of the key elements for emerging elite groups to establish their superposition. The diversification of the technologies, particularly in metallurgy, created a spectrum of new 'persons' as full- or part-time specialists and new producer groups including technological networks within and beyond the actual Maykop network (Helwing 2016). The most important aspect, however, was probably not the diversification of commodity production but the sophisticated building programme related to the big Maykop mounds.

'A fundamental need of emerging institutions or groups is the creation of new ties that link people to the institution or group, thereby transcending or superseding their existing bonds of loyalty and affiliation' (Pollock 2007, 217). This citation on the impetus of the Ur mass burials gets to the heart of the issue in establishing new cultural formations also for Maykop. Possibly individuals such as the main person in the Maykop-Oshad mound were even early representatives of figures like the later Mesopotamian supernatural 'kings', who were able to represent in their own person the entire collective and thus superimpose all other parts of society (Cohen 2005, 3 4; Hansen 2013).

A cosmological importance might have been one of the triggers for emptying their graves in order to obtain artefacts that have acquired additional symbolic importance. But probably the monuments replaced within a short period of time the individuals buried inside as focus for collective memories and acted by themselves as nodes in a web of mutual collaboration and integration.

site	complex	metal vessel	multi-functional tools/weapons							tools (wood-working, metallurgy)										ornaments								ceramic vessel	radiocarbon date 1σ
			dagger	silex dagger	lance	shaft hole axe	stone hammer axe	silex arrow head	bone arrow head	nose ring	adze	socketed chisel	socketed adze	awl	hook	silex tool	bone awl	polishing stone	wheetstone	glod earring	gold/silver pin	bronze/bone pin	other gold objects	other silver objects	gem stone beads	bronze beads		
Klady	1898 K1	5	9		1	4		7			3	3		x	3	7		x	x	≥2	x	x						8	
Klady	K31 G5	5	13	2		6		5			2	2		7	2			7	2	6	2		x	x	x			8	3661-3519 cal BC
Klady	K30 G1	3	2			1					1			1	1					1	1	2	3	3	x	x		≥6	3517-3369 cal BC
Klady	K28 G1		5			1			2						1	1			1	1								2	
Klady	K4 G1		2			1		12		2	1			2														5	
Klady	1898 K2		2			1		7			1			x	1				1	3		x							3321-3020 cal BC
Klady	K15 G1		2			1		1						1		1	3											1	
Klady	K11G G23		1																									5	
Klady	K11H G34		1																									1	
Klady	K31A G1		1											1														2	
Klady	K38 G1		1																									1	
Klady	K38 G2		1																	1	1							6	
Klady	K24 G6							3																				4	
Klady	K4 G5							1													1					1		3	
Klady	K31 G4															2				2								1	
Klady	K2 G1																			1	1		5						
Klady	K11H G43																					2						2	3620-3369 cal BC
Klady	K11C G9																					3						1	
Klady	K34 G1																								x				
Klady	K11 G39																											2?	
Klady	K11F G20																											6	
Klady	K11D G14																											4	
Klady	K11 G32																											3	

Table 2. Late Maykop inventories form Novosvobodnaya-Klady (first part).

site	complex	metal vessel	multi-functional tools/weapons							tools (wood-working, metallurgy)									ornaments							ceramic vessel	radiocarbon date 1σ
			dagger	silex dagger	lance	shaft hole axe	stone hammer axe	silex arrow head	bone arrow head	nose ring	adze	socketed chisel	socketed adze	awl	hook	silex tool	bone awl	polishing stone	wheetstone	glod earring	gold/silver pin	bronze/bone pin	other gold objects	other silver objects	gem stone beads	bronze beads		
Klady	K11 G12																										2	
Klady	K11 G28																										2	
Klady	K11 G31																										2	
Klady	K11 G44																										2	
Klady	K11A G2																										2	
Klady	K11D G16																										2	
Klady	K11F G21																										2	
Klady	K11G G24																										2	
Klady	K4 G2																										1	
Klady	K9 G2																										1	
Klady	K11 G22																										1	
Klady	K11 G41																										1	
Klady	K11 G45																										1	
Klady	K11A G1																										1	
Klady	K11B G3																										1	
Klady	K11D G17																										1	
Klady	K11H G30																										1	
Klady	K15 G3																										1	
Klady	K31A G2																										1	
Klady	K11C G6																										1	
Klady	K11D G15																										1	
Klady	K11H G49																										1	

+ 19 intact inventories without objects, chiefly infants

Table 2. Late Maykop inventories form Novosvobodnaya-Klady (second part).

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The production and use of archery-related items as a reflection of social changes during the Late Neolithic and the Early Bronze Age in Europe

*Clément Nicolas**

Abstract

Dates ranging from 2500 to 1700 BCE are a period of major social and economic change in western and central Europe, with the spreading of the Bell Beaker Culture and the introduction or the development of metalworking (copper then bronze). At that time, archery-related items became peculiarly significant for the Bell Beaker and some Early Bronze Age communities. They include especially specific types of arrowheads and an original item, the stone bracer, thought to have adorned organic wristguards. Technological studies point to the objects that were more or less easily made during the Bell Beaker period, suggesting that each warrior was able to shape his own set, while during the Early Bronze Age, the level of know-how as well the context of production suggests that these items were manufactured by craftsmen for the elite. Use-wear analysis shows that these objects might be commonly worn. During the Bell Beaker period, part of the arrowhead and, to a lesser extent, some bracers were used for shooting. However, in some regions during the Early Bronze Age, these objects were intended for display only. These two types of production and uses of archery-related items illustrate a shift from the object-signs of the Bell Beaker warriors towards items alienated from their primary function or sacred objects of the Early Bronze Age elites. Finally, the wide distribution of Bell Beaker arrowheads and bracers allow considering the relevance of the circulation of ideas, objects and individuals in adopting a European fashion.

Keywords: Bell Beaker, Early Bronze Age, Europe, flint arrowheads, stone bracers, technology, use-wear analysis

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Introduction

The time ranging from 2500 to 1700 BCE is a period of major changes in western and central Europe, with the introduction or the development of metalworking (copper

then bronze). The spreading in large parts of Europe of the Bell Beaker Culture from the mid 3rd millennium BCE onwards led to large networks, allowing a large-scale mobility of people, objects, ideas and technologies. This networking contributed to the circulation of an exponential amount of metal ores and likely to the rise of new elite and structured societies during the Early Bronze Age.

Between these dates, specific objects were produced, including in particular archery-related items: flint arrowheads and stone bracers (wristguards). These objects regularly found in graves have been long considered indicators of warriors who would have invaded Europe and spread the Bell Beaker Culture (Childe 1929). From the 1970s, these objects are thought to be part of a prestigious set resulting from long-distance exchanges (Shennan 1977). They are now considered more likely to be objects highlighting the social status of the individuals (Bailly 2002; Lemercier 2011; Fokkens *et al.* 2008). These assumptions are mainly based on literature without properly examining the artefacts. However, recent studies on bracers pointed to their quite long life cycles (Vaart 2009; Woodward and Hunter 2011), while little attention has been paid to the arrowheads. Thus we will examine different case studies in several parts of Europe (Brittany, Britain, Denmark, Czech Republic, Hungary) in order to investigate how these objects were produced and used, how they reflect social changes. A large-scale analysis allows us to identify regional and international trends particularly relevant to appreciate the diverse expressions of the Bell Beaker Culture in Europe. In this paper, we will present the main results on technology in a broad sense, from raw materials to final use, and then discuss their role among other triggers of social transformation. Finally, we will evaluate the importance of migrations in the adoption of this warrior set.

Bell Beaker arrowheads (*c.*2500-2100 BCE)

Bell Beaker arrowheads include piercing varieties, differing among European regions (Fig. 1). To the west (France, Britain), the main type is the arrowhead with squared barbs and a squared tang and its derivatives (barbs or tangs being rounded or pointed). In parallel coexist cruder barbed-and-tanged arrowheads (Nicolas 2017). The main type finds close similarities in projectiles produced by early 3rd-millennium communities in western France, especially the Artenac Culture, where it probably originates (ibid.). To the east (Denmark, Czech Republic, Hungary), few arrowheads with squared barbs and tangs occur in the early stage of the Bell Beaker Culture (Nicolas 2017; Heyd 2001). But there, arrowheads are mainly hollow-based, probably following a Corded Ware tradition (Budziszewski and Tunia 2000; Kolář 2006). In Denmark, hollow-based points might have various shapes but barbs are generally rounded or pointed. There are only two pieces with slanted or squared barbs. In central Europe, hollow-based arrowheads have essentially squared barbs (and to a lesser extent rounded or pointed). This original type with squared barbs probably results from the acculturations between the Corded Ware technical tradition (hafted arrowheads with a concave basis) and the new fashion promoted by the Western Bell Beaker Culture (squared barbs). Whatever the base (barbed-and-tanged or hollow-based), once hafted, these different Bell Beaker arrowheads should have looked quite similar.

The supplies of raw materials show quite different patterns according to the geological setting. In areas where usable flints occur (Cretaceous or Danian flint in England and Denmark), procurement is local. This observation could be applied as well for southern Moravia, where Krumlovský cherts have been widely used but in a limited area around the sources (up to 50 km; Kopacz *et al.* 2009). Elsewhere (NW France, Czech Republic), flint networks have been set up in order to compensate for the low quality of local raw materials (small-sized, poor knapability). In north-wes-

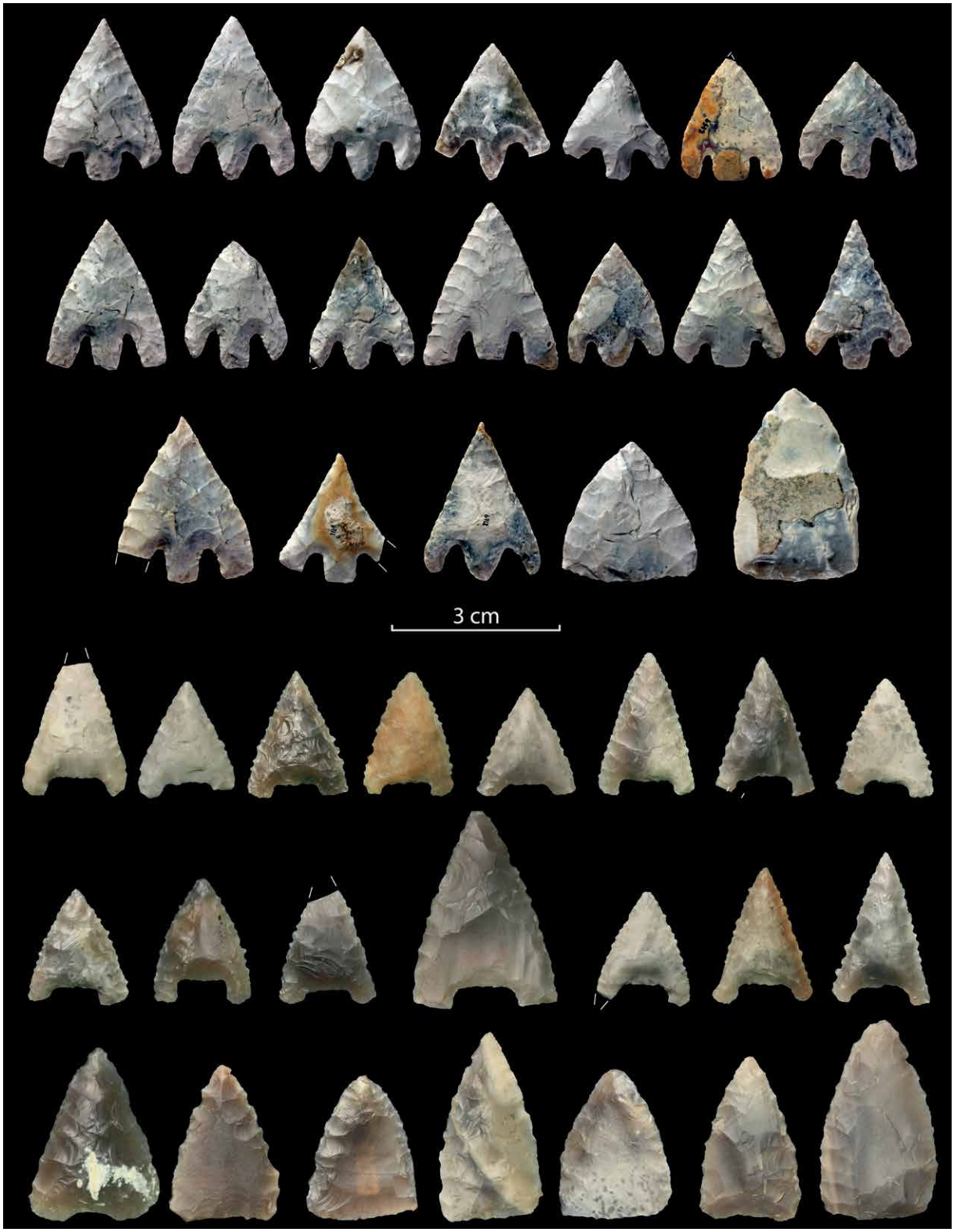

Figure 1. The two largest funerary sets of Bell Beaker flint arrowheads from western and central Europe.
Above: Barbed-and-tanged arrowheads and two rough-outs from the Amesbury Archer's burial (Wiltshire, United-Kingdom (SSWM)).
Below: Hollow-based arrowheads and seven rough-outs from burial 2 at Stehelčeves III (Bohemia, Czech Republic (VMS)). Photos C. Nicolas.

tern France, flints from the Armorican Massif margins (*e.g.* Le Grand-Pressigny flint, Cher Valley flint) circulated over a distance of 400 km, whereas the domestic industries are made up of sea flint pebbles or local siliceous rocks (Nicolas 2017). In the Czech Republic, two main imported flints were used: silicite from glacial sediments (north to Ore Mountains and Sudetes Mountains) mostly in Bohemia, Jurassic flint from the Krakow-Częstochowa plateau (Lesser Poland) mainly in Moravia (Kopacz *et al.* 2009; Přichystal 2013). Besides them, a few local siliceous rocks or imported flint were used as well (ibid.; Nicolas 2016). A specific case is provided by Hungary in the Budapest area where the easternmost Bell Beaker community is (Csepel group). Located on the Csepel Island (Hungary) and its surroundings, this Bell Beaker group is surrounded by different contemporary cultures (Endrődi 2013). Here, networks of raw materials seem to be much more restricted (< 85 km) and the local Buda hornstone has been mainly used. Fine quality radiolarites (Gerecse, Szentgál), even regionally present (40 to 85 km), are in a minority (Horváth 2017). Arrowheads from Szigetszentmiklós-Felső-Ürge-hegyi dűlő cemetery are made of a variety of fissured Buda hornstones, which is far from optimal for knapping. This quite restricted supply might be related to the relative isolation of the Csepel group in the Bell Beaker networks.

All Bell Beaker arrowheads are made from full débitage flakes, sometimes cortical or Kombewa (with two bulbar faces). Some patinated blanks suggest that parts of them could have been recovered on earlier settlements or flint workshops. Although in the minority, several graves in Europe yielded arrowheads, blanks and preforms (Nicolas 2016, Fig.1). The latter are generally ogive-shaped and slightly bigger than the finished products. According to progress, they could be shaped by one or two rows of the retouch. The final retouch is bifacial, low-angle and quite regular. Its extent is from marginal to covering, highlighting diverse investment in making arrowheads. Hollow bases are knapped by short retouching, while barbs and tang are shaped with a combination of short retouches and small notches.

For pressure flaking, both animal bone or antler tools and copper awls could have been used. In Britain and central Europe, several antler tools known as 'spatulae' associated with Bell Beaker arrowheads could have been used as pressure flakers even if other, more debatable uses have also been proposed (see Nicolas 2017). Copper awls had probably been used, as well as those of bone or antler. Indeed, a few copper awls have been found in graves containing Bell Beaker arrowheads in north-western France and also in Scotland (ibid.).

The function of Bell Beaker arrowheads as projectiles is well attested. Although organic remains are generally poorly preserved in Bell Beaker graves, there is much evidence of hafting. In Denmark and central Europe, up to 10% of arrowheads yield some black residues, likely to be glue remains. The best examples are two pieces from grave A at Prosiměřice (Moravia): they are covered in the central part by black, matt and dry residues (birchbark tar?) with woody prints left by the shaft (Fig. 2, 1-2). Furthermore, one of them showed at the time of discovery larger residues with prints of the binding threads wound around the shaft (Pernička, 1961; Fig. 2, 1). Regularly, blunt parts could be observed on the barbs. They are somewhat grained and located on the removal ridges. They are rarely visible to the naked eye but can be felt with the fingertips. When they are well developed, they might be more frequent, bright and visible (Nicolas 2016). However, their origin remains unclear (Gassin 1996, 117-118): intentional abrasion preventing the cut of binding threads or use-wear due to the hafting or the transport in the quiver? One answer is possibly provided by the further blunt parts on the tips of numerous Bell Beaker arrowheads from central Europe (Fig. 2, 3-4). Under a low-magnification microscope they look similar to the ones observed on the barbs. But they could be much more intense to round the tips and affect their piercing properties. Investigations of Early Bronze Age arrowheads (Nitra Culture, Moravia) revealed similar patterns.

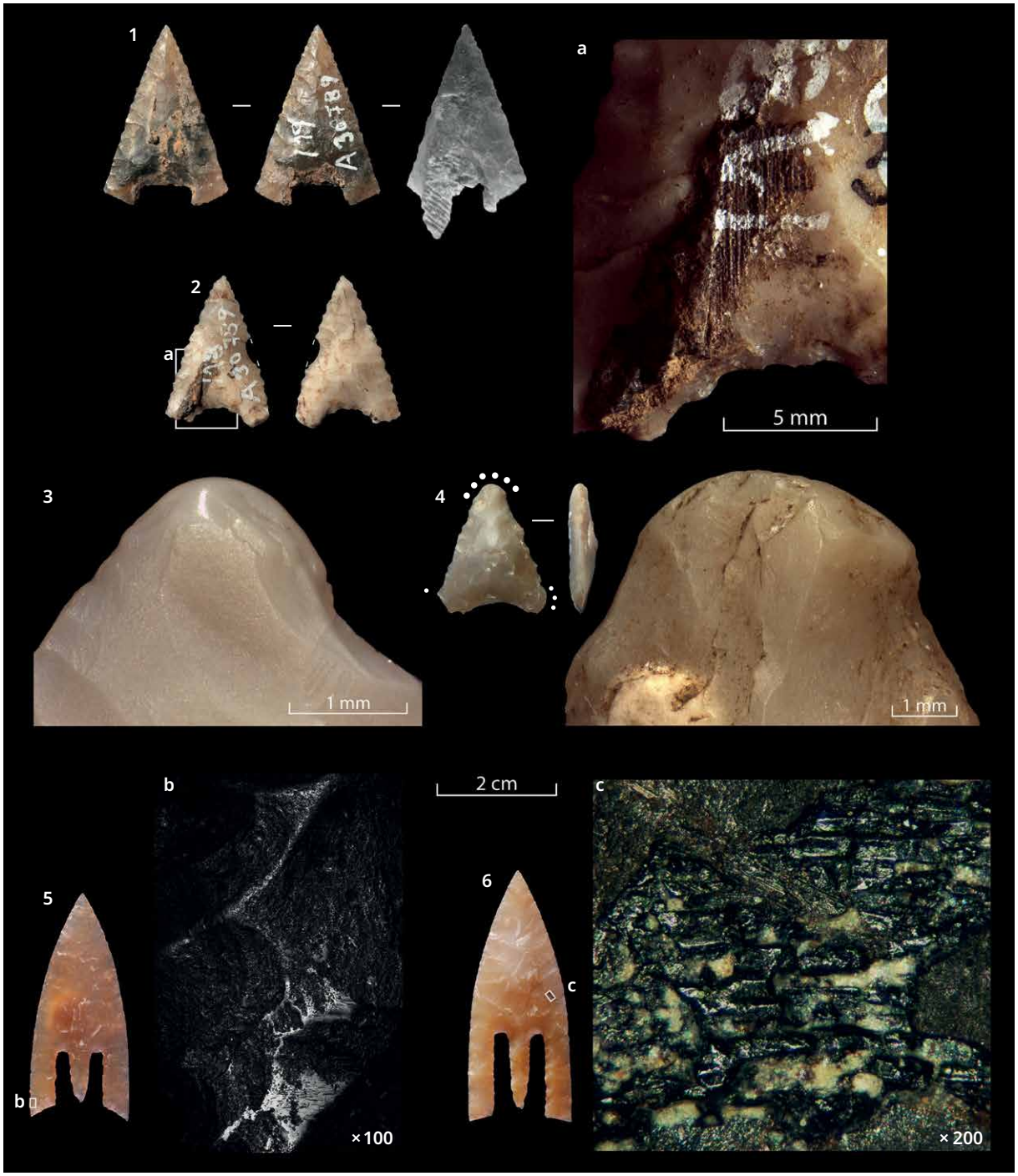

Figure 2. Hafting use-wears on Eastern Bell Beaker arrowheads (1-4) and Early Bronze Age Armorican arrowheads (5-6). (1, 2 & a) Glued arrowheads with woody prints and remains of the binding thread. (3 & 4) Blunting on the tips of arrowheads. (5 & b) Blunt and bright spots with striations on the long barbs of the arrowheads. (6 & c) Glue residue with linear prints of the binding threads. (1 & 2) Prosiměřice, grave A (Moravia, Czech Republic, (JMZ)). (3) Hulín. (2) 'Pravčice', grave H59 (Moravia, Czech Republic (ACO)). (4) Neratovice I, grave 16 (Bohemia, Czech Republic (NMP)). (5 & 6) Prat ar Simon Pella grave (Lannilis, Brittany, Finistère (CDAF)). (1-4 & a) Photos C. Nicolas & Masaryk University archives, Brno. (5 & 6) Photos S. Oboukhoff. (b & c) Photos C. Guéret.

Their examination under a high-magnification microscope allowed identification of friction against dry skin (Kaňáková *et al.* 2016). Similar use-wear was obtained while experimenting with the transport of arrowheads in quivers (Wolski and Kalita 2015). If such an interpretation is correct, the most intense blunt parts observed on Bell Beaker arrowhead tips could have resulted from transport over quite a long time (many years?). Nonetheless, there is evidence of the use of arrowheads as projectiles, underlined by a small number of examples with diagnostic impacts (2 to 5%; Nicolas 2016). In some cases, the arrowheads show signs of repair after shooting (retouch fresher or abrupt). Interestingly, only three cases of deadly arrows are recorded over the entire Bell Beaker Europe (*i.e.* over thousands of burials; Schröter 1997; Nicolas 2017).

After this quick overview, several trends could be underlined for the Bell Beaker arrowheads. Except in Denmark (see below), there is no specific production between objects found in graves, settlements or the countryside, that could be highlighted by differences in size or manufacture. They do not show a high level of technical expertise, even though they appear to have been worked significantly better than the rest of the lithic industry. In some areas (in Brittany for instance), they are the only items produced by bifacial reduction. However, the simplest examples (flakes shaped by short retouching) do not require specific know-how. With a good copper pressure flaker, almost everybody (the author included) was able to knap such arrowheads. However, more elaborate pieces with covering retouching required more practice but probably not a long apprenticeship. This pattern does not exclude the possibility that some knappers acquired greater skill than others (Wiessner 1983); in these cases one could speak of 'experts' as defined by Pelegrin (2007). They could derive a certain prestige from this competence and could exchange some of their arrowheads, but without getting a real benefit in return for their (low) investment. The existence of this kind of skilled knappers could then be a step towards the craft organization of arrowhead production. Moreover, the fact that some of the deceased were buried with arrowheads and part of the arrow maker kits (blanks, preforms, antler or copper pressure flakers as well as arrowshaft smoothers) argues not necessarily for craftsmen's graves but more likely for a low-scale production quite widely mastered in the Bell Beaker societies (Nicolas 2017). The recurrence of archery equipment in graves and its depiction on the stelae of the cemeteries of Le Petit-Chasseur (Sion, Switzerland; Gallay 1995) and Saint-Martin-de-Corléans (Val d'Aoste, Italy; Zidda 1997) suggests the existence of a warrior class identifying itself through manufacture of its hand-made objects (Bailly 2002; Lemercier 2011). In southern France and central Europe, archaeozoological remains highlight that the economy was largely based on farming and wild species were fairly marginal in the food supply (Lemercier 2011; Kyselý 2012). Thus Bell Beaker 'warriors' could have been involved in some prestigious hunting (Nicolas 2017) or warfare, presumably ceremonial due to the low rate of violent deaths (Turek 2015).

Danish Late Neolithic 1 arrowheads (*c.*2350-1950 BCE)

In the Danish Late Neolithic 1 (including Bell Beaker Culture), arrowheads show specific patterns. First of all, they are rarely associated with Bell Beakers elsewhere in Europe but mainly with the Danish flint daggers, being highly symbolic, whose first production involved Bell Beaker communities (Sarauw 2007b, Fig. 3). Such associations once again seem to represent the personal equipment of warriors (Sarauw 2007a).

There are many known Bell Beaker settlements (Sarauw 2007b; 2008) and they yielded hollow-based arrowheads, like the ones found in contemporary graves (see detailed references in Nicolas 2016). Their dimensions are similar but slightly

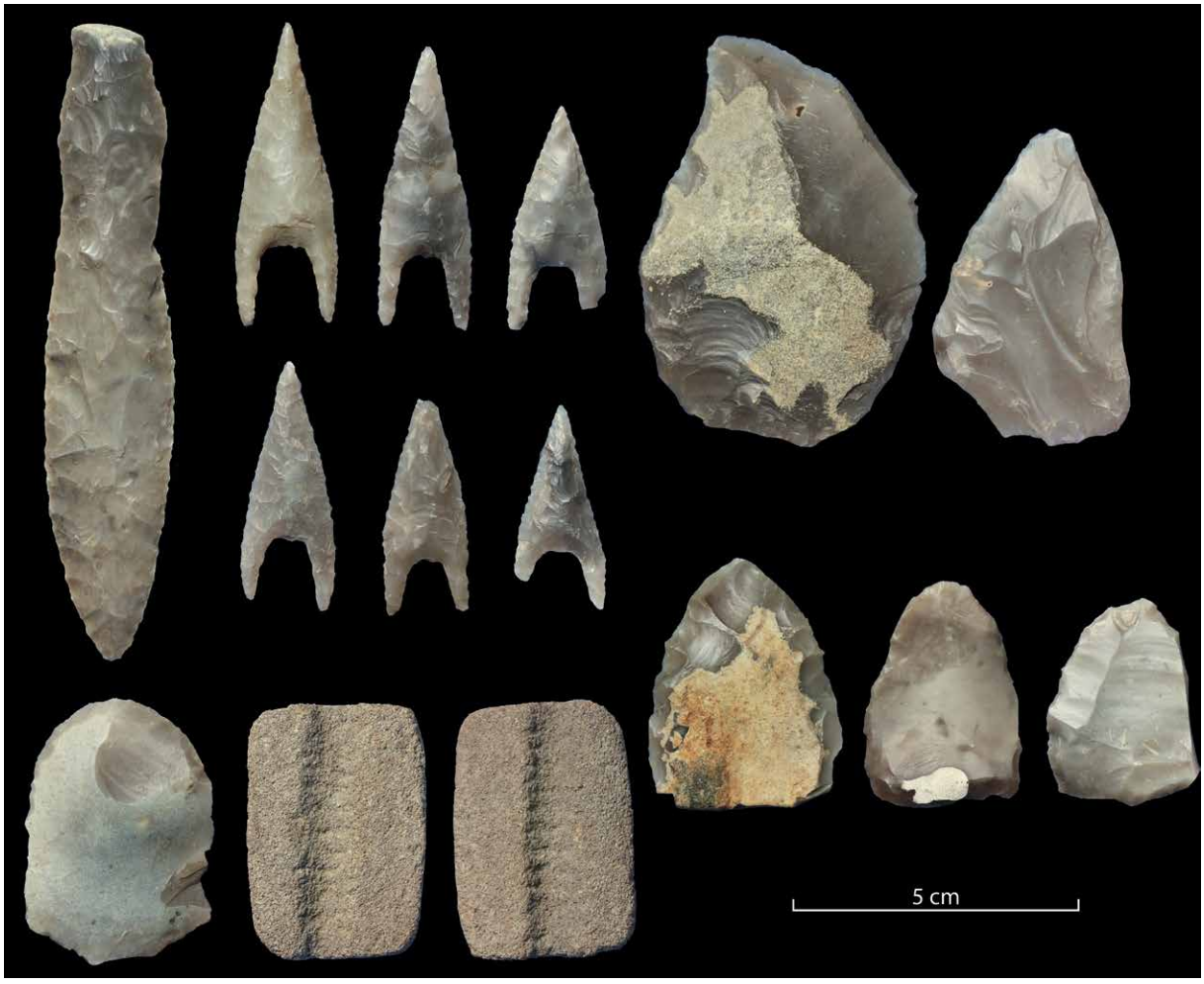

Figure 3. Arrow maker grave from Vorbasse 2a, Ribe, Denmark (NMK), including arrowheads, rough-outs, sandstone arrowshaft smoothers, dagger and scraper. Photos C. Nicolas.

smaller in the settlements (ibid.). A similar pattern has been observed for the flint daggers (Sarauw 2006; 2008). In settlements, additional arrowhead types are known, such as transverse arrowheads, triangular points, or points with concave proximal edges. Thus at least a selection or specific production could have occurred for the arrowheads found in burials.

The hollow-based arrowheads in Denmark show a low degree of similarity (*i.e.* great morphological diversity) and highly variable levels of technical expertise, ranging from those that had been produced quickly to others that had been carefully worked. Several contexts of production show that they were firstly roughed out in workshops and then finished in settlements, with mined flint being used in some cases (see detailed references in Apel 2001; Nicolas 2016). Arrowhead rough-outs are always accompanied by other bifacially reduced preforms for larger pieces (daggers, axe-heads and sickles). Arrowheads are generally in the minority in these industries and so they were not the main objective of the production. Moreover, arrowheads might have been knapped from flakes resulting from the production of the larger bifacial objects (Apel 2001), implying that they would have been a by-product. Arrowhead production in Denmark thus seems to be a secondary craft, with little effort invested owing to the low gain from production. Apel (2001) proposed that the dagger production was based on an apprenticeship system and was the privilege of specific lineages or clans, as was access to flint sources of pure quality and sufficiently large. And so arrowhead production could have served to provide training for apprentices learning the skill of bifacial knapping. This is not, however, to deny the

existence of exceptional examples that had been made by master knappers (Nicolas 2017). By the way, three graves from the Ribe county yielded preforms and, in one case, arrowheads and a pair of arrow shaft smoothers (Fig. 3). The contexts of production as well as the high level of know-how involved for some noteworthy workpieces underline that we are probably dealing with craftsmen's graves.

Early Bronze Age arrowheads around the English Channel (*c.*2150-1600 BCE)

In some parts of Europe and especially around the Channel, production of socially valued arrowheads took place in post-Bell Beaker time, that is, the Early Bronze Age. Their shape clearly derived from Bell Beaker models: they are mostly ogive-shaped with pointed tangs and slanted barbs in north-western France (the so-called 'Armorican arrowheads') and more likely triangular with squared tang and slanted, squared or bevelled barbs in Britain (Nicolas 2017). In Brittany, such arrowheads were, with few exceptions, buried in large numbers (up to 60) in rich graves and found together with further prestigious items (bronze daggers, goldwork, exotic adornment and so on; Nicolas 2016). Although in Britain the Early Bronze Age arrowheads could be part of the elite burials, they are always found in smaller amounts.

North-western France

In north-western France, several types of Early Bronze Age arrowheads have been defined according to the shape, the length/width ratio and the length of the barbs (Nicolas 2016; Nicolas and Guéret 2014). At an early stage, short and subtriangular arrowheads tend to develop towards short or medium-length ogive-shaped forms (Fig. 4). At a middle stage, the previous arrowheads evolve towards ogive-shaped and elongated points with short barbs or more spectacular long barbs (up to 23 mm). Arrowheads with longer barbs are mainly found in north-western Brittany, suggesting the existence here of a local workshop of the finest arrowheads. During the final stage, the arrowheads are triangular in shape with a tang or alternatively a concave base. The latter could be interpreted as the result of the loss of the tang while knapping, rather than as an intentionally hollow-based form; indeed some examples have a tiny 'stump' instead of a true tang. Two triangular specimens made from sheet copper alloy may be interpreted as being imitations of flint arrowheads (Nicolas 2017). This loss of know-how that is expressed by the inability to knap a long tang and by making metal copies seems to mark the end of the production of Armorican arrowheads.

The Armorican arrowheads are made of a quite large variety of facies, ranging from translucent or semi-translucent colours (colourless, grey, honey-coloured, orange, red, brown) to more opaque colours (grey or honey-coloured). However, most of these varieties seem to stem from a single source, the flint of Meusnes lying in the Lower Turonian levels in the Cher Valley (Fig. 4). If some of the varieties occur in the primary deposits, the reddish or orange pieces result from coloured patina, probably acquired on river terraces. This aside, further flints were used, maybe collected as well, in a similar area (along the Loire? Nicolas 2016). At the early stage of production, all varieties were used but then a high quality honey-coloured translucent facies, with rare inclusions, was used, preferably for making the long ogive-shaped arrowheads.

Reconstructing the operational sequence of the Armorican arrowheads is a difficult task because only finished, highly retouched products are known. As with the Bell Beaker arrowheads, different flakes have been used as blanks: full débitage, cortical, Kombewa and patinated flakes. The production and the use of the blanks were apparently not determined by a strict operational scheme. The adaptation of

Figure 4. Possible arrow makers' graves from Britain.
Above: Flint grave goods from Breach Farm Barrow (Llanbleddian, Wales (NMW)).
Below: Rough-outs from Barrow 13, Petersfield Heath cemetery (Hampshire) (People of the Heath project, directors S. Needham & G. Anelay)). Photos C. Nicolas.

the volume of the blank to the planned arrowhead seems to be the most important. The shaping of the Armorican arrowheads apparently starts with a preform made by soft organic percussion as is suggested by the small and scaled removals observed on several pieces. The shaping is then continued by pressure flaking, as attested by clearly concave first negatives of removals, fine and regular removals and sharp micro-overhangs left on either side of the pressure point. The use of an awl made from copper alloy is demonstrated through the presence of small pressure points (< 1 mm) and of slight greyish green traces left by unsuccessful retouching (Nicolas 2016). Moreover, bronze awls, harder and possibly thinner, may allow being more accurate and making the tiniest retouch easier.

The retouch types are generally coverings and more rarely invasive or short. Most of the pieces manufactured in this way are perfectly biconvex. The edges were systematically regularized by particularly fine micro retouching (< 2 mm long). The most critical moment in the manufacture of an Armorican arrowhead is the knapping of the tang and the barbs. Each removal requires controlled pressure that is sufficient to remove the flake and to avoid plunging. The shaping of the tang and the long barbs requires the use of high-quality material (translucent honey-coloured flint from Meusnes) as well as sophisticated knapping in shaping an arrowhead that is both slender and thin. The Armorican arrowheads with the longer barbs are extremely slender and thin, measuring generally between 2.6 and 4.1 mm in thickness. It clearly appears that more appreciable thinness was required in order to shape the tang and the long barbs. Thus the knapper has less thickness to remove with less pressure and therefore the preform is more manageable and less likely to break.

The Armorican arrowheads doubtlessly required a high level of skill in order to master all the stages of the operational sequence and to control pressure flaking with maximum accuracy. Experiments were carried out by Frédéric Leconte according to an operational sequence similar to the one observed on the archaeological specimen (Nicolas 2016). These experiments revealed that a self-taught knapper, after two years of daily practice, will master the knapping of arrowheads with barbs of a 12-mm length and of arrowheads with barbs of a 16-mm length after several additional months of training. Yet Frédéric Leconte was not a complete novice in flint knapping and he practised for about ten years (knapping mostly hand-axes). Two to three years could be therefore the minimum time span to master the manufacturing of Armorican arrowheads. This apprenticeship period is certainly different from that of prehistoric times. The teaching provided by the knapping masters probably encouraged the progress of the apprentice. As argued for the Danish Late Neolithic, the evidence suggests that we are dealing with a specialized craftsmanship but with strong differences: Armorican arrowheads were the only highly crafted flint goods in north-western France and its diffusion is much more restricted to some elite burials.

While excavating, several archaeologists observed the survival of shafts, glue and binding threads (see Nicolas 2016). The remnants of shaft bindings have disappeared since the excavation but the traces of glue were better preserved. These are visible to the naked eye in the form of brown-black deposits, sometimes associated with a brown film and can be identified as remnants of glue. In most cases, this brown-black matter can be observed only occasionally on the surface of the arrowheads. Preliminary analyses (infrared spectroscopy) made it possible to confirm that the brown-black matter attached to the three arrowheads is indeed remnants of glue. The signal obtained matches that of plant tar or resin, perhaps of birchbark tar (study Rageot; Nicolas and Guéret 2014). When remnants of glue are well preserved, it can be stated that the brown-black matter covers not only the barbs but also the entire arrowhead: the remnants of glue are present close to or on the edges of the arrowheads and sometimes near the tip. Under the microscope, one glue deposit bears linear and parallel marks possibly left by a non-braided binding thread (Fig. 2, 6).

Almost all the arrowheads observed under the microscope bear bright spots visible to the naked eye. These are located on the high points, mainly on the arris of the negatives (Fig. 2, 5). Where they are particularly large, they may slightly recover the cavities. They are located in the lower zone of the arrowhead, on the barbs and above, rarely exceeding half of the pieces. Where they are well developed, the bright deposits are marked by short and large striations without polished ground. The striations are triangular with one end larger than the other. They are parallel but transversal with regard to the orientation of the arrowheads. These stigmata are often associated with blunted pieces. On a microscopic scale, these latter are systematically marked along the barbs and more particularly their denticulations. They overflow only very little, except for the end of the barbs where they tend to cover the sides, associated with bright spots on the ridges of the removals. They are very matt, coarse and often without polished components.

The bright spots are very similar to taphonomic alterations, often visible on archaeological material. Their distribution and the pattern of the striations, however, leave no doubt about their functional origin. These stigmata are closely related to blunted pieces and seem to occur during the same time span (Fig. 2, 5). Most probably they result from transversal and repeated movements of the implement during hafting. Equally, the absence of a clear directional sign, the smoothness and the location of the blunting are rather indicative of progressive development, certainly linked with the binding threads. This assumption would imply quite a loose hafting which enabled the arrowhead to move in a transversal manner according to the direction of the striations. It should therefore be admitted that the hafting of these arrowheads was of poor quality and not destined for accurate aiming. This statement is supported by the fact that no diagnostic break indicative of an impact could be observed on the Armorican arrowheads. The hafting of the Armorican arrowheads thus seems to be symbolic rather than functional and lasted long enough to cause bright spots and blunted parts. According to the distribution of the bright spots and the blunt zones, the arrowheads were hafted with a thread passing around the barbs. In one case, this binding thread was applied on the glue (Fig. 2, 6). Glue was placed on the internal edges of the barbs and the tang but also on the external edges of the barbs. It is thought it was to totally cover the binding threads, the lower part of the arrowheads and sometimes their tip. With such a type of hafting, the long barbs of the Armorican arrowheads became perfectly invisible.

The analysis of the traces reveals that these artefacts were widely used before they became grave goods. There is evidence to suggest that all or at least a very large number of the Armorican arrowheads were loosely and poorly hafted, in such a way that use-wear appeared (Nicolas 2016). Such an inoperative hafting together with the absence of impact marks make these Armorican arrowheads non-functional objects, mounted on shafts for their exhibition only. This display is in itself contradictory because the long barbs of the arrowheads become invisible when the arrowhead is hafted. If our observations are right, what was important was not that their owner displayed them, but rather that it was known that he owned them. In many respects, the Armorican arrowheads are prestige items alienated from their primary function.

The Armorican arrowheads, manufactured from exogenous flint by highly skilled knappers, certainly craftsmen, were apparently intended for display only. There is no doubt that these objects were reserved for the Early Bronze Age elite. These are in addition the most numerous and the most distinctive objects in the tombs of these chiefs. The Armorican arrowheads therefore can be considered to be an insignia of power. These Early Bronze Age chiefs probably controlled the manufacturing of the arrowheads through the supplying of the raw material, by supporting the craftsmen and/or by controlling the circulation of the arrowheads (Nicolas and Guéret 2014; Nicolas 2016).

Britain

In southern Britain, the mode of production is less obvious for the Early Bronze Age: in graves, sets of arrowheads are smaller, and fewer examples exist than in Brittany. Without being dominant, arrowheads are some of the prestige objects of the Wessex elites (Fig. 5). These distinctive patterns by comparison to Brittany result probably from a different way of consumption and use_of the arrowheads. Large amounts of barbed-and-tanged arrowheads, presumably related to the Early/Middle Bronze Age, occur in British museums, attesting a fairly large production of these artefacts. Furthermore, some arrows were clearly deposited in non-funerary hoards. At Kingsmead Quarry (Horton, Berkshire), a hoard has been found at the base of an oven, within one of the Early/Middle Bronze Age farmsteads. The hoard includes, among other things, eight flint barbed-and-tanged arrowheads, a piece of sandstone (an abrader?) and a copper alloy awl. Beyond the interpretation of such a deposition, this set_could be considered part of the toolkit of an arrow producer (Wessex Archaeology 2009). At Holloway Lane (London), a hoard includes six barbed-and-tanged arrowheads, made by covering retouch, and parts of an aurochs (thought to be an endangered species at that time in Britain). This symbolic hoard highlights a symbolism around hunting (Cotton *et al.* 2006).

Large amount of barbed-and-tanged arrowheads shaped by covering retouching could point towards a quite specialized production. Moreover, the noteworthy character of some arrowheads (accurately knapped, peculiarly thin) suggests a craft specialization similar to that underlined for Brittany (Fig. 5). By the way, several British examples show some patterns (ogive-shaped or long barbs) which do not fit the local tradition of fancy triangular arrowheads and might be considered copies, more or less successful, of Armorican arrowheads (Nicolas 2016). In addition to the Kingsmead Quarry hoard, there is further evidence of a specialized craftsmanship of arrowheads. The recent excavations of a barrow cemetery at Petersfield Heath (Hampshire, England) yielded two graves with arrowhead rough-outs. In Barrow 11, a probable cremation within a wooden coffin contained a bronze dagger and a perforated whetstone related to the Wessex 2 period and, above all, a pile of nine pieces of flint and two pieces of sandstone (abraders?); an additional strike-a-light flint was found alongside (Needham and Anelay 2014). In Barrow 13, a pit grave partially destroyed by an antiquarian trench, revealed a heap of cremated bones. It includes in particular ten arrowhead rough-outs arranged in a pile. A possible eleventh rough-out was found beneath an item of sandstone, a possible abrader (Needham and Anelay 2015). The rough-outs correspond to different stages of processing and their sizes are much larger and thicker than previously in Bell Beaker times (Fig. 5). They are made from bigger blanks worked by several series of removals by soft percussion. The next stage would have been probably final shaping by pressure flaking. Such manufacture is more time-consuming and reveals a greater investment in obtaining regular and biconvex products. Thus the knappers would have presumably been quite specialized, dedicating part of their time to producing arrowheads. Such discoveries evoke the previously mentioned graves from south-eastern Jutland, yielding arrowhead preforms as well, and could correspond to graves of arrowhead craftsmen. The fact that at Petersfield Heath no finished products were found with the arrowhead rough-outs might suggest a major economic change with a greater distinction between the producers (craftsmen) and the recipients than during the Bell Beaker period.

This interpretation should be qualified with the famous Early Bronze Age grave from Breach Farm (Llanbleddian, Wales). It contained a cremation buried under a quite large barrow and yielded one of the most exquisite set of arrowheads of the British Isles (Fig. 5). Beside the 13 arrowheads, six flint bifacial pieces were found (probably arrowhead rough-outs), a flint scraper and a flint planoconvex knife, an

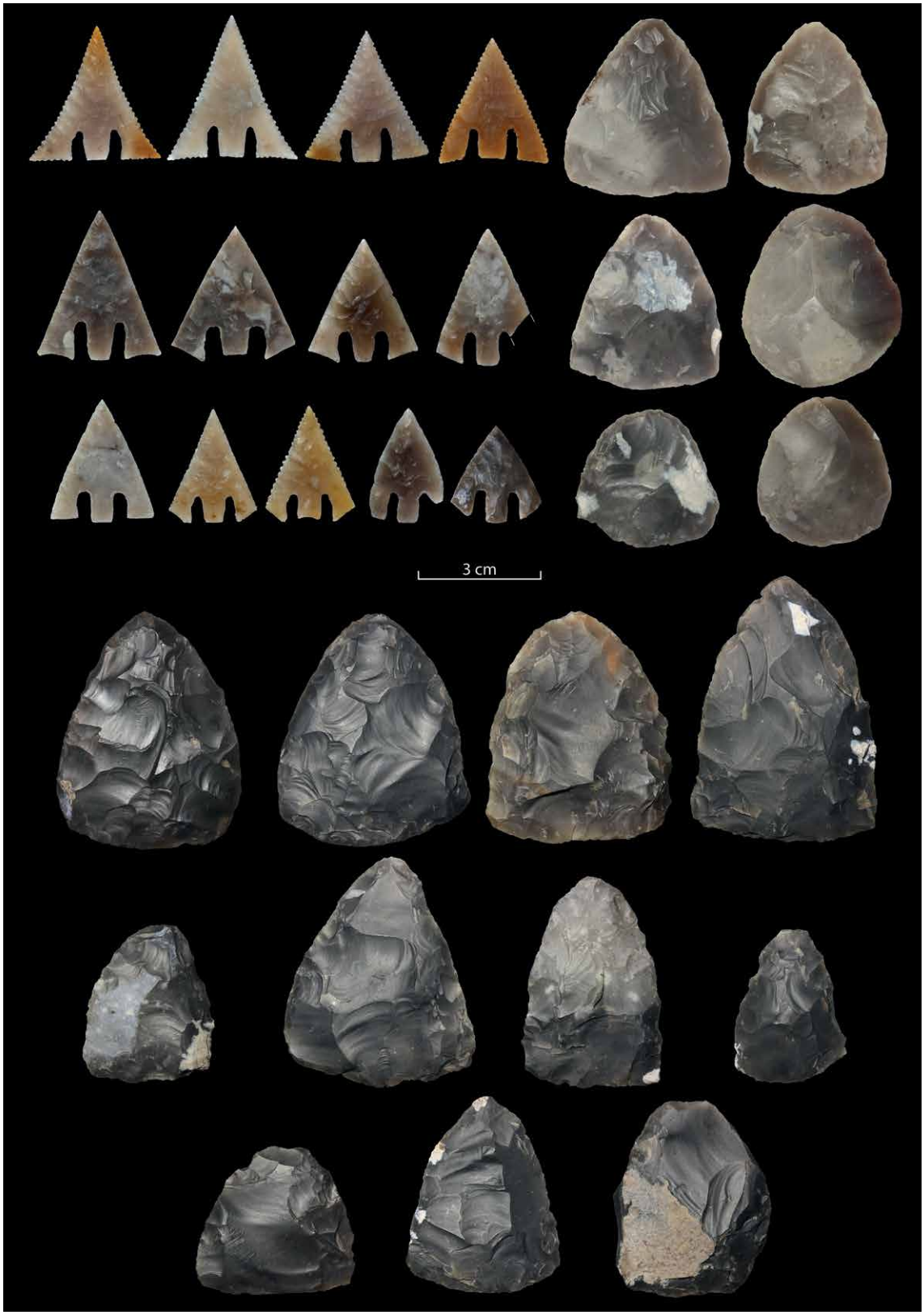

Figure 5. Early Bronze Age Armorican arrowheads. Above: Half of the arrowheads from the Kernonen barrow (Plouvorn, Brittany, France). Below: Arrowheads from the Limbabu grave (Saint-Thégonnec, Brittany, France (MPF)). Photos: C. Nicolas.

axe, two sandstone arrowshaft smoothers, a dagger and a chisel made of bronze as well as a pigmy cup (Grimes 1938). Again, the association of finished arrowheads, probable rough-outs and arrowshaft smoothers suggest that part of the Breach Farm grave goods could correspond to the set of an arrow producer. The difference from the Petersfield Heath burials lies in a joint collection of half-products and finished examples. These latter show stylistic parallels with Armorican arrowheads and highlight connections between elites across the Channel (Nicolas 2016). The rest of the grave goods (bronze dagger, axe and chisel, pigmy cup) liken the Breach Farm barrow to the Wessex 1 series and underline too the high status of the deceased. In this case, we can question whether instead of being an arrow producer his status allowed him to control this craftsmanship.

Bell Beaker bracers

Intrinsically tied to the arrowheads, the bracers or wristguards are part of the Bell Beaker warrior set (Fig. 6). However, this functional and symbolic association is not evident at first glance from the archaeological records. A minority of burials (< 5%) yielded both arrowheads and bracers and, in some countries like Austria or Denmark, they are never found together (Sarauw 2007a; Bosch 2008). This presumably results from a selective deposition in burials, expressing maybe the different status of warriors.

Like arrowheads, the two main traditions have been identified between Western and Eastern Bell Beakers (Fig. 6). In Atlantic Europe, the bracers are generally flat, narrow and two-holed. Such types occur in central Europe as well, apparently in an early stage of the Bell Beaker Culture (Heyd 2001). Then to the east, a new type appears with a curved section and four holes which constitute the majority of the corpus. They occur also in Britain (Woodward and Hunter 2011). Beyond these two main types (flat two-holed and curved 4-holed), there is a wide diversity according to the shape of the edges (straight, convex, concave), the number of holes, the section (rectangular, biconvex, planoconvex, more or less curved) and the presence of some carved ornamentation (cup-marks, parallel incised lines and so on).

Bell Beaker bracers in continental Europe are generally made of a wide range of soft rocks (sandstone, claystone, siltstone, slate and so on), differentiated by their grain size, their colour or their bedding (Fig. 6). Whatever the stone, specific colours (beige, black, green, red) seem to have been selected. Within a single region, these rocks could be quite diverse, limiting any attempt at provenience studies. However, when petrographic analysis has been carried out, the rocks stem most likely from local to regional sources (Přichystal 2000). But this pattern should be qualified with wider investigations carried out in the Anglo-Celtic Isles, where specific products made of harder rocks have been identified: curved bracers made of Great Langdale tuff, largely diffused in Britain, or flat amphibolite pieces (Woodward and Hunter 2011). In Brittany or the Czech Republic, different blanks were used, such as small blocks or slabs and pebbles (Fig. 7, 5-6).

The first stages of bracers shaping are unknown. However, some rough-outs unpolished or ready to be holed or in the process of drilling are known from settlements and graves (Turek 2015). In Brittany, some slate pieces show negatives of removals, suggesting that they were roughed out by knapping (Nicolas 2016), while in the Czech Republic this technique seems to be unused. However, in both areas, oblique or longitudinal striations on the edges suggest less coarse shaping by abrasion than sawing. Thus it is likely that the first stage was to saw a blank of the required volume. The rough-out is then shaped by abrasion. For the most complex pieces with a deeply curved section, this stage represented the main task using long and convex abraders. Then, a finer abrasion, generally longitudinal, allowed

Figure 6. Bell Beaker stone bracers from western Europe (above) and central Europe (below). Brittany: (1) Plobannalec-Lesconil stone-cist, (Finistère (MPF)). (2) Nelhouët passage grave (Caudan, Morbihan (MAN)). (3) Coatjou-Glas barrow (Plonéis, Finistère (MAN)). (4) Finistère (MAN). (5) L'Estridiou passage grave (Plomeur, Finistère (MAN)). (6) Kerandrèze gallery grave (Moëlan-sur-Mer, Finistère (MAN)). (7) Kerody (Saint-Nicolas-du-Pélem, Côtes-d'Armor (DAG)). (8) Lothéa barrow (Quimperlé, Finistère (MAN)). (9) Tišice, grave 77/99 (Bohemia (ARUP)). (10) Hulín 1 'U Isidorka', grave H95 (Moravia (ACO)). (11) Luleč grave (Moravia (MV)). (12) Souš grave (Bohemia (RMT)). (13) Předmostí grave 2 (Moravia (MKP)). (14) Němčice nad Hanou, grave 33 (Moravia (MZMB)). (15) Praha 'Ruzyně' (Bohemia (NMP)). Photos C. Nicolas.

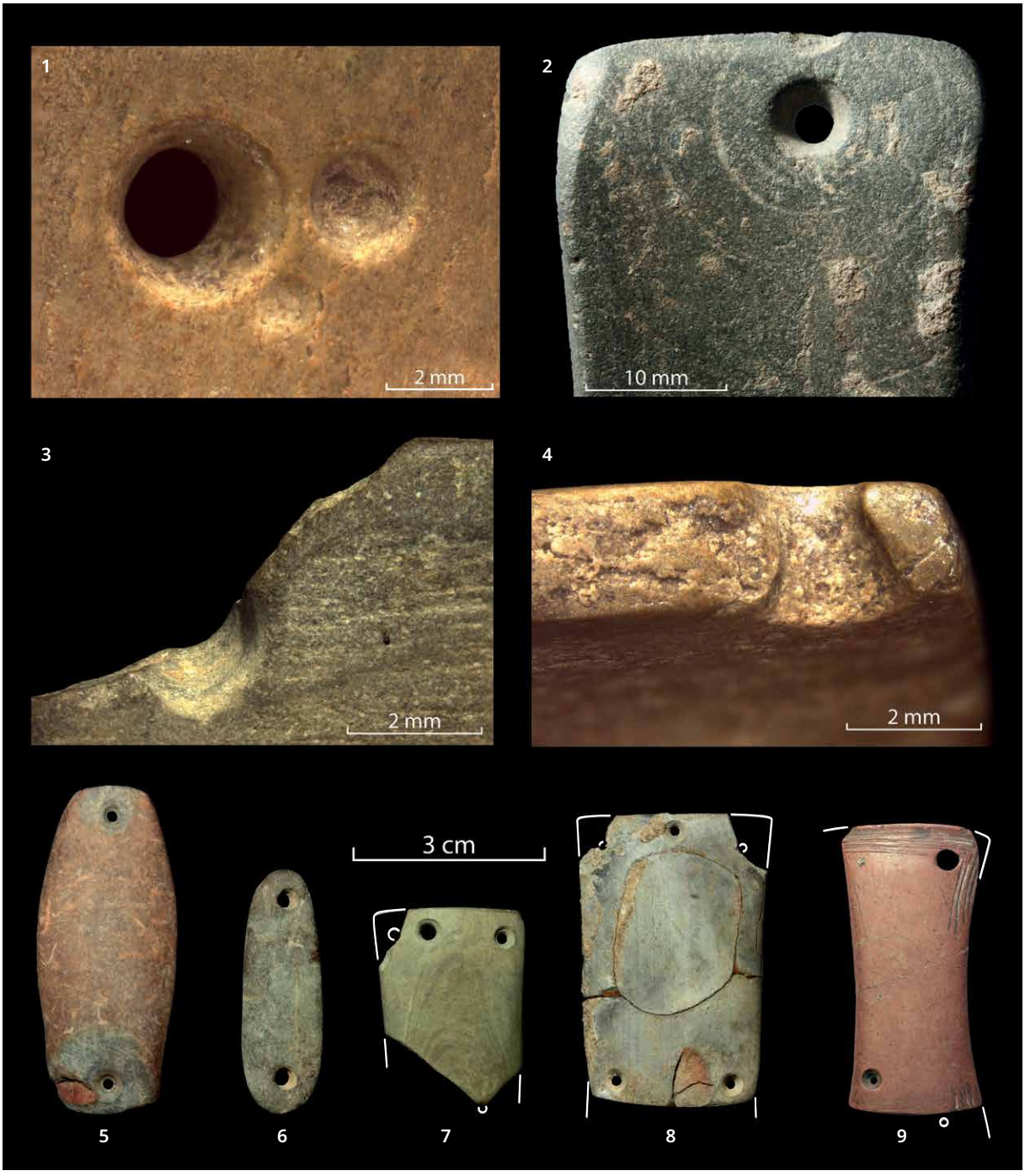

Figure 7. Details of stone bracers and unsuitable pieces for wristguards in Czech Republic. (1) Two aborted perforations close to a hole. (2) Bow drill striations around a perforation. (3-4) Broken and blunted holes. (5-6) Perforated pebbles. (7-9) Broken and reshaped bracers. (1 & 4) Grave 53/80-I, Radovesice-Bílina III (Bohemia (RMT)). (2) Třebovle, Bohemia (RMK). (3 & 7) Grave 1 at Stehelčeves III (Bohemia, Czech Republic (VMS)). (5) Grave 11, Praha 'Kobylis' XV (Bohemia (MHMP)). (6) Grave, 841/02, Hoštice IV (Moravia (MV)). (8) Grave 1/50, Bohutice II (Bohemia (NMP)). (9) Velké Žernoseky (Bohemia (RMT)). Photos C. Nicolas.

smoothing of the faces. The flat bracer could have been polished by longitudinal, transversal or oblique abrasion. Greater care is devoted to work on the outer side of the bracer, while the inner face is more coarsely abraded or even left raw. Holes are mainly hourglass-shaped, sometimes preferentially drilled from the inner side. In a few cases, funnel-shaped holes led to small scars on the opposite face during drilling. Frequently, hourglass-shaped holes are not perfectly face to face and one or several abandoned perforations could be observed. Striations in and around holes are very regular, circular and point towards the use of a bow drill (Fig. 7, 2). Some pieces are ornamented with cup-marks, similarly drilled like the holes. Further bracers are decorated with grooved lines. Such ornamentation could be carried out before or after drilling.

Making bracers does not require special skills. Sawing, abrading, polishing could be time-consuming but are possible for anyone with a basic know-how. The critical stage is probably drilling, as shown by the numerous abandoned holes (Fig. 7, 1) and broken pieces during piercing. However, such breaks were not definitive and several specimens were reshaped in order to make new holes (Fig. 7, 7-9). Experiments reproducing the simplest flat bracers suggest that they could be done in two to four hours only (Smith 2006; Vaart, 2009). Moreover, a few bracers are simple pebbles perforated at their ends that should have been done even more quickly. Nevertheless, curved pieces would have required more time for hollowing out the inner side. As with Bell Beaker arrowheads, everyone should have been able to produce their own bracers. But this does not mean that everyone has the same talent and it is likely that different skills were expressed in the balance of the shapes or the symmetry of the perforations. However, an exception could be made for the most complex bracers, trapezoidal in shape, with curved section, carved ornamentation and flanges on the ends. Such pieces required the mastering of the volumes of the rough-out in order to optimize the working time. Above all, the symmetry of the forms and the regularity of the engravings of certain examples show a certain skill, acquired only by experience. These fancy bracers were probably produced only by experts, or even craftsmen.

The biographies of bracers suggest that these perforated stones were used as ornaments and not proper archers' wristguards. In central Europe, most of them are profiled to be adjusted on the forearm (*c.*10 cm long, *c.*0.5 cm thick, curved section, even a trapezoidal shape). However, different specimens are likely incompatible with the use of a wristguard. As previously argued by Fokkens *et al.* (2008), small bracers (< 5 cm) are not sufficiently long to protect the forearm during bowstring release (Fig. 7, 5-6). Equally, flange-ended bracers could be 1 cm thick, increasing the risk of the bowstring catching on the bracer (Fig. 6, 12). Nonetheless, experiments recently demonstrated that small removals could occur when the bowstring impacts on the wristguard (Muñoz and Moro 2017). Such use-wears are quite common as similar marks occur frequently on both polished faces due to erosion. But very few bracers show evidence of use as wristguards, suggesting in return that most of the bracers were slightly or not used as such. Several studies have shown a regular pattern of more or less intensely blunted bracers throughout Europe (Vaart 2009; Woodward and Hunter 2011; Nicolas 2016, Fig. 7, 3-4), suggesting that some of them could have been worn quite a long time (during the life of the individuals, over generations?). Repeatedly, some bracers are broken, reshaped, holed again to such an extent that at the end of their life cycles they were not suitable to be used as wristguards (Fig. 7, 7-9). Furthermore, Fokkens *et al.* (2008) have pointed out that most of the bracers were worn on the outer side the forearm, suggesting that they were more than likely an ornament than a proper wristguard. And so, if some of them were used in such a way, it could be the exception rather than the rule.

Early Bronze Age bracers

During the Early Bronze Age, bracers were still in use in some regions. Some late Bell Beaker bracers could be made in luxury versions, as stone bracers riveted with gold studs in Britain (Woodward and Hunter 2011) or gold-sheet bracers copying the funnel-shaped holes (Spindler 1993). In the meanwhile, several original products belong to Early Bronze Age cultures. For instance, in the Nitra Culture (Moravia, Slovakia), some bracers were no longer holed at the end but grooved, involving a new way of wearing them (Ondráček and Šebela 1985). In the Únětice, Polada and El Argar Cultures, two-holed or four-holed bracers occur in relatively quite large numbers (Aspes and Fasani 1976; Bartelheim 1998; Muñoz Moro 2017). However, in the El Argar, bracers were likely used as sharpeners (Muñoz Moro 2017). In Brittany, four small bracers with a distinctive shape (concave edges) are made of precious raw materials (Baltic amber, gold sheet or Whitby Jet; Fig. 8). The latter is in particular made of a jet spacer bead, typical ornament of the crescentiform necklaces produced in northern England (Sheridan and Davis 2002), highlighting long-distance networks and quite complex biographies for such objects. Once arrived in Brittany, this jet spacer bead was reshaped, the edges carved in order to make them concave, following the local fashion of the Early Bronze Age bracers. The raw materials and the size of such bracers definitely do not fit a use as wristguards. However, there is some use-wear on the holes, suggesting that they were worn, probably as bracer ornaments. These four bracers were found together with the Armorican arrowheads in rich graves, forming a symbolical set of archery-related items.

Discussion

Bell Beaker and Early Bronze Age arrowheads and bracers result from specific technologies and constitute socially valuable artefacts that reflect transformations of social practices.

The development of barbed-and-tanged arrowheads is rooted in a long-lasting tradition. Except for_early examples occurring in Solutrean societies in Spain (*c.*23000-17000 BCE; Javier Muñoz *et al.* 2012), they appear in the western Mediterranean during the early 4th millennium BCE (Vaquer and Bordreuil 2013). From the early 3rd millennium BCE, they were adopted in more northern areas but the Bell Beaker Culture introduced this new type in northernmost Europe (Ireland, British Isles, and Scandinavia). Even though copper tools are not necessary for producing such arrows, as underlined by Solutrean examples, they probably made it easier to execute the preform shaping and the knapping of barbs and tang (copper awls offer a smaller point of pressure). Indeed, the development of barbed-and-tanged arrowheads occurred at the same time as the introduction of copper awls in southern France (Thiercelin-Ferber 2013). Until the Early Bronze Age, there is much evidence to show the use of such copper alloy tools for producing barbed-and-tanged arrowheads.

Barbed-and-tanged arrowheads require a more time-consuming production than the simpler types (*e.g.* transverse arrowheads) but they offer a greater efficiency, limiting the removal of the arrows and causing greater injuries. As suggested by ethnographic studies carried out by P. and A.-M. Pétrequin (1990), complex arrowheads were intended for war, as it was more important to kill a human than an animal. Thus it is conceivable that the spread of barbed-and-tanged arrowheads was linked with warfare development. Indeed for the first half of the 3rd millennium BCE in France, there is much evidence of violent deaths (Guilaine and Zammit 2001), sometimes by arrows (Dias-Meirinho 2008). In the meanwhile, there is an increasing number of enclosed sites. One of them, the fence enclosure defending a spur at Basly (Calvados) was burnt down and dozens of arrowheads (transverse

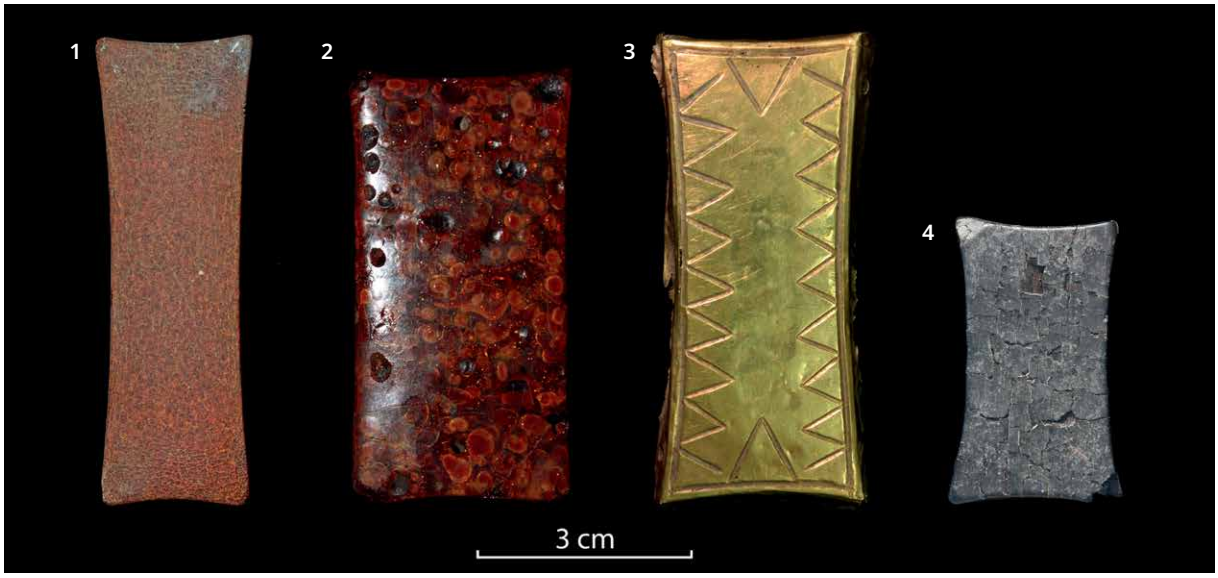

Figure 8. Early Bronze Age bracers from Brittany made of Baltic amber, gold sheet and Whitby Jet spacer bead. (1) Kernonen barrow (Plouvorn (MPF)). (2) Saint-Fiacre barrow (Melrand (AM)). (3) La Motta barrow (Lannion (MAN)). (4) Kerguévarec barrow (Plouyé (MPF)). Photos C. Nicolas.

and barbed-and-tanged) were found along the fence (Fromont *et al.* 2014). Nevertheless, for the Bell Beaker period we recorded only three cases of individuals killed by arrows, representing less than 0.1% of the graves at that time. Except around the Mediterranean where Bell Beaker communities occupied previously fortified sites, the Bell Beaker settlements are open all over Europe (Vander Linden 2006). Thus violence during the Bell Beaker period is less tangible and might suggest a more peaceful time, allowing large networks all over Europe. Nonetheless, archery equipment did not disappear then and it became the object sign of warrior status. The arrowheads aside, new objects appeared according to the regions: stone bracers, as well as bow-shaped pendants (Růžičková 2009). These archery-related items were socially valuable, intended for display or used from time to time (prestige hunting, ceremonial warfare?). In some parts of Europe, these objects gained a new value during the Early Bronze Age. The fancy Armorican arrowheads, which were not designed to be shot but to be displayed, as well the bracers made of gold, amber or jet definitely count as 'precious objects' as defined by Maurice Godelier (1999). Furthermore, these display items were kept exclusively for the use of chiefs (no classical Armorican arrowheads having been found outside the graves) and they were not exchanged. In these respects, Armorican arrowheads could be considered sacred objects, that is to say, inalienable goods which do not fit into the logic of a gift economy (ibid.). These sacred objects generally have a mythical origin, as items reportedly inherited from distant ancestors or given by divinities. In this respect, Armorican arrowheads, derived from earlier patterns, could be interpreted as a clear reference to the ancestors and the representation of the Bell Beaker warrior. In some historical contexts when social hierarchy exceeds divisions on the basis of sex, family and clan, these kinds of sacred objects become for the elite a real means of social reproduction and of intercession with the gods (Godelier 1999; Pétrequin *et al.* 2012), which would explain the prominent place of Armorican arrowheads in elite burials.

This long-time perspective underlines the evolution of the role played by arrowheads and bracers, from objects for war or hunting to display items. In this respect, they reflect social changes observed during the 3rd millennium BCE. Considering western France, there is very little evidence for the Late Neolithic social organizations, as collective burials in megaliths make it difficult to define the structures of the societies. With the introduction of the Bell Beaker Culture appear the first individual graves, underlining the privileged status of some people. But there are no large diffe-

rences in grave goods and no specific products: arrowheads found inside or outside graves are similar. The richest Bell Beaker graves could be at best considered those of local chiefs (Jeunesse 2016). Furthermore, anyone with basic manual skills would be able to produce arrowheads and bracers more or less elaborate according to their know-how. With the Early Bronze Age in Brittany, funerary arrowheads and bracers become much more important and the result of specialized craftsmanship. They belong to wealthy graves as sacred objects.

Archery-related items and their technologies could not be considered proper triggers for social changes but they reflect them. The main social and economic transformations between the Bell Beaker period and the Early Bronze Age rest on more stratified societies, development of long-distance networks, the growing importance of metalworking in everyday life, and above all new land management with the appearance of the first field systems (Marcigny 2012; Nicolas 2016). Nonetheless, copper and bronze awls as well as craftsmanship organization allowed the production of new symbols of power and therefore legitimate new elites and a new social organization.

Regarding the diffusion of the Bell Beaker archery equipment, evidence for long-distance exchange of goods is scarce. More probably, it is the ideas, the related techniques and those who master them that have travelled. As argued by anthropological morphometry, isotope and DNA analysis (Price *et al.* 2004; Desideri 2011; Olalde *et al.* 2018), at least individuals, small bands or larger groups spread the Bell Beaker Culture and the warrior ideology around archery. However, these migrations were not one-way and stopped once the people were established. During all the Bell Beaker period, we observe material culture evidence and regular contacts between distant regions. By the way, in many parts_of Europe, the legacies of the local cultures have been recognized, involving the process of acculturation. In this respect, western barbed-and-tanged and eastern hollow-based arrowheads are a clear example. New fashions (squared barbs) were adopted eastwards from the west and adapted to the local model of the hollow-based arrowheads, with no changes in the local way of hafting. Elsewhere as in Britain, barbed-and-tanged arrowheads and all their manufacture were transferred. These two ways of transfer (imitation, technical diffusion) occurred for further artefacts (*e.g.* pottery, metal) and led to diverse expressions of the Bell Beaker Culture in Europe (Taylor 1978; Salanova 2000; Vander Linden 2006). Then, during the Early Bronze Age, material cultures including the production of arrowheads and bracers are much more regionalized, expressing strong cultural identities, although some large-scale trends could be observed (Nicolas 2017). However, this pattern did not preclude the mobility of people (*e.g.* trade, matrimonial exchange), as suggested by isotope analysis in some regions (Frei *et al.* 2015; Knipper *et al.* 2017). If some copies could be noted for arrowheads, they are mainly not subject to long-distance exchanges or technical transfers. Therefore for the Armorican arrowheads, everything happens as if this high technology was kept jealously by those who controlled it. As 'sacred objects', Armorican arrowheads were of such great relevance for the chiefs at that time that they were not exchanged.

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Notes on contributor

Clément Nicolas is a postdoctoral researcher at the laboratory UMR 8215 Trajectoires (Nanterre, France). His research focuses on the first metalworking societies during the 3rd and the 2nd millennia BCE in Europe. As a lithic specialist, he has led studies on the productions and functions of fancy archery-related items (arrowheads, bracers and so on) in several countries in order to track their biographies and their relations to social hierarchies: in France, Britain and Denmark during his PhD, in central Europe as a postdoctoral fellow of the Foundation Fyssen. He also works on the questions concerning craftsmanship and Atlantic exchange networks through the studies of a range of grave goods (metal artefacts, jewellery).

In the meanwhile, he has developed a field approach in Brittany, leading or participating in several surveys and excavations on Neolithic and Early Bronze Age periods. This research aims to study the territories and the structures of human settings (graves, settlements, field systems) to provide a clearer understanding of the rise of highly stratified societies.

The appearance, disappearance, and reappearance of non-figurative rock art during the southern Scandinavian Neolithic and Bronze Age

*Rune Iversen**

Abstract

This paper investigates to what extent the appearance, disappearance, and reappearance of non-figurative rock art can be linked with decisive social transformations taking place within the southern Scandinavian Neolithic and Bronze Age. New finds from the Neolithic site Vasagård on Bornholm (Denmark) have decisively proven that the most widespread rock art motif, the cup-mark, dates back to the earliest 3rd millennium BCE, that is, the Middle Neolithic following the Scandinavian chronology (Fig. 1). Cup-marks are the most common rock art motif and are explicitly part of the Bronze Age rock art repertoire (*c.*1700-500 BCE). However, due to the simple nature of cup-marks and their presence on primarily dolmen capstones, some scholars have suspected that they might reach far back into the Neolithic. This has not been possible to prove until now and the new findings open up the possibility that simple rock art could have been part of the neolithization process in the region. Then, with the end of the Middle Neolithic Funnel Beaker Culture and the appearance of Corded Ware (Single Grave) communities and following social changes, *c.*2850 BCE, the focus on megalith tombs and rock art seems to disappear. Firstly with new social transformations at the beginning of the Bronze Age, rock art began to flourish. We now see, as a new feature, figurative representations as a part of this imagery revival.

Keywords: Neolithic cup-marks, rock art, Scandinavia, megalithic art, non-figurative representation, aniconism, Bronze Age

Introduction

In a southern Scandinavian context, rock art is generally ascribed to the Bronze Age, *c.*1700-500 BCE (Fig. 1). Motifs include ships, weapons, animals, humans, hands, footprints, and the like. Besides, many of the depicted attributes such as helmets,

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Early Neolithic:	**4000–3300 BC**
Early Neolithic I:	4000–3500 BC
Early Neolithic II:	3500–3300 BC
Middle Neolithic:	**3300–2350 BC**
Early Middle Neolithic:	3300–2850 BC
Late Middle Neolithic:	2850–2350 BC
Late Neolithic:	**2350–1700 BC**
Late Neolithic I:	2350–1950 BC
Late Neolithic II:	1950–1700 BC
Early Bronze Age:	**1700–1100 BC**
Periods I–III	
Late Bronze Age:	**1100–500 BC**
Periods IV–VI	

Figure 1. General Neolithic and Bronze Age chronology of southern Scandinavia. Dates given in calendar years BCE.

axes, shields, lures, and even the sun horse motif are found in the archaeological record leaving no doubt about the affiliation of the rock carvings with the cultural milieu of the Bronze Age. Thus all these rock art motifs constitute figurative and recognizable features, which makes it possible to relate them to the material world of the Bronze Age. It has even been possible to establish a chronology of the Bronze Age rock carving ships based on similar depictions on bronzes recovered from archaeological contexts (Glob 1969, 55-56, Fig. 37; Kaul 1998b).

However, rock art as such is a far older phenomenon and is known from, for example, northern Scandinavia (*c.*9000-2000 BCE) where it is traditionally referred to as 'the Northern Tradition' or 'the hunter's tradition' usually depicting big-game animals. The southern part of Scandinavia is on the other hand solely represented by the Bronze Age rock art tradition and only in a few cases do the two traditions overlap as seen at, for example, Nämforsen in Västernorrland, Sweden, and in the Trondheim area in Norway (Kaul 2005; Nimura 2015, 14-15). This does not necessarily mean that all southern Scandinavian rock art motifs just belong to the Bronze Age as dolmen capstones are one of the most often used media for the simplest rock art motif, the cup-mark (Felding 2015). However, recent excavations have brought new evidence on the emergence of the non-figurative rock art tradition, which has made it necessary to consider the emergence and use of rock art in southern Scandinavia. At present, the use of rock art in southern Scandinavia does not seem to form an unbroken tradition but instead fluctuates with socio-cultural transformations. Hence the aim of this paper is to account for this development and try to link it with the marked socio-cultural changes that took place from the beginning of the Neolithic to the establishment of Bronze Age societies in the region.

The appearance – rock art as part of the neolithization?

The neolithization of southern Scandinavia started around 4000 BCE with the occurrence of the Funnel Beaker Culture and the introduction of the cultivation of cereals and domesticated livestock. Recent years' studies of ancient DNA (aDNA) and stable isotopes point to migration as a key factor in the neolithization of Europe (*e.g.* Brandt *et al.* 2013; Brandt *et al.* 2015; Hofmanova *et al.* 2016; Haak *et al.* 2010; Lazaridis *et al.* 2016; Rowley-Conwy 2011; Schulting and Borić 2017; Skoglund *et al.* 2012). In southern Scandinavia, farming could very likely have been introduced by

pioneering farmers from the Michelsberg Culture *c.*4400-3500 BCE (Becker 1947, 260-64; 1955, 172-74; Sørensen 2014, 124-26, 227-33).

After an initial phase of forest clearance and establishment of Neolithic life spanning *c.*200 years, a long period of monument building was initiated that included chambered tombs (earthen long barrows and megalithic tombs) and causewayed enclosures. In southern Scandinavia, the earliest megalithic monuments and causewayed enclosures seem to appear around 3700-3500 BCE but both types of monuments were subjected to an extensive reuse practice (Andersson and Wallebom 2013, 121, appendix 1; Klassen 2014, 141-42, 150, 211-214, 245). As for the megalithic tombs, this practice stretched well into the Bronze Age and even beyond whereas the causewayed enclosures often show recutting and infilling during the final Funnel Beaker phase in the early 3rd millennium BCE (Nielsen 2004; Nielsen *et al.* 2014).

Apart from the construction of earthen long barrows, tens of thousands of megalithic tombs and causewayed enclosures, large-scale depositing of flint axes, bog pots and amber beads took place in southern Scandinavia during the highly productive 4th millennium BCE (Becker 1947; Ebbesen 1995; Koch 1998; Nielsen 1978). In addition, the majority of Neolithic human sacrifices belong to this period (Bennike 1999) and copper flat axes are to be found, which represent a significant amount of copper imported into southern Scandinavia together with metal forging technologies (Klassen 2000).

Chambered tombs are widely spread across northern and western Europe from the early/mid 5th millennium BCE (France), the late 5th millennium BCE (Iberia), and the early 4th millennium BCE (Britain and southern Scandinavia). The earliest chambered tombs such as the earthen long barrows were non-megalithic, made of earth and timber. However, these were soon replaced by the first megalithic tombs, the non-accessible dolmens and then by accessible dolmens and passage graves. Even though the megalithic tombs varied considerably regarding their precise configuration in the different regions, they still share a general homogeneity of the architectonic concepts and they all share the presence of a chamber built to contain the dead. The chambered tombs are part of a larger megalithic tradition that in some areas includes standing stones (*menhirs*, Breton meaning 'long stone') and stone settings (Cummings *et al.* 2015; Laporte and Scarre 2016; Müller 2009; Patton 1993; Paulsson 2017; Scarre 2002).

Non-figurative geometric motifs are found as engravings on large stones throughout western Europe in many of the areas where megalithic tombs were built. Such engravings are generally referred to as *megalithic art* even though the same ornaments also occur on standing stones and as rock art on bedrock in Britain, Ireland and western Iberia. Similar non-figurative geometric expressions are found on, for example, Middle Neolithic Funnel Beaker pottery, which belongs to the most elaborately decorated and aesthetically finest produced in northern Europe's prehistory. It is characterized by complex and strictly executed compositions showing great artistic skills, and only in extremely rare cases are recognizable features indicated. The highest concentration of megalithic art is in the Boyne Valley, Ireland, where the Knowth and Newgrange passage graves stand out. The megalithic art of Ireland and Britain (primarily Orkney) is geometric and non-representative, mainly made up of circles, chevrons, triangles, lozenges, meander lines, spirals, arcs and the like. The peculiar lack of unambiguous figurative representations in the British and Irish megalithic art has been pointed out several times (O'Kelly 1970; Scarre 2007; 2017; Twohig 1981).

The main areas of megalithic art also include Brittany, central western France, and northern and western Iberia. In Iberia and Brittany, both carved and painted decoration occur (this has also been proved for some of the megalithic tombs in Orkney). In many cases, the decorated stones were in fact reused standing stones,

which were broken up and used as building material for the tombs. Even though the megalithic art of Iberia was mainly non-representational, sun symbols, whale motifs, animals including quadrupeds, serpents and stylized anthropomorphic figures are present. Also, Brittany holds figurative representations in the form of depictions of hafted axes, quadrupeds and whales (Alves 2012; Bradley *et al.* 2001; Bradley 2002; Cassen *et al.* 2015; Cummings *et al.* 2015; Fairén-Jiménez 2015; Jones *et al.* 2017; Twohig 1981; Whittle 2000).

Scandinavia immediately lacks megalithic art even though cup-marks are found on dolmen and passage grave capstones but these have usually been conceived as later Bronze Age engravings (Ebbesen 2011, 398-99; Glob 1969, 119; Kaul 2005, 55). The cup-mark is the simplest rock art motif, basically just a pecked concave depression in the rock surface. Cup-marks usually have a diameter of about 5 cm and a depth of *c.*1cm, but they can be as small as 1-2 cm in diameter; however, less than 4 cm in diameter is rare. Large cup-marks also occur. These can have a diameter of up to 10-15 cm and a depth of 5-7 cm. These are extremely rare though, but 6-10-cm wide and 2-5-cm deep cup-marks are not uncommon (Glob 1969, 111).

Due to their simple form, cup-marks are hard to date unless they form part of larger pictorial compositions. However, observations from the Newgrange passage grave in Meath (Ireland) show that the British 'cup and ring' mark tradition predates the construction of the tomb *c.*3200 cal BCE. Some radiocarbon dates from the Iberian peninsula suggest an occurrence of megalithic art already in the early 4th millennium BCE at approximately the same time as the tombs were built. Also, Brittany shows megalithic tombs with cup-marks. In some cases these are placed on the not visible 'hidden' sides of the stones, indicating that the cup-mark stones were reused as building material for the megalithic tombs. Thus it may be that cup-marks and megalithic art spread with the megalithic tombs or in some cases even predate these (Bradley 2002, 2009; Horn 2015; Pailler and Nicolas 2016; Scarre 2010a; Sharpe 2012, 112-22). In a southern Scandinavian context, this would be around 3700/3500 BCE. The question is whether we should assign the cup-marks found on megalithic tombs to the rich and ritually complex Neolithic epoch of the 4th millennium BCE as we know it from other parts of western Europe.

Megalithic art in southern Scandinavia?

The most common rock art motif in southern Scandinavia is definitely the cup-mark: more than 27,000 cup-marks have been documented in Denmark (*c.* 4,400) and Scania (*c.* 22,600) (Nimura 2015, table 4.14). In Denmark, dolmens are one of the preferred rock art media with more than 225 dolmens displaying cup-marks. In comparison, they appear on just a few more than 50 passage graves (Felding 2015, Fig. 6.3). However, as the total number of preserved megalithic tombs within present-day Denmark is *c.*2,400 (Eriksen and Andersen 2014, 47), the percentage of decorated tombs is just about 12. Thus the decoration of megalithic tombs was far from a prevalent tradition even though the real number of tombs with cup-marks or other rock art motifs might be higher as no systematic recordings have been carried out with modern techniques.

The cup-mark is by far the most frequent rock art motif on the megalithic tombs and they are usually placed on the capstones (Fig. 2). Only in ten Danish cases do we see other typical Bronze Age motifs, including ships, wheel crosses, footprints, spirals, and a male figure (Ebbesen 2011, 398; Glob 1969, find list I; Nielsen 1991). It is still an open question whether the cup-marks were pecked in the Neolithic, perhaps being contemporary with the building of the tombs or later Bronze Age additions. The occurrence of identifiable and datable Bronze Age imagery such as ship motifs, definitely shows that the capstones were accessible and attracted attention in the Bronze Age.

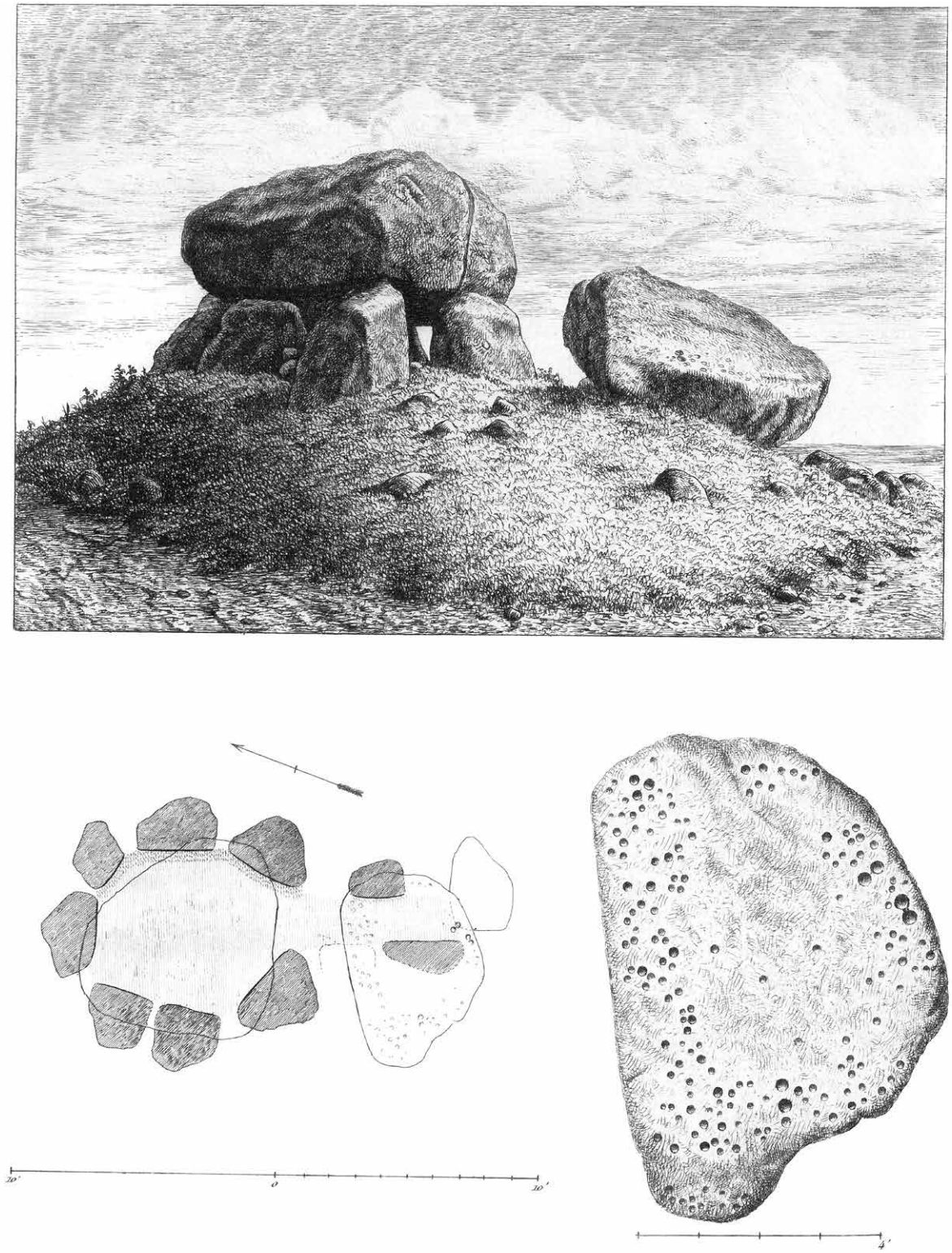

Figure 2. Drawing of the Sømark dolmen on Møn, Præstø County (Denmark). 445 cup-marks have been recorded on the passage capstone, three cup-marks on the chamber capstone, and ten cup-marks on one of the western chamber orthostats (Madsen 1896, pl. XXXVIII).

Figure 3. A 29-cm long flagstone with cup-marks from megalithic drystone walling, Onsved Mark, Horns Herred (Kaul 1987, 29).

One find, however, strongly implies the use of cup-marks in the Early Neolithic, the period in which the early dolmens were built. In 1986, The National Museum of Denmark excavated a destroyed and ploughed-down, long dolmen with a partly preserved chamber at Onsved Mark, Horns Herred, North Zealand. The kerbstones had already been removed a long time ago but flat flagstones from the drystone walling were still lying around, scattered at the site. One of these flagstones, a 29-cm long and 5-cm thick piece (Fig. 3), contained twelve cup-marks, two or three of which were cut through by a breakage, presumably as a result of the shaping of the flagstone when the drystone walling was built (Ebbesen 2011, 153; Kaul 1987). Even though the flagstone was not found *in situ* but picked up from a secondary deposit at the site, it clearly suggests that the cup-marks were made some time before the construction of the dolmen.

In addition, a small number of ornamented sandstone fragments with 'miniature' megalithic art have been recorded in Denmark and Scania, showing sketchy patterns including lines, chevrons and the like. Furthermore, the island of Bornholm, in the Baltic Sea, has revealed an increasing number of so-called 'sun-stones' from the early 3rd millennium BCE. These are usually small engraved shale plaques with spider web-like incisions, sun motifs, 'ladder patterns', sketchy lines, arcs, and plant/crop signatures indicating that stylistic fields or landscapes are depicted (cf. Kaul 1998a, 114-17; Kaul *et al.* 2016).

Yet another megalithic tomb has added information on the use of cup-marks. During a partial excavation of the Brutkamp (Albersdorf LA 5) dolmen in western Holstein, Germany, a stone with cup-marks was recovered directly under a stone pavement dated to the Late Neolithic period I. Due to its size and shape, the stone presumably represents one of the passage capstones which were moved during a Late Neolithic intrusion of the passage from above. Thus the cup-marks must be Late Neolithic at the latest, but they most likely date back to an early use, or even the construction phase, of the tomb (*c.*3600-3100 BCE, Brutkamp phases 1 and 2) (Dibbern 2016, 83-106).

Based on the Swedish evidence, Lasse Bengtsson argues that some of the larger cup-marks should be contemporaneous with the construction of the megalithic tombs, whereas the smaller cup-marks should be dated to the Bronze Age. However,

large cup-marks also occur among the Bronze Age rock carvings (Bengtsson 2004a; 2004b, 64-66; Horn 2015, 30-31 with references).

Also Burenhult argues for a Neolithic date for the cup-marks found on the megalithic tombs based on the distribution of Danish tombs with cup-marks. Megalithic tombs with cup-marks have a wider distribution compared with the general distribution of figurative Bronze Age carvings, which clearly concentrate in areas that held central importance in the Bronze Age, for example north-western Zealand. Furthermore, he ascribes some schematic 'megalithic type' carvings from Scania and Bohuslän, Sweden, to the Middle Neolithic. One of the places where these have been found is Järrestad in eastern Scania, which is located within one of Sweden's most significant areas when it comes to megalithic tombs. The carvings at Järrestad are found on a bedrock panel and include typical Bronze Age carvings such as ships, axes (palstaves), footprints, shoe soles and the like, except for some different carvings including double spirals, zigzags, U-motifs, and snakes. The latter group of motifs resembles those found in the megalithic art in western Europe, in particular in Ireland, which makes Burenhult suggest that they were pecked in the Middle Neolithic (Burenhult 1980, 104-20, 123; 1999, 311-13). This, however, has been contradicted by Peter Skoglund, who sees them as Bronze Age carvings (Skoglund 2013). Comparable 'megalithic' geometric motifs have also been recognized on rock art panels in western Norway, for example at Ausevik. Also these motifs have been ascribed to western influences (Irish, English, and Scottish) during the Middle or Late Neolithic (Fett and Fett 1979; Walderhaug 1995).

New evidence from Bornholm

During the last five years, the Bornholm Museum and the National Museum of Denmark have carried out excavations at the Neolithic site Vasagård, on southern Bornholm. From 2014, the investigations took place in cooperation with archaeological field school teams from Aarhus University and the University of Copenhagen (directed by the present author). Two Early Neolithic causewayed enclosures (Vasagård East and West), separated by a river valley, constitute the main features at Vasagård in addition to a Middle Neolithic palisaded enclosure, parts of which have been documented at both sites. The two enclosures have been subjected to several reuse phases, which include recuttings and depositions. The final reuse phase seem to correspond to the late Funnel Beaker period, the Vasagård phase (2900-2800 BCE) according to the local chronology (Nielsen et al. 2014; Nielsen *et al.* 2015).

In a Scandinavian context, palisaded enclosures date to the early 3rd millennium BCE, *c.*3000-2500 BCE. They comprised very large (up to 6-ha) fenced areas that probably functioned as central places of assembly. They are only known from eastern southern Scandinavia, that is to say, Zealand, Falster, Bornholm, and Scania. In general, the Danish sites are associated with the final Funnel Beaker Culture, whereas the Scanian sites have been related to the vaguely defined early Battle-Axe Culture (Brink 2009; Iversen 2015, 69 with references; Svensson 2002).

For the first time, the excavations at Vasagård have uncovered cup-marks in secure Neolithic contexts as two cup-mark stones were uncovered *in situ*. The first stone was found in one of the systems of ditches of the Vasagård West causewayed enclosure in 2016 in a layer immediately dated to *c.*3000-2900 BCE. The second stone was recovered from a section of the Middle Neolithic palisaded enclosure in 2017 (Fig. 4) (Iversen and Thorsen in preparation; Persson 2017).

With the new evidence from Vasagård, we have proved that the cup-mark tradition reaches back to at least the beginning of the 3rd millennium BCE. The cup-marks known from other parts of western Europe and those recorded on the megalithic tombs in Denmark and southern Sweden provide further indications that this tradition is even older. Strong indications that cup-marks were introdu-

Figure 4. Vasagård East (Bornholm, Denmark). Cup-mark stone in situ, palisade trench at excavation campaign 2017 (Photo: Rune Iversen).

ced with the megalithic building tradition has been provided by the cup-marked flagstone from the megalithic dry walling found at Onsved Mark and from the cup-mark stone found in the Brutkamp dolmen. But what about the period following the Funnel Beaker Culture, the later Middle Neolithic? In this period, the incipient rock art tradition seems to die out in southern Scandinavia, before it flourishes in the Bronze Age.

The disappearance – the Corded Ware interference

At the beginning of the 3rd millennium BCE, we see the emergence of Corded Ware communities in southern Scandinavia starting *c.*2850 cal BCE and covering a restricted area of the central and western Jutland peninsula (the Single Grave Culture). From the very beginning, we see a fully developed Corded Ware idiom with interments of east-west oriented flexed individuals covered by small burial mounds, curved cord-decorated beakers, and new types of stone battle-axes

as well as amber ornaments. Unfortunately, very few graves contain preserved human bones suitable for isotopic or aDNA analyses that could help us answer the question whether the buried were migrants, as advocated by Glob (1945, 241-58; 1971, 106-08) and Kristiansen (1991; 2009; 2012), or rather indigenous Funnel Beaker people who adopted a new culture and ideology (Damm 1993; Hübner 2005, 694-719). Only the contours of the body are preserved in the sandy lime-deficient soils of central and western Jutland.

However, recent years' aDNA studies have pointed to a substantial genetic influx from the Pontic-Caspian steppe into central Europe during the early 3rd millennium BCE, which has been connected with the spread of the pastoral Yamnaya Culture into Europe contributing to the creation of Corded Ware communities. This has also been backed by archaeolinguistic studies suggesting that proto-Indo-European was introduced at this point (Allentoft *et al.* 2015; Anthony 2007; Haak *et al.* 2015; Iversen and Kroonen 2017; Kristiansen *et al.* 2017).

Close to 2,400 single graves are known from Jutland (Hübner 2005, 60). Outside the Single Grave core area, megalithic entombments continued, in particular on the Danish islands, in Mecklenburg-Western Pomerania and in eastern Schleswig-Holstein. On the Danish islands (including Bornholm) and in Scania, the Funnel Beaker tradition continued in the form of a prolonged MN V phase and a permanent use of megalithic tombs (Iversen 2015).

Generally, the new Single Grave communities seem to have had a preference for small and scattered settlements located on sandy soils, often with relatively few finds compared with the larger conglomerated late Funnel Beaker settlements. The emergence of Single Grave communities in Jutland led to deforestation, which constituted a radical change in the Funnel Beaker landscape and might have been the result of an increased need for grazing in an intensive land-use system based on pastoral farming and some arable agriculture (Iversen 2015, 65-73 with references). Building with large stones did not seem to be a part of this mobile pastorally based land-use system and nor were engravings on such stones even though engraved stelae are well known from the Yamnaya Culture (Reinhold 2018; Telegin and Mallory 1994). However, wooden and stone-built burial cists existed in parallel with the classic single graves but these are mainly found in a restricted area in north-eastern Jutland. The cists date from the late Under Grave period and well into the Late Neolithic (Hübner 2005, 557-84).

Also dolmens and passage graves were reused in the Single Grave period. The reuse of megalithic tombs was a common feature throughout southern Scandinavia, even though this practice also displays great variations. In eastern Denmark, continuity prevailed in that megalithic tombs continued as the main burial form during the entire Middle Neolithic. It was largely the same tombs that continued in use from the late Funnel Beaker period to the end of the Middle Neolithic. This, however, was not the case in Jutland, where few tombs show continuity from the final Funnel Beaker to the Single Grave period. Generally, Single Grave megalithic burials occurred at a late stage on the Jutland peninsula and must be seen in conjunction with the building of wooden and stone burial cists. Consequently, the introduction of the Single Grave burial custom to Jutland was a distinct break with the megalithic tradition (Iversen 2015, 76-82, Fig. 4.40).

This breach of tradition probably also resulted in the abandonment of cup-mark making, even though some of the cup-marks recorded on megalithic tombs could, at least theoretically, belong to the Single Grave Culture. Cup-marks have been interpreted as an old fertility symbol affiliated with agricultural communities (Felding 2015; Horn 2015) and thus fits the Funnel Beaker focus on agriculture, fertile arable lands, permanent settlements, communal tombs, and ancestor worship. The use of cup-marks and megalithic art in general might even have connected megalithic societies across western Europe, creating a certain identity based on a shared

habitus that created, and was created by, commonalities of practice. In this context, *habitus* should be understood as commonly shared dispositions and perceptions of the world that resulted in congruent behavioural patterns (Bourdieu 2005, 197-8; Jones 1997, 90, 120; Prieur and Sestoft 2006, 38-45). As stated above, the Single Grave economy was presumably not primarily agricultural but rather pastorally based. The possible influx of newcomers introducing a Corded Ware lifestyle including a different approach to settlement, landscape, and burial practices and not sharing the 'megalithic/agrarian' *habitus* could explain the lack of cup-marks associated with the Single Grave/Corded Ware Cultures.

The reappearance – cup-marks and the introduction of figurative representations

Until the recent investigations on Bornholm, the oldest known cup-marks from secure contexts were those recovered during excavations, in 1955, of the burial mound Rævehøj, close to Gladsaxe School, just north of Copenhagen. The cup-marks were found on two stone slabs that formed part of a Late Neolithic stone cist, grave XIV (Vebæk 1980).

Stone architecture was reintroduced on a larger scale at the beginning of the Late Neolithic in the form of stone cists, presumably inspired by the north-western French gallery graves (*allées couvertes*) dating from the Late Neolithic and Copper Age, *c.*3250-2250 BCE (Ebbesen 2007, 33; Patton 1993, 134-47, 171-78; Scarre 2011, 230-40). The stone cist tradition continued until urn burials became predominant at the beginning of the Late Bronze Age.

However, the Late Neolithic stone cists can be separated from those of the Early Bronze Age in terms of construction. The Late Neolithic cists were constructed as 'burial chambers' intended for repeated use. They are mainly oriented east-west and the eastern end is often of a lighter construction than the western end, as it was intended to be reopened. Some cists even have a short entrance section and a threshold stone. In contrast, the closed stone cists commonly built during the Early Bronze Age (also termed 'stone coffins') were constructed for single interments. The reuse practice connected with the Late Neolithic cists often makes it difficult to date the construction of the cist precisely as previous interments were pushed aside in order to make room for new corpses and thereby mixed with earlier burials (Iversen 2015, 123-24 with references). The stone cist at Gladsaxe has been dated to the Late Neolithic period I (*c.*2350-1950 BCE) via the presence of a type I flint dagger (Ebbesen 2007; 2011, 153; Vebæk 1980, 57-59, Fig. 13).

In his 1969 publication on the rock carvings in Denmark, Glob records seven Late Neolithic burials containing cup-marks, but not all of these are clearly dated. In one case, a cup-mark stone was found in the mound filling of a Late Neolithic burial and in another case no artefacts were recovered to precisely date the grave. In other cases, cup-mark stones were part of stone cists as in Gladsaxe. Cup-marks are also known from several stones from Bronze Age barrows as are figurative motifs (Glob 1969, 119-25). Most notable among these are of course the elaborate Kivik cist in eastern Scania and the engraved stone slabs from the Sagaholm burial mound near Jönköping, Sweden (Goldhahn 1999; 2013; Randsborg 1993). A stone recovered from a ploughed Bronze Age mound at Truehøjgårds Mark in northern Jutland shows two ship motifs, a human figure, three feet, and cup-marks. In addition, feet and hand motifs are found in connection with graves from the Bronze Age (Glob 1969, 30-33, 85-96).

A Late Neolithic find from Nibehøj in Himmerland, northern Jutland, is of particular significance as it contains three cup-mark stones and a stone with a wheel cross and cup-marks. The three cup-mark stones were found among the eastern kerbsto-

nes surrounding the mound. The wheel cross stone was recovered in relation to a stone pavement located under the mound as a short trench was dug into the mound. The stone shows a five-spoke wheel cross with nine cup-marks placed between the spokes and one additional cup-mark at the centre of the wheel cross. Two graves were found under the stone pavement, both dated to the Late Neolithic period II, *c.*1950-1700 BCE. The rock carvings were reported to be 'freshly made' and have not been exposed to weathering, indicating that the burials and the rock art are contemporaneous (Glob 1969, 233-34, 274, Fig. 73).

The rock art tradition seems to have continued well into the pre-Roman Iron Age, until *c.*200 BCE. Motifs are known in the form of some ship images and riding scenes/mounted warriors and some cup-marks probably also date to this period (Coles 2008; Goldhahn *et al.* 2010; Horn 2015; Skoglund 2013, 6 with references). Actually, cup-marks are part of the early modern folklore dating back to the 17th century AD in Scandinavia and the use of cup-marks has been recorded in the ethnographic records in the Baltic States. Here they functioned as containers for small offerings as late as in the 19th and early 20th centuries AD (Goldhahn *et al.* 2010, 1; Horn 2015; Tvauri 1999, 138-43).

The Bronze Age clearly stands out from the predominantly imageless Neolithic period in showing a rich diversity of images depicting all kinds of rock art scenes, including ships, weapons, animals, humans, sun horses, hand motifs, footprints and the like. Furthermore, similar ship motifs, including associated beings such as humans and animals, are found as ornaments on bronzes throughout the Bronze Age, as are bronze figurines and miniatures, including the famous sun chariot. However, the significant Neolithic disregard of figurative representations, including figurines, is far from a southern Scandinavian phenomenon but can be found over large parts of western Europe in the areas where megalithic architecture and geometrical megalithic art prevail.

Discussion

As already pointed out above, megalithic art is mainly geometric and non-figurative (Twohig 1981, Fig. 13). The lack of figurative representations and the exclusive use of schematic and geometrical ornaments contrasts with the Neolithic and Chalcolithic societies of south-eastern Europe and the Near East. Here, clay figurines are counted in tens of thousands and seem primarily to be associated with domestic contexts. Furthermore, there is a strong correlation between figurines and settlement density: figurines are related to houses built for larger communities and they are abundant on, for example, the mega-sites (proto-cities) of the Cucuteni-Tripolye Culture (Bánffy 2017; Monah 2016; Perlès 2001, 6-7; Videiko and Rassmann 2016). Thus it is very likely that one of the functions related to the figurines was connected with the integration (via rituals?) of more complex societies, as proposed by Catherine Perlès for the Greek figurines (2001, 6). Compared to the megalithic and non-figurative northern and western Europe, the figurines seem to represent a very different organizational setting with complex and conglomerated social structures.

When discussing the lack of figurative representations and megalithic art in western Europe, a certain group of standing stones stands out: the statue menhirs of Brittany, southern France, western Iberia and the western Alps. The statue menhirs are stylized anthropomorphic standing stones dated mainly to the 3rd millennium BCE even though some of the French human-shaped menhirs probably date back to the 5th millennium BCE. Some statue menhirs are modified and shaped into humanized forms with pronounced heads and shoulders and some are carved, showing details such as facial features, clothes, weapons, and ornaments. However, the more elaborate carved anthropomorphic statue menhirs

occur fairly late compared with the beginning of early agricultural communities in western Europe and the large-scale megalithic building phases. It might be that the 'ordinary' unshaped and uncarved standing stones dated throughout the Neolithic should also be considered human representations (Cummings *et al.* 2015; Scarre 2007; 2010b; 2017).

This question is of course hard to answer, but if it deserves credit, we might be witnessing a rather long process of 'freeing' and concretizing the human figure from the naturally formed stone slabs. This happened firstly via shaping and then further articulated via engravings. In other words, the 'legalization' of anthropomorphic representations was a slow and gradual process that can be followed in certain areas of megalithic Europe – presumably associated with the emergence of complex societies. When it comes to the elaborate statue menhirs of the 3rd millennium BCE, they might have celebrated a restricted elite. It is during the Bell Beaker phase that individual burials appear and it is in this period that the statue menhirs gained importance in indicating new social practices and manifestations of elite groups (Bradley 2009, 89-93). Thus it might well be that figuration and social complexity were interlinked in Neolithic and Chalcolithic Europe.

In the Near East and in south-eastern Europe, a correlation between figurative representations and the integration of more complex societies is visible from early on with a rather early conglomeration of the settlement structure and use of clay figurines. In western Europe, a somewhat similar correlation came through in the course of the 3rd millennium BCE though displayed differently. In the latter region, it was not until the later Neolithic and Chalcolithic that personifications appeared as did clearer social structures. The question is whether a similar correlation between figurative representations and social complexity is also apparent further north in southern Scandinavia.

In southern Scandinavia, we clearly see a marked social diversification from around 2000 cal BCE and a de facto appearance of Bronze Age societies. This did not happen overnight but must be understood as a long formative process that partly originated in the cultural heterogeneous Middle Neolithic. Four aspects seem to have been essential to this process: the rise of the warrior figure, the reintroduction of metal, increased agricultural production, and the establishment of one of the characteristic features of the Bronze Age, the chieftain hall. One of the basic elements for the success of the upcoming Early Bronze Age elites in southern Scandinavia must have been an economic surplus gained through the reinforced agricultural focus. This surplus could be invested in trade and exchange with early Únětice Bronze Age communities (Iversen 2017 with references). During the earliest part of the 2nd millennium, formal hierarchies and centralization of wealth developed further and paved the way for the classic Nordic Bronze Age, from *c*.1600 cal BCE (cf. Vandkilde 2014) with its developed contact networks, wide-ranging communication, and exchange routes, elite lifestyle and the like. As part of this social stratification, images, human figures, mythologies, and rituals were recorded in stone and on bronzes. At this point, there was no turning back to the less formalized and less elitist social structure of the Neolithic and the associated disregard of figurative representations characterizing the megalithic monument-using communities of northern and western Europe.

It is indeed notable that the supposed old fertility symbol, the cup-mark, reappeared in a period holding renewed agricultural focus. If we assume that at least some of the cup-marks found on megalithic tombs were picked in the Neolithic, probably when the tombs were built, it is not inconceivable that Bronze Age people revisited these old monuments and pecked new cup-marks in a period when agriculture and related rites were revitalized and intensified. Bronze Age interments are known from several megalithic tombs (Ebbesen 2011, 391-99), as are classical Bronze Age rock art motifs, which clearly shows that the megalithic tombs attracted attention

in the Bronze Age. If we look at the classical figurative Bronze Age rock art known from the large bedrock panels in, for example, Bohuslän, Sweden, new studies have shown that these were far from static and fixed images but that individual carvings were revisited, transformed, and repecked through time. An explanation for this behaviour might be that by altering and adding elements to the rock art figures, the Bronze Age communities could engage with the past and their ancestors or mythical figures through these transforming events. The rock art became a medium through which people could engage with their forebears (Horn and Potter 2018, 379). A similar scenario could explain the Bronze Age use of megalithic capstones as a medium for rock art, including cup-marks.

Conclusions

In this paper, I have tried to view the use of cup-marks in a long-term perspective and link it with the socio-cultural developments that took place in southern Scandinavia from the Early Neolithic to the appearance of the classical Bronze Age. Based on new evidence and existing finds, it has been possible to date the cup-mark tradition back to the Middle Neolithic, presumably going back to the introduction of megalithic tombs in the Early Neolithic. Thereby, southern Scandinavia connects with the cup-mark tradition seen in other places of megalithic western Europe. However, no evidence of cup-marks or other rock art exists from the later Middle Neolithic, when Corded Ware influences became predominant. This might be due to a changed cultural and economic focus, no longer directed towards agriculture, fertility, monuments, and ancestral legitimation of land rights. Cup-marks reappear in the Late Neolithic together with a renewed agricultural and megalithic focus, now in the form of stone cists.

During the entire southern Scandinavian Neolithic, we see a pronounced disregard of figurative representations. This situation has clear parallels among western European megalithic monument-using societies, who might have shared some ideological/religious-based aversions against figurative representations. This situation is strongly contrasted by the widespread use of clay figurines in the south-eastern European Neolithic and Chalcolithic. This western European aniconism, or 'ban' on figurative representations, only seemed to loosen as social complexity increased and clear elite groups appeared during the 3rd millennium BCE. In southern Scandinavia, this development was somewhat delayed as rich figurative imagery first appeared when the old Neolithic social structures were replaced by pronounced elite manifestations at the beginning of the Early Bronze Age.

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Changing pottery production technologies in urbanizing societies in the Bay of Naples (8th-7th centuries BCE)[1]

*Lieve Donnellan**

Abstract

Innovations in pottery production techniques appeared first in the 8th century BCE in the Bay of Naples, southern Italy. Painted fine wares, produced on a fast wheel, were introduced alongside new forms of storage vessels and both types became quickly ubiquitous in settlements and tombs, partially substituting, partially supplementing, the existing handmade coarse and semi-coarse ware repertoire. The technological innovations have traditionally been attributed to Greeks, who, according to references made in ancient texts, would have founded new settlements, 'colonies', along the shores of the Mediterranean and the Black Sea. Greek colonization is considered by many scholars to be a major force of social and cultural transformation in the EIA. With the foundation of colonies, the Greeks would have transmitted their material culture, forms of urban living and economy to native groups. The aim of this paper is to show that by adopting a critical and theory-based perspective on mobility – distinguishing between the mobility of people, objects and technologies – it is possible to trace how a small number of skilled newcomers introduced new practices such as pottery production technology alongside new consumption practices to an existing native population. The entanglement of people and objects in networks enabled new technologies to transform society and landscapes radically. The new forms of pottery production went hand in hand with new industries of wine and perfume production, and the involvement of larger groups of people in these productions stimulated new forms of interdependence and growth of the network. The new pottery production technology was mobile and cheap, which also allowed larger groups to participate in the consumption. This study shows how a seemingly simple new technology such as pottery production could provoke radical social change in the EIA Mediterranean, without invoking large-scale migrations as the drive behind social and cultural change.

Keywords: pottery production, technologies, mobility, urbanization

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Introduction

New pottery production technologies are believed to mark one of the major historical events in the first-millennium BCE Mediterranean. From the 8th century BCE onwards, Greeks appeared on the Mediterranean shores, far beyond the Aegean, and brought their characteristic vessels, painted fine wares for drinking wine, with them. Through the pottery, archaeologists traced the Greeks from Libya via Italy to Spain. The pottery appears to confirm accounts in much later written texts, in which reference is made to the foundation of cities ('colonies') throughout the Mediterranean and the Black Sea (Malkin 2009; Osborne 2016).

The traditional idea is that the Greeks were driven from the Aegean by hunger and social strife and flocked to the more fertile coastal parts of the Mediterranean and the Black Sea to appropriate agricultural land and raw materials. In this process of 'colonization', they would have forcibly removed native groups. With the native groups in the hinterland and the mountains on the other hand, the Greeks of the coastal colonies would have maintained more peaceful interactions, mainly to trade raw materials for the elegantly painted Greek drinking cups, jugs and mixing bowls. This exchange then caused a rapid cultural transformation among the natives, in the form of an acculturation, or Hellenization (de la Geniere 1978; Guzzo 2011). 'Greek colonization' thus came to be perceived as a major force of social and cultural change in the EIA Mediterranean.

This dominant and Helleno-centric view is now rejected by many scholars (Donnellan and Nizzo 2016) and more complex explanatory mechanisms for social and cultural change in the EIA Mediterranean are sought. That the notion of a massive 'Greek colonization' needs to be downscaled becomes clear through the consistent presence of indigenous material culture in settlements called 'Greek colonies', as continuing excavations are revealing (Donnellan and Nizzo 2016). In addition, the adoption of post-colonial theories have led scholars to attribute more agency to native populations, when discussing intercultural interactions and exchanges with the Greeks. Thus attention has been drawn to the persistence of native practices and the selective adoption of the dominant culture of the colonizers (van Dommelen 1997; 2002; Dietler 2010). Terms such as 'Hellenization' and 'acculturation' are now being rejected and 'Greek colonization' is seen as a more gradual process of social and cultural transformation (Donnellan 2016a and 2016b; Yntema 2016). Scholars now scrutinize Greek and native identities and the expression of native identities, while selectively appropriating Greek culture is acknowledged (Burgers & Crielaard 2016). Even the possibility of an outright rejection or resistance to Greek culture among some native groups has been suggested (Cuozzo and Pellegrino 2016), whereas other recent work has pointed out that the creation of certain subaltern non-Greek identities could have been a response to the presence of a dominant urban elite Greek culture (Zuchtriegel 2017).

Whereas we have now a decent understanding of processes of creative appropriation of Greek cultural models by natives beyond the 'Greek colonies' – often within elite strategies of conspicuous consumption (Kistler 2012) – the cultural transformations within the 'Greek colonies' themselves remain hotly debated (Donnellan and Nizzo 2016). Caught in contested readings of textual foundation discourses (whether or not the cities were really founded, and if so by whom and how – Donnellan and Nizzo 2016), the dynamics of material culture interaction in the early 'Greek colonies' remain under-studied, often as a result of fragmentary preservation of the evidence and partial publication of excavations, in addition to insufficient theoretical models to frame the social and cultural transformations.

It is now widely accepted that natives must have been part of the settlements we call 'Greek colonies'. Excavations throughout the Mediterranean have revealed a consistent picture of continuity in LBA/EIA settlement patterns, pottery produc-

tion techniques, housebuilding techniques and burial traditions, to suggest that native cultures were not eradicated upon the arrival of 'Greek colonists'. Discussion remains, however, as to what the social status of these natives was within the 'Greek colonies': were they slaves, subjects, citizens or was there intermarriage with the native groups of the hinterland (Saltini Semararo 2016)? Many scholars consider the natives to have been subjects of the Greeks, but recently convincing attempts have been made to stress that native identities, even within early 'Greek colonies', were not necessarily subordinate (Kelley 2012).

This view at a micro level, however, does not yet provide an explanatory mechanism for the social and cultural change we perceive on a macroscale. Nor does it address where we can locate the role of migration and the effects it had on existing native cultures. The EIA in the Mediterranean witnessed processes of urbanization, state formation, increased social inequality, the adoption of writing, the reintroduction of monumental architecture, figurative art and massive innovations in pottery production techniques – among others. If we cannot attribute all innovations to incoming Greeks carrying a full cultural package with them, as traditional culture-historically inspired accounts would have it, what should come instead?

In the remainder of this paper it is claimed that, in order to shift away from traditional narratives of cultural change in the EIA Mediterranean, caused by migrating Greeks trading their wine drinking cups, jugs and bowls, it is necessary to disentangle mobility from pottery production technology. Critical approaches to mobility now stress that the movement of people does not necessarily overlap with the movement of objects or technologies. Therefore we need to address separately how migrants might have moved around and how production technologies changed and what the social effects of the latter were. Thus we can assess what the effect of innovations brought about by temporary or permanent migrants was and counter traditional accounts of 'colonization' and 'Hellenization'.

The analysis here centres on the area that is traditionally seen as the region that was first 'colonized' by the Greeks. Ancient sources state that, in the Bay of Naples, Cuma (Campania, Italy) (Kyme) was the first city ever founded by Greeks in Italy and specify that the settlers had previously inhabited the small offshore island of Pithekoussai (Ischia, Italy), before reaching the mainland (fig. 1). Excavations in the Bay of Naples have been conducted since the 19th century and from the earliest phase attributed to early Greek 'colonization' we are informed mainly through burials. The burial contexts are quite rich and their inventories testify to a wide repertoire of ceramic and metal objects, locally produced and imported from elsewhere in the Mediterranean. Very recent excavations at Cuma are also bringing to light the earliest phases of urbanization. Both at Cuma and Pithekoussai, we know a number of workshops. Thus sufficient evidence to study production technologies, material culture and social transformation on a macroscale is available. Rather than confirming a massive influx of Greek colonists, this study will conclude that just a few temporary or permanent migrants set in motion a process of innovation in production technology that led eventually to radical transformations in cultural practices, social organization and the use of landscapes.

Perspectives on mobility and technology

The phenomena of migration and cultural change have in archaeological analysis long been considered intrinsically linked. Cultural-historical archaeologists such as Vere Gordon Childe saw migration as the major drive behind cultural change (Trigger 1989). Technological transfers within this theoretical perspective typically took place from 'higher' cultures to 'lower' cultures. Scholars operating within a culture-historical perspective saw social transformations in the EIA Mediterrane-

Figure 1. The Bay of Naples (Campania, Italy) and the two earliest 'colonies' of Pithekoussai and Cuma.

an, such as the rise of political systems, urbanized settlements, the introduction of writing and the adoption of codified drinking practices as an institution as innovations spread via 'Greek colonization'.

Drawing on recent critical theoretical perspectives (Hahn 2005; Maran and Stockhammer 2017), archaeologists, however, aim now at disentangling the mobility of people, objects and technologies and they approach social and cultural change as processes that were driven by a variety of factors, internal and external. The new approaches derive from different theoretical perspectives that have been developed in social/cultural anthropology, sociology and cultural studies. Rather than a single theoretical body, there are various strands of thinking, interlinked and overlapping, that are helping archaeologists to rephrase their perspectives on social and cultural change and migration.

Some of the first critiques on the tight connection made between 'pots and people' were formulated within a school of thinking, aiming at examining social identities, especially ethnicity, more critically (Jones 1997). This approach became especially *en vogue* in the later 1990s and was enthusiastically adopted by scholars working on the EIA Mediterranean, at the same time that post-colonial theories were embraced (van Dommelen 1997; 2002). This led to a major shift in studies of Greek as well as Phoenician 'colonization'. Thus the presence of natives and the selective appropriation of Greek culture among natives in the hinterland became gradually integrated in scholarly discourse, as was outlined in the previous section.

More recently, mobility as a practice has been scrutinized by archaeologists and is, as a result, being hailed as a new paradigm for the Mediterranean (Kiriatzi and Knappett 2017). Mobility, it is now understood, can exist on different scales and it is important not to confuse individual mobility with migration on a macroscale (Kiriatzi and Knappett 2017). Moreover, mobility of people does not always overlap with the mobility of objects or technologies and it is paramount to distinguish between them (van Dommelen and Knapp 2010; Kiriatzi and Knappett 2017). Some scholars suggest referring to object diasporas in order to disentangle human mobility and objects, from a materiality perspective (van Dommelen and Knapp 2010). Thus the focus has shifted to a study of how people used objects, how these shaped their lives, how they were

entangled with their bodies (van Dommelen and Knapp 2010, 4) and could be used to negotiate intercultural encounters of mobile people. Technologies, in turn, should also be seen as something used to negotiate the encounter and interaction between people. Some technologies such as pottery production technologies appear to have been more prone to mobility than other technologies (Kiriatzi and Knappett 2017).

Technology – to be distinguished from things themselves – is the key to understanding the relation between things and society (Dietler & Herbich 1998) or, in other words, objects and people. In a narrow sense, technology can be seen as the processes surrounding the production of objects, best known by archaeologists in its conceptualization of the *chaîne opératoire* of Leroi Gourhan. In a broader sense, technology can be understood as a way of doing, of action, of performance (Dietler & Herbich 1998; Kiriatzi and Knappett 2017). The latter idea is derived from a paper on the body and bodily performance by Marcel Mauss (1935) not very frequently cited among archaeologists. His *Techniques du Corps* aimed at revealing how movement, speech and other ways of doing things were transmitted through the body. Learning thus takes place via the body and, as a consequence, bodily practices or corporal techniques are culturally specific (Mauss 1935).

Mauss's ideas were influential for Leroi Gourhan's development of the concept of the *chaîne opératoire* just mentioned (Leroi Gourhan 1963). Another concept, Pierre Bourdieu's definition of the habitus (Bourdieu 1977) as a set of learned dispositions is closer to Mauss's original ideas. However, Bourdieu was not very interested in the body or objects or technology, but focused on social boundaries instead. Many scholars now also prefer to see the relation between people as less deterministic than Bourdieu's habitus would have it, and a special role of technology (in a narrower definition of objects or things) is now believed to be crucial in understanding how relations between people are mediated (Latour 2005).

More recently, knowledge of landscapes has also been defined as a form of technology (Kiriatzi and Knappett 2017). Knowing where to find raw materials and which crops to cultivate in what landscape require the possession of a specific set of operational behaviours and tools, linked with certain spatial information.

Technology as a concept thus covers both the more traditional and narrower idea of objects and the production thereof, whereas it can also be defined more broadly as embodied knowledge that can be exchanged, transmitted or manipulated by people in the interaction with their physical and social surrounding. The analysis in the remainder of this paper draws on these various understandings of technology: in a narrower sense, as the production of things – conceptualized as a *chaîne opératoire* – and as a broader understanding of technology, as embodied knowledge – in a Maussian sense – in terms of ways of using things and also landscapes. Humans are thus intrinsically entangled with other people and with their material surroundings (objects, landscapes), and this complex network of relations assumes different forms of exploitation, production, consumption, dependency, and exchange. Because of the interconnectivity of the various parts, a change in one part of the network can cause a change in the other parts. Therefore a change in production technology (in the narrow sense) causes social change because it changes embodied technology (in the broad sense). The change in production technology changes the relation with other parts of the network (people, object, landscapes) because the relations of dependency, production, exploitation and so on are redefined.

In the Bay of Naples, innovations in pottery production technologies led to the redefinition of relations between people in terms of production, dependency and exchange and of landscapes, which were used differently to accommodate the new industries. The production of new pottery was linked with new industries that were linked with new behaviours and the whole behavioural network changed the landscape. The result of the new pottery production technology was a dramatic social and cultural change and urbanization.

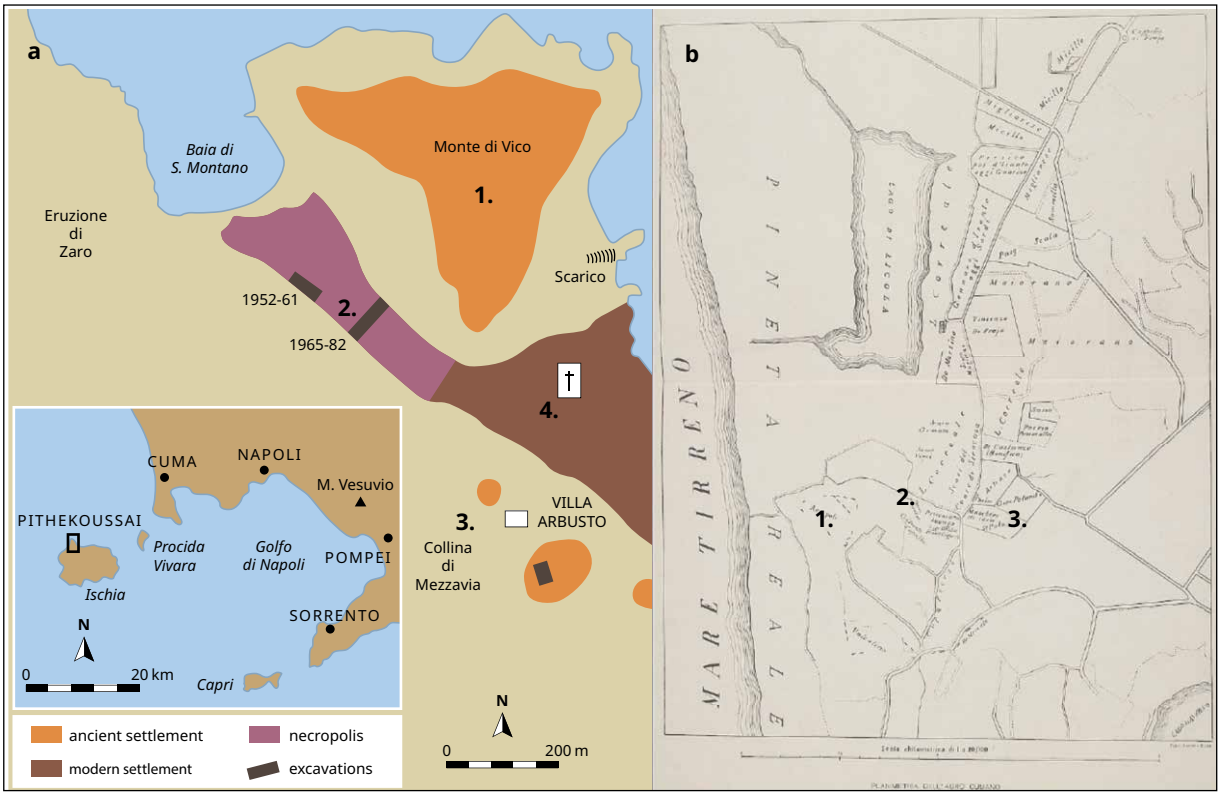


Figure 2. Plans of the excavated areas in the Bay of Naples (Campania, Italy). (a) Pithekoussai (1 = acropolis, 2 = necropolis, 3 = metal workshop, 4 = pottery workshop): (b) Cuma (1 = acropolis, 2 = fibula workshop, 3 = necropolis) (adapted from Nizzo 2008a, 27 and Gabrici 1913 pl. 1).

Production technologies in the Bay of Naples

The preservation of contexts related to production in the Bay of Naples is quite exceptional. Apart from two late 8th-century BCE workshops, one on Pithekoussai (fig. 2a, no. 3) (Klein 1972), the other one in Cuma (Greco 2009) under the Roman forum, below the acropolis (fig. 2b, no. 2), identified as *fibulae* production places, a pottery production place from the same period is known from Pithekoussai (fig. 2a, no. 4). The pottery workshop allows us to gain an understanding of the organization of the pottery production technologies, that is to say, ovens and work surfaces, as well as the range of vessel types that were produced.

The pottery production place was found under the Church of Santa Restituta on Pithekoussai (Olcese 2017). It was located in the vicinity of an acropolis (fig. 2a, no. 1), probably the location of a settlement occupied throughout the 8th and 7th centuries BCE – if not earlier – and its necropolis, situated in the valley below (fig. 2a, no. 2). The necropolis has been extensively excavated and, more importantly, published, even though partially (Buchner & Ridgway 1993; Nizzo 2007). More than 600 tombs, including inventories, have been studied in detail. Metal objects from the tombs such as *fibulae* and jewellery have demonstrated that native culture continued to have a deep impact on the society (Guzzo 2004). A continuity in funerary practices such as tomb architecture and ways of depositing corpses should also be seen as indicative of the continued importance of native ways of doing things (Donnellan 2016a and 2016b), even at the time Greek 'colonists' supposedly would have taken over.

In Cuma, excavations have led to the discovery of many dozens of tombs from the 9th century BCE onwards. Regretfully, many of the contexts have been mixed up or lost and only 79 contexts of the later 8th and 7th centuries BCE are known. Although these have been published (Pellegrini 1903; Gabrici 1913), the publications are now over a century old and many problems in the typochronological classification of

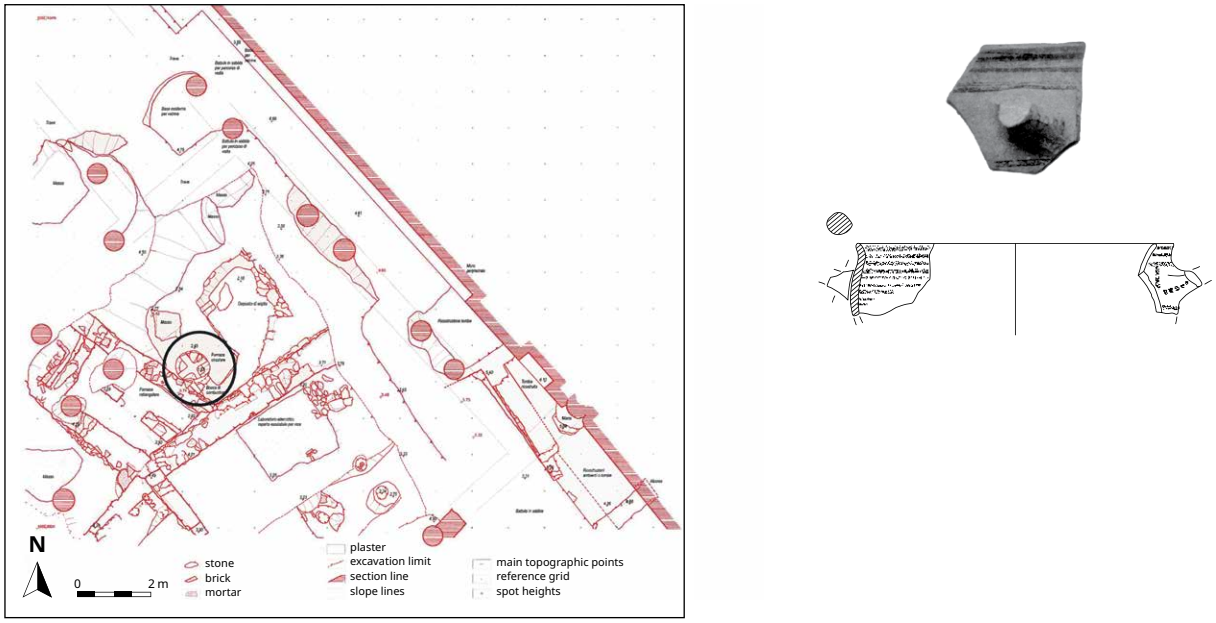


Figure 3. Plan of the pottery production place of Santa Restituta and a fragment of a local skyphos associated with oven 1 (adapted from Olcese 2017, 60 fig. IV.5 & 303 fig. 3/5).

the objects await revision. Until the rich inventories from Cuma are fully restudied, analysis can, at best, be approximate.

The tombs that were excavated in the Bay of Naples contained many hundreds of imported and locally produced vessels for the consumption of food and drinks, for storage, and for the preparation of food. Through the discoveries in the necropolis, there is now a fair understanding of the local pottery repertoire, its evolution and the impact of innovations, derived from elsewhere (Mermati 2012).

The production place excavated under the Church of Santa Restituta provides an exceptional insight into the organization of the local pottery production (Olcese 2017). The area was in use for centuries, due to its excellent location in the vicinity of the coast. The earliest oven that was excavated had a circular layout (fig. 3), had height-wise a diameter of *c.*1 m. It could contain only a couple of vessels at a time. Later ovens had a rectangular layout and were surrounded by bases for the preparation of the clay. The pottery associated with the oven allowed it to be dated to around the end of the late 8th century BCE. According to the finds, the area was used for the production of a variety of fine wares, produced on a fast wheel: drinking cups (skyphoi, kotylai), jugs (oinochoai), plates and bowls in Greek style. However, also less refined ollae, used for the preparation and storage of food, and bowls and basins appear to have been produced in the workshop. Thus a variety of shapes, some traditional, some new, were produced in the same production place. The shapes that were produced in the workshop are abundantly documented in the necropolis. The pottery production of the Santa Restituta workshop (and the necropolis) has been characterized as a serial production, not very refined (Olcese 2017), and thus indicative of an increase in the scale of production in terms of quantity rather than in quality.

Another new vessel type that is known to have been produced locally as well, at least from around the middle of the 8th century BCE if not earlier, is a vessel for storage and transport (fig. 4). Amphorae have been found in large numbers in the necropolis of Pithekoussai. In Cuma, they are, in contrast, an exceptional find. Local products have been found alongside imports from various parts of the Mediterranean. The amphorae types made on Pithekoussai were derived from Levantine prototypes, however, with a flat bottom rather than a rounded one (Petacco 2003). The earliest vessels were not yet very standardized in terms of shape, but the massive presence of the vessels in the Pithekoussai necropolis points to mass production. Amphorae were not found in association with the production area of Santa Restituta,

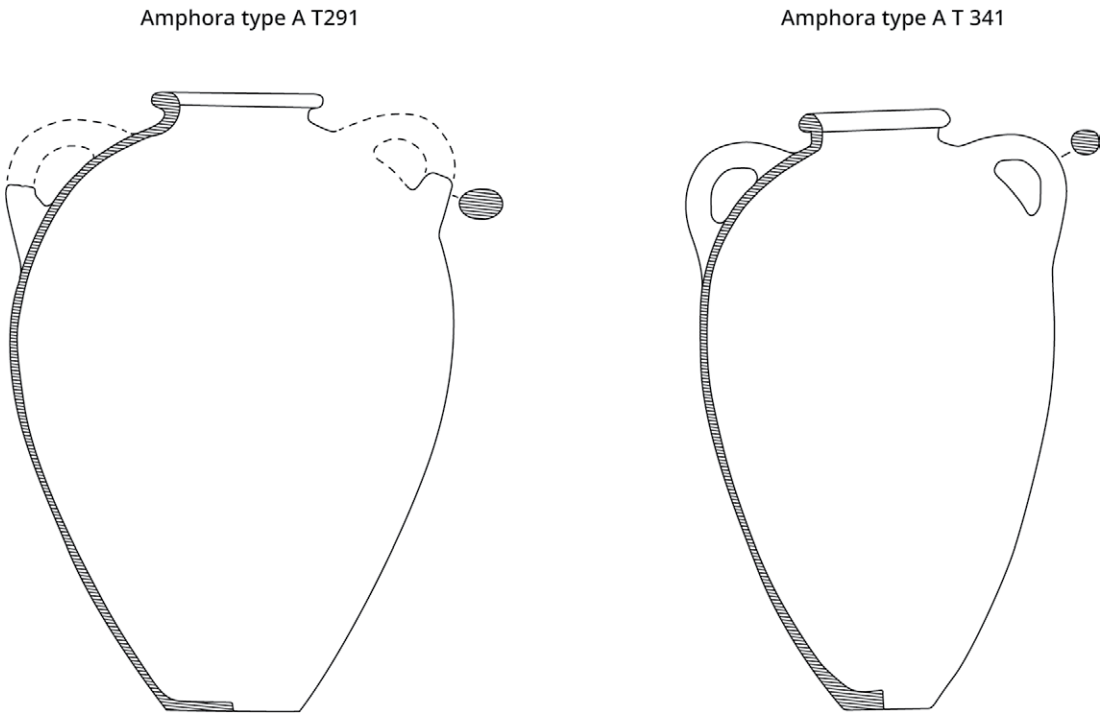


Figure 4. Amphora type A of local production (adapted from Buchner and Ridgway 1993, pl. 194-195).

so it must be assumed that their production was organized differently, possibly at another location altogether.

The amphorae are thought to have contained wine; its production was an industry for which the volcanic island of Pithekoussai was particularly suited (Olcese 2017). Even today, the island still produces an excellent wine. Traces of wine production have been found throughout the island. Massive basins for the collection of grapes have been discovered. While some are fairly recent, it is thought that others might date to Roman times, or perhaps even earlier. A systematic study of the wine production infrastructure is, regretfully, still lacking, but there can be little doubt that the appearance of the amphorae on Pithekoussai was accompanied by a well-organized wine production.

Apart from vessels for the storage and consumption of wine, numerous small vessels, containers for unguents or aryballoi and lekythoi were found (fig. 5). The earliest imports came from the island of Rhodes and the earliest locally produced aryballoi follow the Rhodian examples. Corinthian perfume vessels were imported soon after on a quite massive scale and a local production imitating the latter was set up as well.

Apart from one possible sherd, the production of perfume bottles seems not to have taken place in the workshop of Santa Restituta. The perfume bottles must have been linked with a local perfume industry. Although we have no firm evidence for this, I am inclined to locate the perfume production not on the island of Pithekoussai, but on the mainland, at Cuma. Both in absolute numbers and in terms of relative distribution, we have many more perfume bottles from Cuma than from Pithekoussai (Donnellan, forthcoming). In the next section, this distribution will be discussed in more detail. Agricultural production in the area of Cuma has not been sufficiently studied to allow an identification of the sorts of ingredients used for the perfume, for example almond oil versus olive oil and flowers or spices, or the way it was organized, but the area was known in later times as one of the most famous producers of perfumes of Roman times (Brun 2012). Both at the cities of Capua (Campania, Italy) and Pompeii (Campania, Italy), perfume production is known, and the roots of these industries need to be sought in the area under study here: 8th/7th-century BCE Cuma.

Rhodian aryballos
T166
Layer 15

Local aryballos
T456
Layer 16

KW import
T168
Layer 17

Figure 5. Aryballoi (perfume containers) found at Pithekoussai (Ischia, Italy) (from Buchner and Ridgway 1993 CXXII, 136 and CXXX).

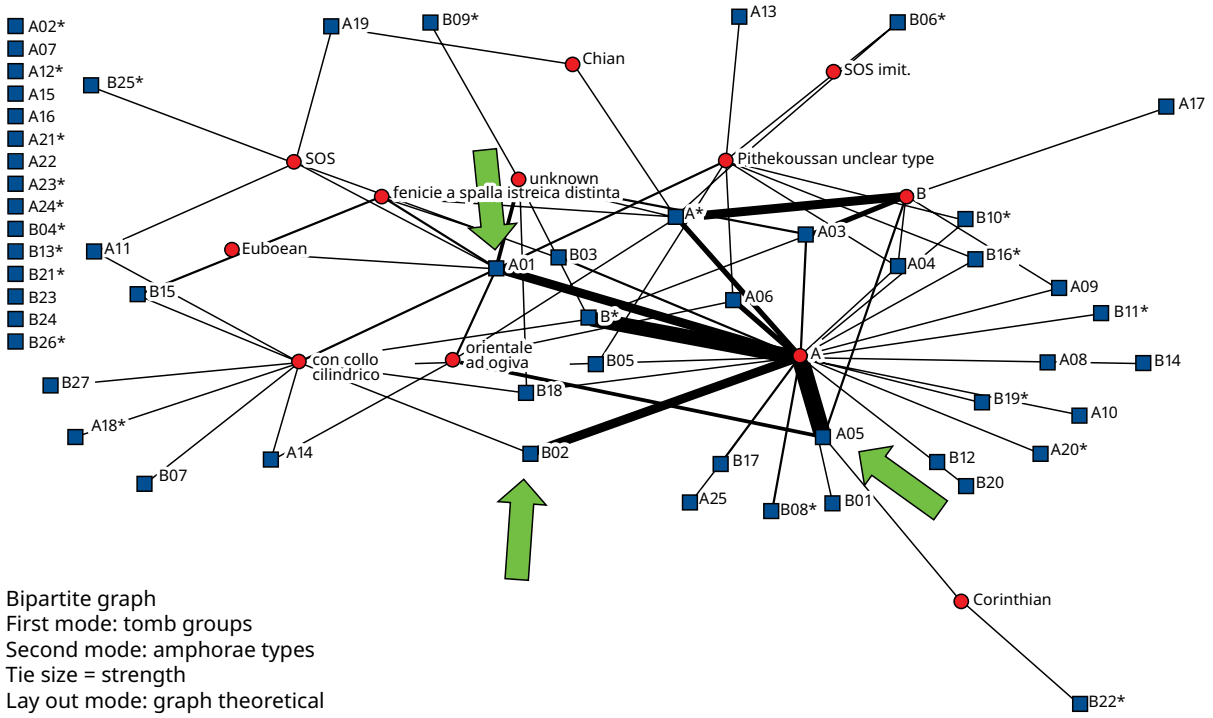
Distribution and consumption in the Bay of Naples

The new pottery production technologies appear to have served in the first place the funerary sphere. Even though our picture might be distorted because we lack properly excavated and published domestic contexts, it seems that a large part of the new vessel types and probably their contents (wine, perfume) were consumed during rites surrounding the burial and commemoration of the dead.

It would be beyond the scope of this paper to analyse the full scale of consumption of individual vessels, but a selective analysis of the consumption of some vessel types in the necropolis reveals interesting patterns.[2] Conspicuous consumption by some groups is evident through the deposition of large numbers of vessels and the variety of types deposited, whereas other groups appear to have used the new vessel types selectively, preferring certain types and eschewing others. This indicates that personal preferences as well as restricted access to some of the new goods guided consumption practices. The differences in funerary consumption should be understood as strategies of self-representation and for the construction of social differences.

When looking at the distribution of amphorae per family groups at Pithekoussai (fig. 6), it becomes clear that out of 54 groups (burial plots, that is to say, family groups), 15 did not contain amphorae. For some of these there is an easy explanation: amphorae were used almost exclusively for the burial of infants. The groups without amphorae were small and there were no infants to bury, so no opportunity arose to deposit an amphora. However, several of the other groups were larger and did contain infant burials, but no amphorae. So either they possessed no amphorae or a decision was taken not to deposit them. On the other hand, it appears that roughly two-thirds of the burying population at Pithekoussai were able to procure amphorae, either locally produced or imported and probably their contents, wine – unless we suppose that a separate trade in empty amphorae existed, which is rather unlikely.

2 The analysis uses the published excavation data of Pithekoussai (Buchner & Ridgway 1993; Nizzo 2007) and Cuma (Pellegrini 1903; Gabrici 1913). The excavation data have been digitized and collected in an Access database. The quantification and visualization used here draws on a two-mode network model (Donnellan 2016a and 2016b) in which contexts are linked with the objects they contain. The unit of analysis for Pithekoussai is the plots in the necropolis, thought to be family groups (Nizzo 2007) – considered here a valid unit for the analysis of social practice. From Cuma, we do not have similar detailed information on family plots, although we can hypothesize that people were also buried in family plots. The units of analysis are the terrain where the tombs were found, which were named after their owners at the time of the excavation. It should be assumed that boundaries between family groups were distorted and that, at best, trends can be situated spatially rather than socially, as is done for Pithekoussai. A burial plot can thus be assumed to have contained one or more family groups.



Bipartite graph
First mode: tomb groups
Second mode: amphorae types
Tie size = strength
Lay out mode: graph theoretical

Figure 6. Two-mode network model of amphorae consumption at Pithekoussai (Ischia, Italy).

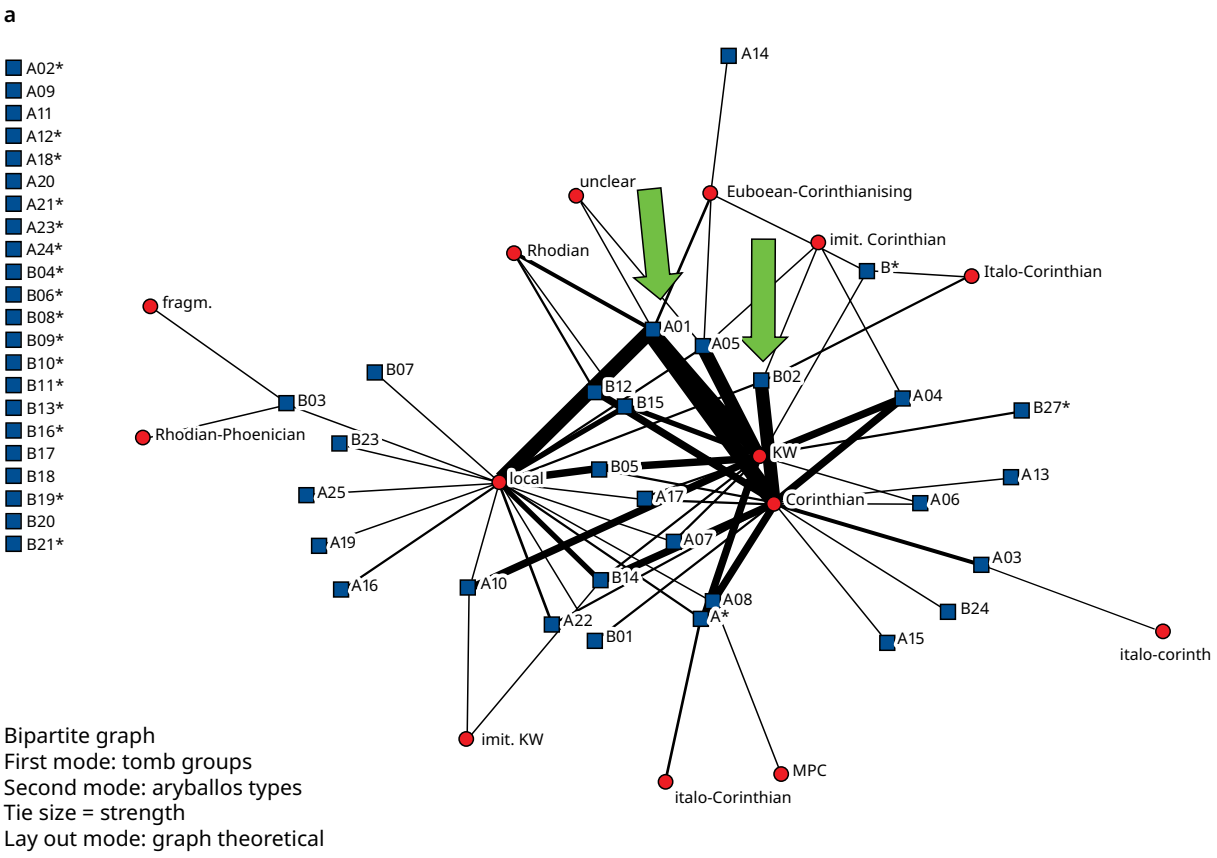
The group with the largest number of amphorae is group A1. A1 is a large group containing 81 tombs. Also group A5 (65 tombs) has quite some amphorae, but not all large groups have many amphorae: group B02 has 56 tombs but only few amphorae. In group B02, several infants received a pit burial and one is buried in an olla. This demonstrates that the deposition of an amphora for the burial of an infant was determined by conscious choice and possibly driven by restricted access to amphorae.

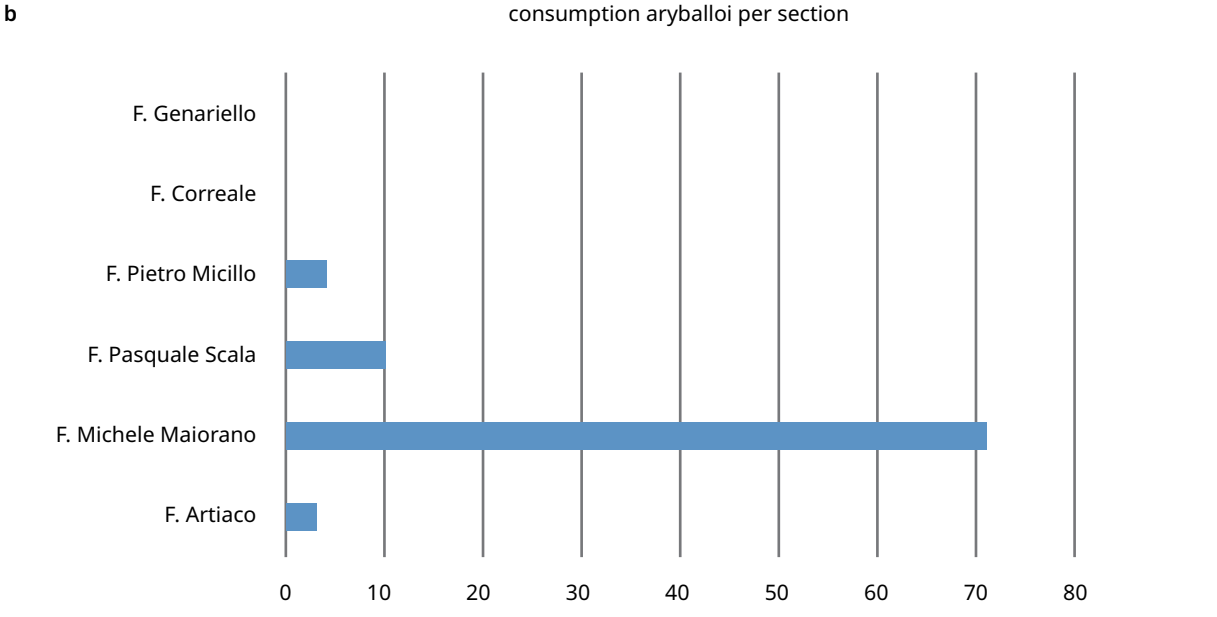
From the necropolis of Cuma, only two amphorae are known. Both were imported, one from Greece (T104) and one from the Levant (T XXXVI of Fondo Maiorano). Infant burials appear to have been virtually inexistent at Cuma and the consumption of amphorae followed a very different pattern.

The distribution of aryballoi at Pithekoussai displays a similar pattern to those of the amphorae (fig. 7a). Group A01 has a disproportionate share of the aryballoi, whereas other large groups such as B02 have relatively few. A large part of the population did not deposit aryballoi. Comparatively, we seem to have more aryballoi from Cuma than from Pithekoussai, as the consumption graph shows (fig. 7b).[3] Overall, 17% of individual tombs at Pithekoussai have one or more aryballoi, whereas in Cuma 57% of the tombs have one or more aryballoi. Over half the tombs of the Fondo Maiorano had one or more aryballoi. Though badly coloured by the troublesome research history, the numbers are interesting. It is worth noting that currently we also have roughly twice the amount of lekythoi coming from Cuma, compared to Pithekoussai.

A third category of objects considered here in detail are oinochoai (jugs for pouring wine). They have been documented in large numbers at Pithekoussai and Cuma. Oven 1 of Santa Restituta gave ample evidence of local production of oinochoai. At Pithekoussai, 19 out of 54 groups or one-third did not contain any oinochoai (fig. 8a). These groups contained hardly any Greek material, despite being composed of numerous tombs, both adult and infant/child. At Cuma, 36 out of 79 tombs contained one or more oinochoai (fig. 8b). Fondo Correale and Gennariello did

3 The current state of the publication, with a troubled history (Nizzo 2008b), does not allow an analysis as detailed as the one conducted for Pithekoussai.

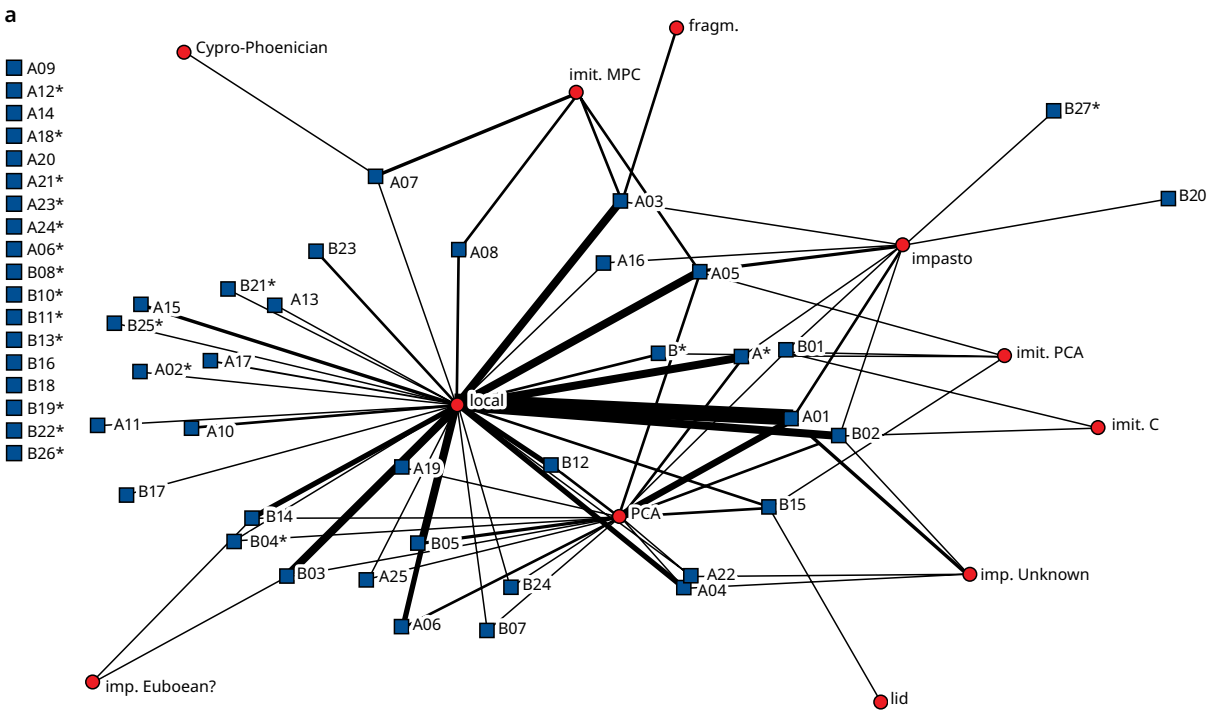




not have any oinochoai despite having several tombs with rich inventories. Again, it might be a choice of display in the tombs, more articulated around non-Greek objects, rather than not having access to Greek-type drinking vessels.

The unequal distribution of amphorae, wine jugs and perfume bottles throughout the necropolis in both Pithekoussai and Cuma can be related to conscious

Figure 7. Consumption of aryballoi at Pithekoussai (Ischia, Italy) (a: two-mode network) and Cuma (Campania, Italy) (b: consumption graph).



Bipartite graph
First mode: tomb groups
Second mode: oinochoe types
Tie size = strength
Lay out mode: graph theoretical

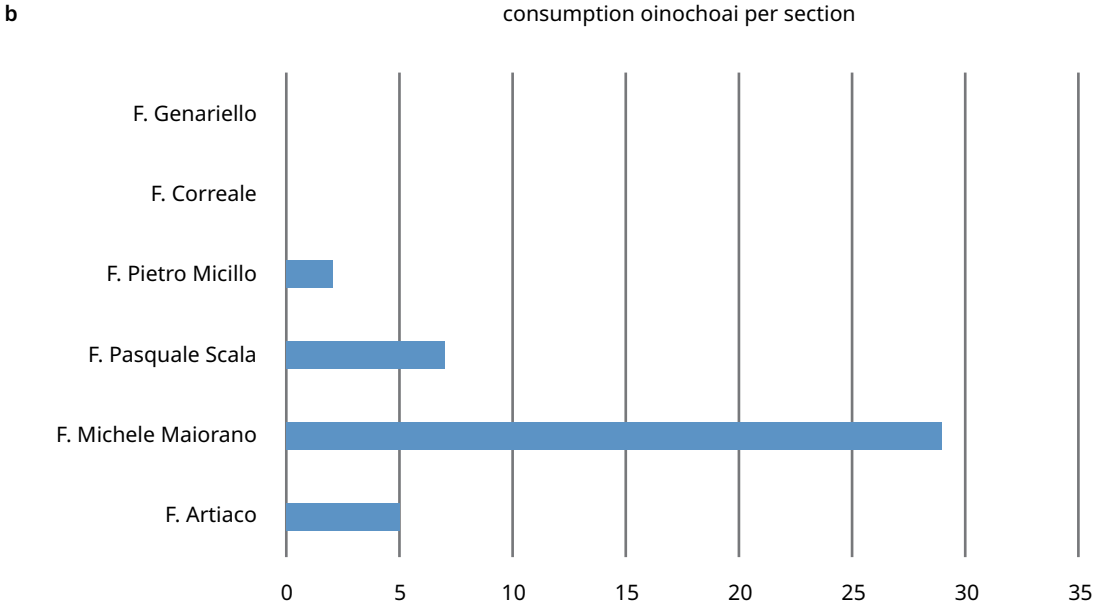


Figure 8. Consumption of oinochoai at Pithekoussai (Ischia, Italy) (a: two-mode network) and Cuma (Campania, Italy) (b: consumption graph).

choices in funerary rites and restricted access to the consumption goods. It appears that not all groups had access to the new production technologies – although we need to take into account that in a number of cases this image might be a bias, due to the choice of depositing the items for burial or not. People might have possessed these goods, but reserved their use for daily life rather than for funerary ritual.

However, it appears justified to suggest, because of conspicuous consumption, that a number of groups were able to control the distribution of the new production technologies and thus had more goods available for deposit in enacting burial rites. Their privileged position could derive from a direct involvement in the production, for example through the coordination of production and collection of crops, the processing of grapes, oil and flowers and/or the manufacturing of containers. Although the exact mechanisms escape us, we can hypothesize that other people were able to participate in the production technology via new mechanisms of exchange that arose through the production of new consumption goods (Donnellan, forthcoming). Valued exchange could have enabled the less affluent groups to procure consumption goods through labour, the exchange of crops or participation in production processes of grapes, oil and flowers for perfume or production of containers (Donnellan, forthcoming).

The vast amounts of Greek-style vessels, both locally produced and imported, coming from the necropolis at Pithekoussai and the plots excavated in Cuma, indicate that a craze for the new exotic objects developed quickly, among a large part of the population, and that a part, however, did not participate, either willingly or unwillingly. Stemming from a long Bronze Age tradition, pottery for consuming food and liquids, for pouring and storage had been well integrated in the local repertoires for centuries, but the pots had been handmade, with a not very refined clay, giving them a plump appearance. In addition, the decoration of these vessels was usually not very elaborate, sometimes with incised or impressed geometric motifs, but unpainted. The new types of painted fine wares were smaller, lighter, more elegant, and visually more appealing, especially since the development of figurative representations in the 7th century BCE. The investment in refining the clay and applying painted decoration was balanced by the standardization of the shapes and the use of a fast wheel for constructing the vessels' bodies. The new production technologies meant that a larger amount of vessels could be produced, thus enabling larger parts of the population to participate in the consumption of these goods. Previously, only a small group of privileged individuals had access to exotic imports, which were few in number and whose supply could not be easily controlled. Local production assured a steady supply and gave the people in charge of this production considerable power over the redistribution of the goods.

The new production technologies enabled more expressed social differentiation through conspicuous consumption in funerary rites. Depositing large quantities of vessels and varying the available types enabled the drawing of boundaries between haves and have-nots and thus the new production technologies contributed to a marked increase in social inequality. On the other hand, the broader availability of vessels enabled larger groups to participate in the consumption of goods, which they managed to procure via new mechanisms of exchange, created through new production processes. The *chaîne opératoire* became longer and more complex because of the involvement of more people and different but linked production technologies.

The lack of properly excavated domestic contexts does not allow an assessment of the extent to which wine drinking and perfuming was integrated into daily life, but it is generally assumed that the practice of civilized banqueting in a Greek/Near Eastern style spread rapidly throughout the Mediterranean in the first millennium BCE and gradually became detached from funerary feasting. The excavation of a dump, coming from the settlement at Pithekoussai, has shown that significant amounts of drinking cups, jugs and amphorae had probably been used in domestic contexts and had been deposited outside the funerary sphere (Coldstream 1995). The funerary sphere nevertheless remained one – if not the – most important context for consumption, especially conspicuous consumption.

Spatial transformations in the Bay of Naples

The new pottery production technologies caused dramatic social changes as the result of involving more people and objects through an extended network of production and distribution. Besides social change, the new production technologies also provoked unprecedented changes in the use of space. The extraction and production of large quantities of raw materials altered the use of the local landscape, whereas the new forms of distribution and consumption required new ways of managing space. An unprecedented concentration of activities in an urbanizing settlement accompanied a more extensive use and expansion of the wider landscape.

The production of grapes for wine and olives or almonds and flowers or spices for perfume meant, if not a radical innovation, at least a dramatic increase in the scale of production.[4] Farmsteads have been found throughout the island of Pithekoussai (Gialanella 1994; de Caro and Gialanella 1998) and it can be generally assumed that larger parts of the landscape were brought under more intensive cultivation. In addition, the subsurface extraction of clay on Mount Epomeo on Pithekoussai (Olcese 2017) led to sophisticated mining and a more intensive use of the central part of the island.

The production of larger quantities of crops also required the installation of facilities for the collection of the raw material and the processing of the crops. Wine producing facilities on Pithekoussai have been mentioned and their installation, probably in close connection with facilities for the production of amphorae, led to a much more intensive use of the wider landscape. Evidence for the perfume industry at Cuma has not yet come to light, as only the settlement and burial plots immediately surrounding the settlement have been explored, but it can be assumed that a similar increase in the intensive exploitation of the landscape surrounding the settlement at Cuma occurred from the mid-8th century BCE onwards.

The transport and distribution of large quantities of goods also required the appropriate facilities; roads and access points to the settlements must have become more marked as a result. The regular exchange and shipping of goods to and from the mainland, as well as from elsewhere in the Mediterranean, required investment in designated spaces and a functioning harbour infrastructure. Designated places were important points of reference for trading partners, who could hardly come ashore to start looking for their trading partners within a dispersed settlement system. Centralization of activities was paramount for the economy to function with its new industries. Centralization of activities, moreover, facilitated control. Safe storage for valuable goods could be provided in a centralized settlement, whereas dependent labourers or individuals subject to taxation in kind could be better supervised.

On the other hand, civilized banqueting (symposium) outside contexts of ritual commemoration would gradually assume a more important place in society and eventually specific places within the domestic context and house designs came to reflect the general adoption of these new practices (Lang 1996).

Transformations of space thus occurred at the level of the broader landscape, which became more intensively exploited, at the level of settlement patterns, which became more centralized to ensure control over people and goods and provide facilities for distribution and exchange, and at the level of the individual domestic context, which became a new location for consumption and performance.

At Pithekoussai, nothing is known from the settlement, but the trends in intensified exploitation of the wider landscape have been documented. Farmsteads have

4 The introduction of wine and olive oil has long been attributed to 'Greek colonists'. Recent discoveries unequivocally prove that grapes and olives had been known in Italy before 'Greek colonization' (Tanasi *et al.* 2017) although we know nothing about the presence of these crops in the area under discussion.

been recorded and infrastructure for wine production could possibly date to EIA or after. At Cuma, we know nothing about the wider landscape, but recent excavations have revealed that towards the late 8th century BCE, the settlement was reorganized. At the foot of the acropolis, a new quarter was installed where there had been tombs previously. The new settlement, perhaps an extension of the existing settlement on the acropolis, received a regular street pattern (d'Acunto *et al.* 2015). The construction of a new neighbourhood is indicative of an increase in population levels and the general size of the settlement, but also of the increase in social control and the development of state power of a political class able to express its power spatially. A strict control over the flow of objects and people was the result.

Conclusion: migration, embodied technologies and social change

Innovations in pottery production technologies introduced in the Bay of Naples in the course of the first half of the 8th century BCE caused radical social and spatial transformations within a couple of generations. Because pottery is a portable production technology and fairly cheap, it has the potential to reach a large group of consumers. Locally produced pottery ensures a steadier influx of luxury goods, in contrast to imports, whose supplies are more difficult to control. New ways of producing pottery enabled the broadening of the local pottery repertoire and production could be increased through standardization. Cups, jugs, mixing bowls, vessels for storage and transport and perfume bottles were produced on a massive scale. The adoption of a fast wheel compensated the larger investment in the refining of the clay. The resulting vessels were smaller, lighter, more elegant, and visually appealing because of their brightly painted surfaces. Depositing these new vessels as part of burial rites became quickly very fashionable.

The new pottery production technologies were linked to new industries of wine and perfume production. Making wine and perfume required an increase in agricultural production, which in turn needed an increase in investment in human labour, which meant that more people got involved. The *chaîne opératoire* was extended, linking more people through agriculture and pottery production and intensive exploitation of the landscape. These larger networks of people and objects allowed new forms of exchange and new modes of distribution to develop. Labour and services could be exchanged for goods, which again enabled more people to participate in the consumption of the new pottery technologies: one did not have to stand at the top to obtain the objects, but one could procure objects by engaging with the top in different ways, or even others on a lower level but connected to the top.

The availability of objects created shifts between the haves and have-nots in society. Some groups managed to coordinate production and appropriated a surplus which they could use for conspicuous consumption. Social distinctions thus became even more pronounced. It was not just about having fashionable new cups, jugs and perfume bottles, but about having *a lot* of them. Gradually, the consumption of these vessels and their contents would become partially detached from the funerary sphere, as consumption in daily life allowed for more regular social display than just the occasion of burial or commemoration of a family member.

New forms of pottery production caused a radical transformation in the use of landscapes alongside the social transformations it provoked. The landscape around the settlements was exploited more intensively to assure a steady supply of grapes for wine and oil and flowers or spices for perfume. The mass production of vessels demanded a larger supply of clay as well. The collection of raw material, the processing of the crops and next the storage of the finished products led to the installation of specific places for these tasks. Special facilities and infrastructure were needed.

The need for safe storage and the desire to control labourers and other dependents created a centralization of activities. The same centralized space provided a spatial point of reference for people from outside, who came to trade their cargos for local surpluses. An infrastructure for trade such as harbour facilities and spaces for trading were created. Quickly, settlements started to gain a distinct urban outlook in which the use of space was well defined.

The seemingly simple technology of pottery production could cause these radical social and spatial transformations because, as theorists of technology have pointed out, technologies are embodied. People use the material world – objects and landscapes – around them to negotiate relations with other people. People maintain different relations of dependency, domination, collaboration through their specific engagement with the material world. The new pottery production technologies tied people together in different ways of production and distribution, and especially of consumption.

The role of the body is crucial for understanding the effect of the technological innovations. The new production technologies created not just vessels that were visually appealing, but the vessels were meant to be handled in elaborate performances in which liquids were ingested and applied to the body. The corporal involvement of the actors with the vessels thus became even stronger and their impact on society more significant. The importance of ingesting liquids, especially of an intoxicating nature, has been stressed by anthropologists. Feasts in which intoxicating liquids were consumed are considered events of primordial social importance, providing an arena for politics, for social display and for the confirmation of economic dependencies (Dietler and Hayden 2001; O'Connor 2015).

It is therefore no coincidence that some of the earliest examples of writing in the Bay of Naples, dating to the 8th century BCE, were found on a drinking cup, a mixing bowl and a perfume bottle (Bartonek and Buchner 1995). The first and the latter are quite elaborate examples of expressions of possession in relation to agency attributed to the vessel by their owner. The inscription on the drinking cup reads: 'I am Nestor's cup, good to drink from. Whoever drinks this cup empty, straightaway, desire for the beautifully crowned Aphrodite will seize him.' The inscription on the perfume bottle strikes a quite different tone, stating: 'I am Tataia's lekythos. May he who steals me go blind.' Another inscription was applied on a krater, a mixing bowl for water and wine. The writing asserts that '[…]inos made me'. The inscription demonstrates the exceptional pride a potter took in his abilities to produce a finely decorated bowl, to the extent that he wrote his name for everybody to see. The new pottery shapes became extensions of the human body. They were vehicles for a variety of practices that displayed human power over objects and gestures that were related to them.

The new pottery production technologies transformed bodily practices massively. These changes on a microscale had a major impact on the macroscale because of the interdependency of people and objects. By transforming one small part of the network, changes occurred throughout the network, resulting in radical social and cultural change.

It is only by adopting a critical theoretical perspective on material culture and human interaction that we can frame social change on a macroscale. Disentangling the mobility of technologies from the mobility of people and objects allows the tracing of the social and cultural changes a new production technology could bring about. A simple, highly mobile and cheap technology such as pottery production could be revealed to have created massive changes in the Bay of Naples, without the need of bringing in large-scale migrations of Greeks replacing the native population as explanatory mechanisms for the appearance of Greek pottery, social complexity and urbanization. Individuals or small groups of temporary or permanent migrants could have introduced the innovations, which were picked up in existing

native groups. The transfer of new technologies such as production technologies and also consumption practices such as civilized banqueting and writing required quite intensive and steady interaction. The intensive trade relations that developed in the Mediterranean did not just bring about a high degree of mobility of objects, but also of people. The enthusiasm with which foreign culture seems to have been adopted in the Bay of Naples probably made it easier for newcomers to blend in, whereas the economic boom caused by the new industries could have been an attractive prospect for people seeking a better future, thus even further enhancing the ongoing urbanization processes.

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Dualist socio-political systems in South East Asia and the interpretation of late prehistoric European societies

Christian Jeunesse[*]

Abstract

The Hallstatt Early La Tène cultural complex shows an interesting contrast between two distinct forms of social organization: on the one hand segmented acephalous societies, on the other hand (the one with princely graves and settlements) stratified societies. The significance of this opposition used to be minored by most scholars, who interpret the corresponding dates (graves, hoards, hilltop enclosures, and the like) as nothing more than indicators of two different ways to display wealth and prestige within the same social system. Ethnoarchaeological research into current societies from the island of Sumba (Indonesia) with a similar dual political and social system within an area showing a homogeneous material culture show, however, that it may generate profound differences in daily life and social and political relations. Comparable configurations exist in other South East Asia societies (Konyak Naga, Kachin), butwe have not identified any case in which such a duality has only superficial consequences in the way people interact politically and socially.

Keywords: Hallstatt, ethnoarchaeology, Sumba, social organization, elite graves

The practice of ethnoarchaeology is linked with the hope that there are some rules commanding the relation between the material and the ideal parts of culture. In this paper , we will try to examine two different topics: (1) the social significance of funeral architectures (what they reflect); (2) the impact on material culture and cultural landscape of different forms of social organization within the same cultural environment (what the archaeologists used to call an 'archaeological culture'). Our main reference area will be the island of Sumba (Indonesia) – well known especially for its still living megalithic practices – on which I have been carrying out an ethnoarchaeological project since 2015 (Jeunesse 2016, Jeunesse et Denaire 2017; Jeunesse et Denaire 2018).

Sumba is one of the lesser Sunda islands located in the south-east of Indonesia (Fig. 1).

Thanks to the late arrival of the Dutch administration, at the beginning of the 20th century, the traditional practices and the old form of social organization are

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quite well preserved. Till now, my main research topics have been the conditions of the formation of bone assemblages in the context of the feasting economy, the circulation of living animals and of meat within the framework of the ritual economy and the collective grave practice. If we want to undertake good research on all these topics, a precise knowledge of the social context is a crucial precondition. On Sumba, there are two sharply contrasting forms of social organization. So we have here the opportunity to study how these two forms are reflected in the material culture and in the landscape. And this is what I will try to present to you in the first part of my paper, with particular emphasis on the architectural traits, grave architecture and house architecture.

Two forms of social organization in Sumba and other 'hill tribes' of South East Asia

The limits on the map in Figure 2 are the borderss of the administrative district, but we know that they reproduce approximately the traditional frontiers separating ethnic groups. On a territory whose size is comparable to that of Corsica, there are 25 ethnic groups (Fig. 2), which speak eight different languages, all belonging to the Austronesian language family, and some of which are divided into several dialects (Fig. 3).

Less than one third of the districts have been seriously studied by ethnologists, so there are still huge gaps in our knowledge of the ethnography of the island (Fig. 4). Most of the districts about which we possess some information lie in the western part of the island. The main monographies are those written by Forth (1981), Gunawan (2000), Geirnaert-Martin (1992), Needham (1987) and Kuipers (1990); also, very useful are the articles of J. Hoskins (1986; 2002 with detailed bibliography) and B. Renard-Clamagirand (1999). The only existing ethnoarchaeological works devoted to the Sumba societies have resulted from the research conducted by Ron Adams about megalithic practices (Adams 2007; 2010; 2016).

All the ethnic groups used to follow the same religious belief and claimed a common origin. According to the cosmological myths, the village of Wunga, in the Kanatang district, is supposed to be the first settlement founded by the common ancestors of all the inhabitants of the island. The ancient animistic religion is called *marapu*. There are distant creator gods, but the central supernatural entities are the spirits of the ancestors, whose main role is to intercede between human beings and gods. The ancestors play a key role in social life; they are co-owners of clan properties, especially ritual goods and they built the links of a temporal chain connecting the living with the founder of the clan. That is why the funerals, the megalithic graves, the origin houses and the clan treasure (heirlooms) are so important in the local culture. The house of origin (or house of ancestors) plays a prominent role, being the ceremonial and political centre of the clan or the lineage and the place where the ancestors' spirits live. The clan house is occupied by the oldest house of the oldest lineages, the one of the founder of the clan.

The house as an institution has great autonomy for wedding strategies and is also the relevant analysis level when we try to understand the managing of funeral monuments. The homogeneity of the material and ideal aspects of culture can be observed, among other fields, in the spatial organization of the villages, the arrangement of the houses, their relation with megalithic graves and with collective sacrificial places. The megalithic dolmens are normally built in front of the origin house (Fig. 5). One of the common patterns is made of a circular sacrificial place surrounded by concentric circles of megaliths and houses (Fig. 5b). There are of course some stylistic differences between the ethnic groups, for instance in the motifs used to decorate the Ikat textiles or the dolmens (in this field, we have the kind of variability for which the archaeologists use the opposition between culture and regional group)

Figure 1. Location of the island of Sumba (Indonesia).

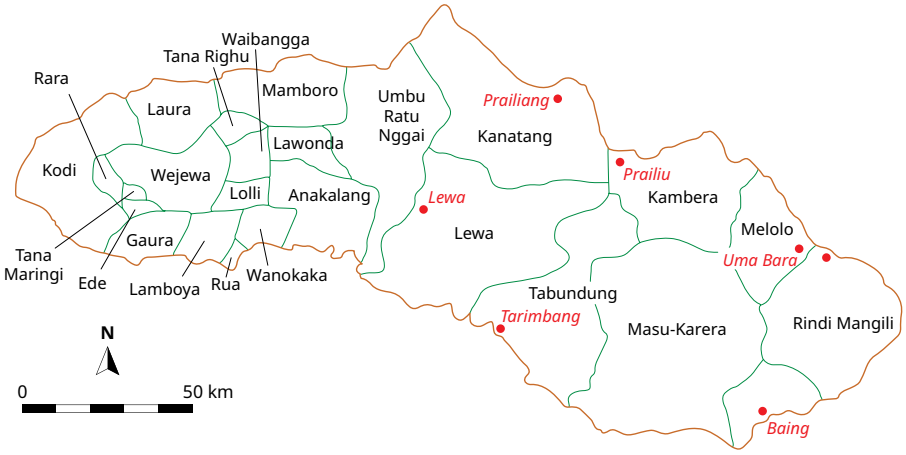


Figure 2. Map of administrative sub-districts, reflecting the distribution and frontiers of the ethnic groups (Doubrawa 2009).

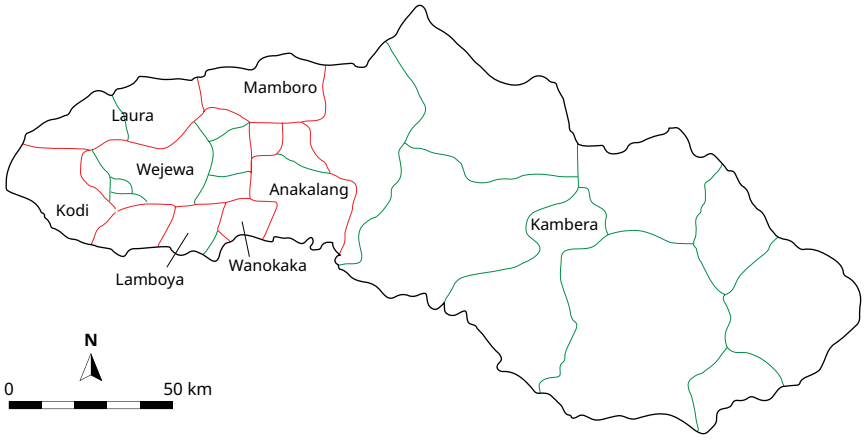


Figure 3. Distribution of languages (Doubrawa 2009).

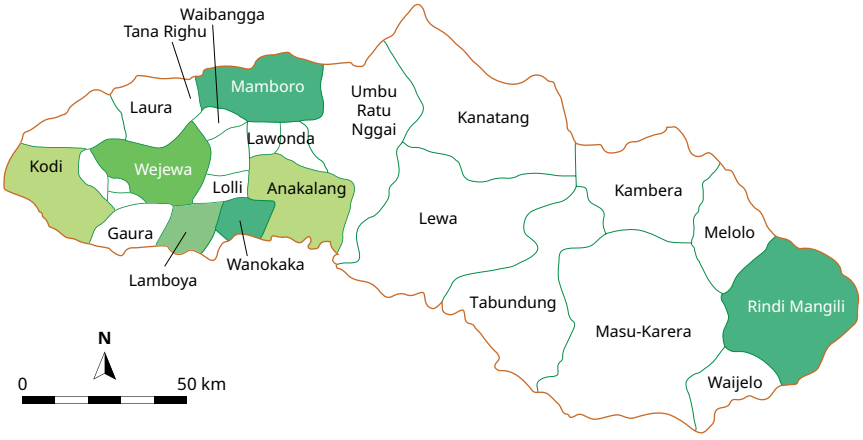


Figure 4. Map of district classified according to the intensity of ethnographic research.

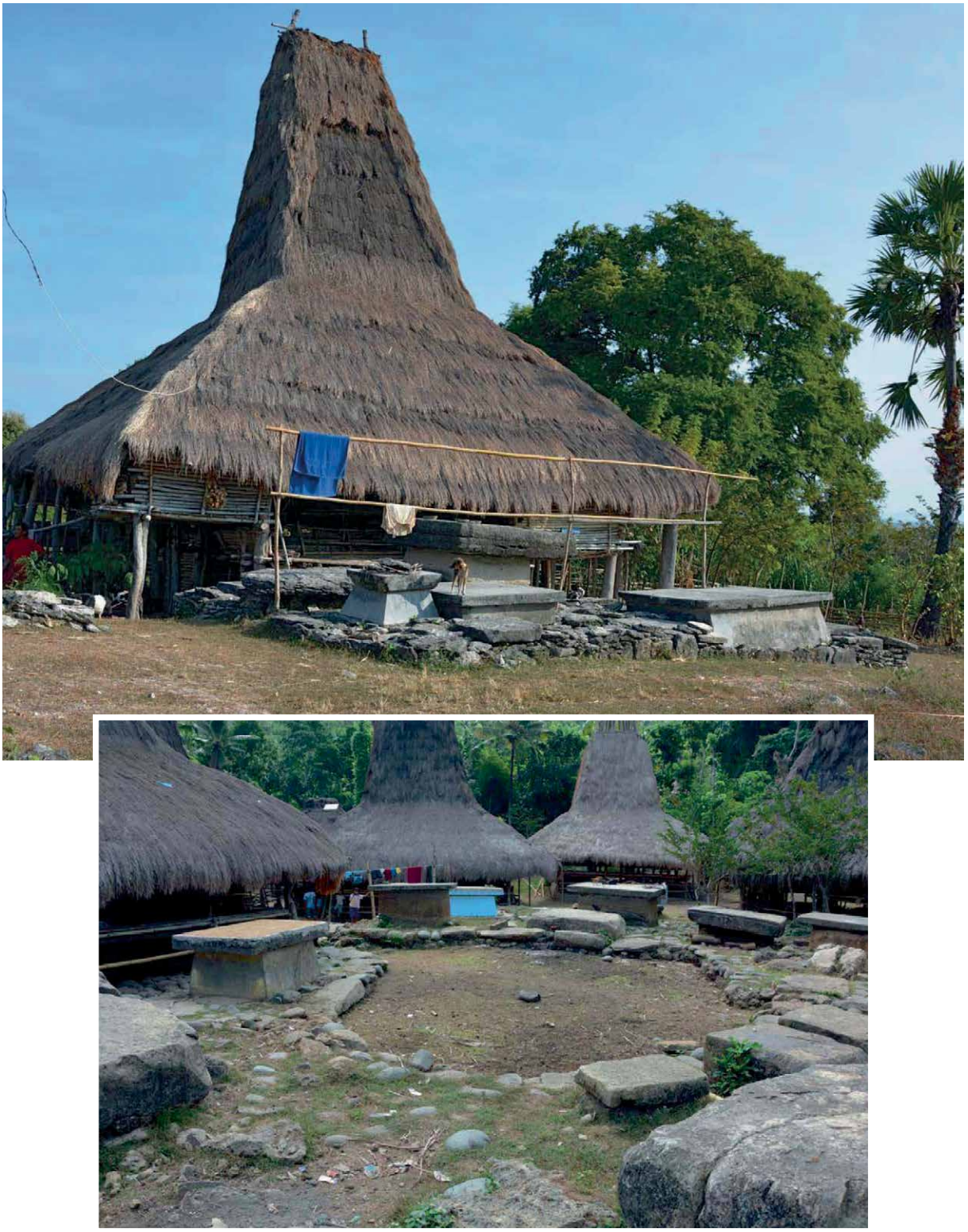


Figure 5. Typical spatial patterns in West Sumba (Indonesia).
Top: Dolmens in front of the origin house of a lineage.
Bottom: Dolmens in circle around a sacrificial place; the origin houses of clan and lineages form a second, outer circle.

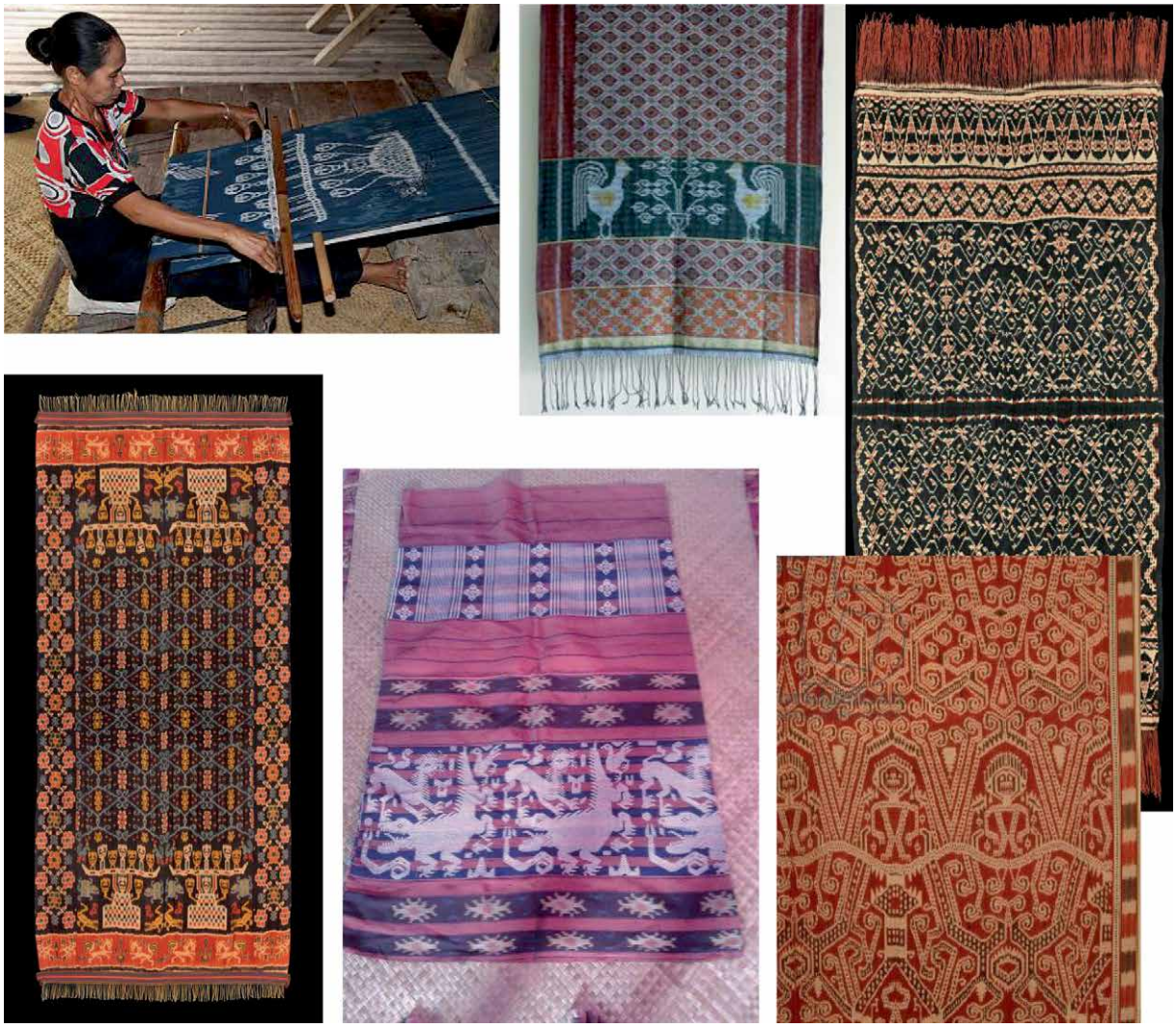


Figure 6. Variability of ikat decorative styles produced in Sumba.

(Fig. 6), but in this article I will focus on the forms of material variability that are correlated not with ethnicity, but with different forms of social organization. Generally speaking, this island, which is three times smaller than Baden-Württemberg and comprises 25 ethnic groups speaking eight languages, shows a degree of homogeneity in the material culture that would undoubtedly convince archaeologists to gather them into one and the same culture. And that is why it is the right place to conduct research into the signification of political and social variability within the boundaries of a single archaeological culture.

Before describing the two types of social organization, let us consider what they have in common. In Sumba, the society is structured according to two leading principles (Fig. 7): firstly a horizontal segmentation in exogamic and patrilineal clans and secondly a vertical division into classes, with three levels, nobles, commoners and slaves. The clan itself is subdivided into lineages and houses, the latter with mostly several nuclear families living in one or several buildings (buildings being here used a synonym for the material or physical house). The social classes are real, endogamic classes, deeply rooted in the story of the ethnic groups. The two kinds of societies I will now describe show quite rigid structures: *ego* inherits his belonging to a particular social class and so also for the benefits of the advantages linked with the position of his clan on the prestige scale. He can achieve some more prestige, in this case individual prestige, through his charisma, wealth, generosity, and in old times his skill

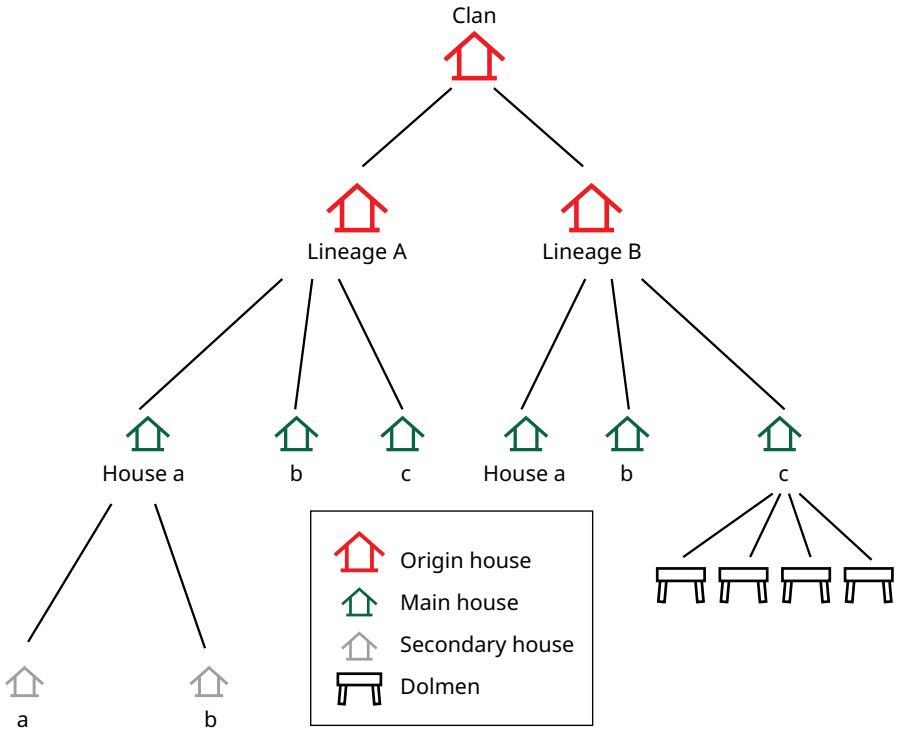


Figure 7. Sumba: subdivisions of the patrilineal exogamic clan. The house is meant as a corporate body; its members may live in two or more 'physical' houses. Dolmens are managed at house level. Each house may have several monuments used simultaneously.

in war expeditions. But the renown he can get will never transcend the limits of his inherited social category defined by class and clan membership. A wise, brave, rich and generous member of a commoner clan will never become a noble.

In the western part we find segmented, acephalous and egalitarian societies with hierarchies based mainly on prestige, a kind of organization known as tribe in the neoevolutionist classifications. In the eastern part, and also in at least one ethnic group in the north, there are stratified societies resembling the Polynesian chiefdom of Marshall Sahlins (1963). In what I call the segmented societies (Fig. 8):

- All clans are considered equal and politically independent; they are hierarchized, but within a purely symbolic hierarchy based on the genealogical proximity with the founder clan.
- There is no political power, which means nobody has the right to compel a free man (noble or commoner) to do something against his will.
- The villages are ruled by councils in which the leaders of both the commoner and the noble clans are represented, with a one man one vote organizational principle.
- The noble clans possess some privileges, but only in the ritual sphere.
- Commoner clans or commoner houses are often richer than noble ones.

We thus face a quite curious combination of social classes on the one hand and on the other an egalitarian ideology, the lack of economic exploitation relations between the two classes of free people and the absence of political power. What I mean by the absence of political power is, as I have already stressed, the absence of coercion between free people. This combination has been poorly commented on in the anthropological literature, although it shows a large geographical extension.I Tt is indeed far from being a particularity of Sumba; the same pattern exists in several societies among the so-called 'hill tribes' of South East Asia, for example in Sulawesi, Borneo, among the Kachin of Burma and some of the Naga tribes in north-east India.

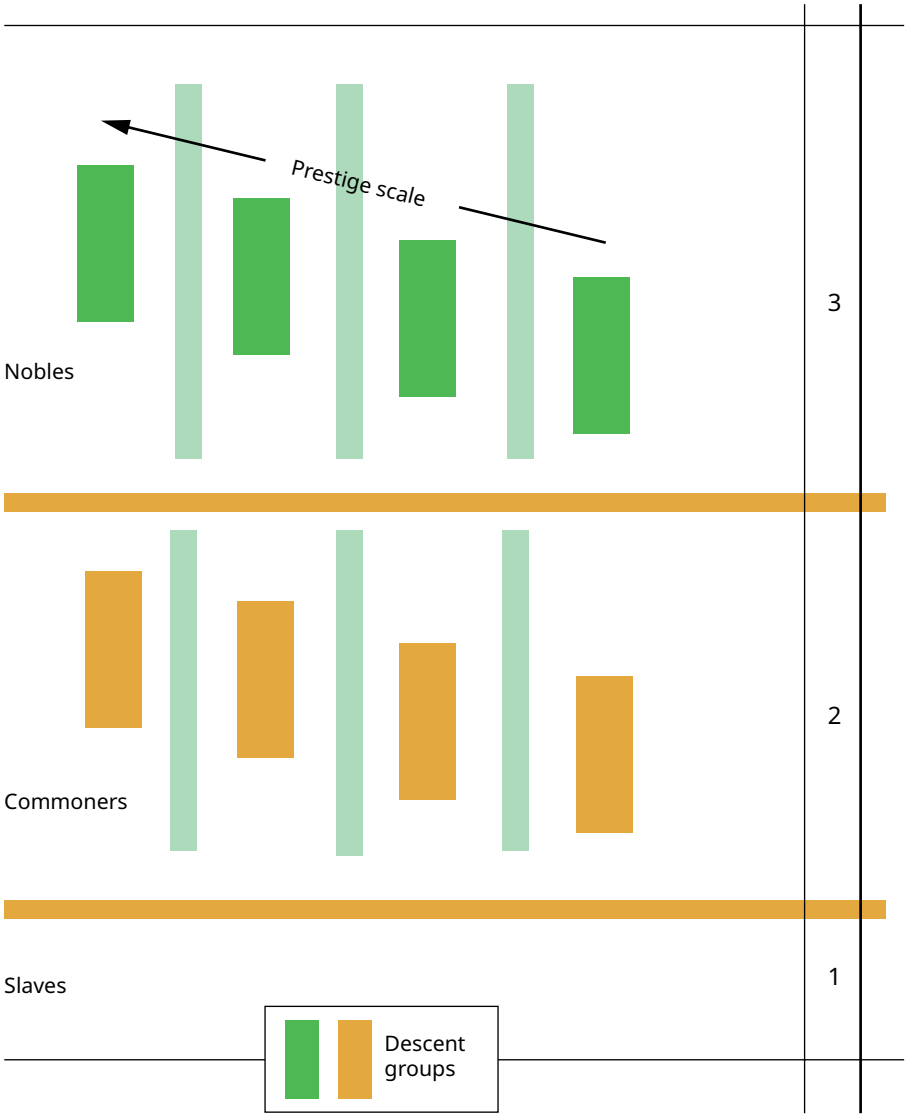


Figure 8. Structure of the segmented acephalous societies of West Sumba. The division into two classes (noble and commoners) does not imply any political inequality or exploitation relationships.

- The main characteristics of the Sumbanese stratified societies (Fig. 9) are the following:
- They built confederations of clans dominated by a leading clan and governed by a royal house.
- Their territories were called domains by the first Dutch ethnologists.
- The king (*raja*) can force free people (commoners, but also members of the aristocracy) to take part in the construction of ways, ditches for irrigation or bridges or to help him in war expeditions; he has the power to declare war.
- The members of the non-ruling clan have the obligations to take part in the main ceremonies of the dominant clan and to contribute to the corresponding feasts with offerings.
- The ruling house used to marry its children to members of royal clans from other domains or even to members of dominant clans from other islands, as we will see later. The sum of the royal clans tended thus to become a fourth, trans-ethnical and endogamic social class, something like an 'upper aristocracy'.
- The dominant clan owns all the arable land of the domain (in the segmented societies, each clan has its own property which is owned collectively by the living and the ancestors).

- It used to exploit large parts of it for its own benefit thanks to numerous slaves (Fig. 10). In the middle of the 20th century, about 1,200 descendants of slaves were still working for the 134 members of the royal clan of the domain of Rindi in East Sumba (Forth 1981). In ancient times, these slaves were also used in war expeditions. In contrast, there are only a few slaves in the segmented societies, as one can see thanks to this statistic presented by Kuiper in his study of the Weyewa ethnic group: 54 slaves for a total of 573 households, which means an average of one slave for ten households (Kuipers 1990).
- Each royal house has its court, which includes specialist craftsmen like sculptors and goldsmiths.
- Royal clans also have a monopoly of the fabrication and use of the most precious goods, especially metal artefacts.
- The royal houses normally live in the origin house of the clan in the villages created by the founder of the clan, which is also the political and ritual capital, the central place of the domain.

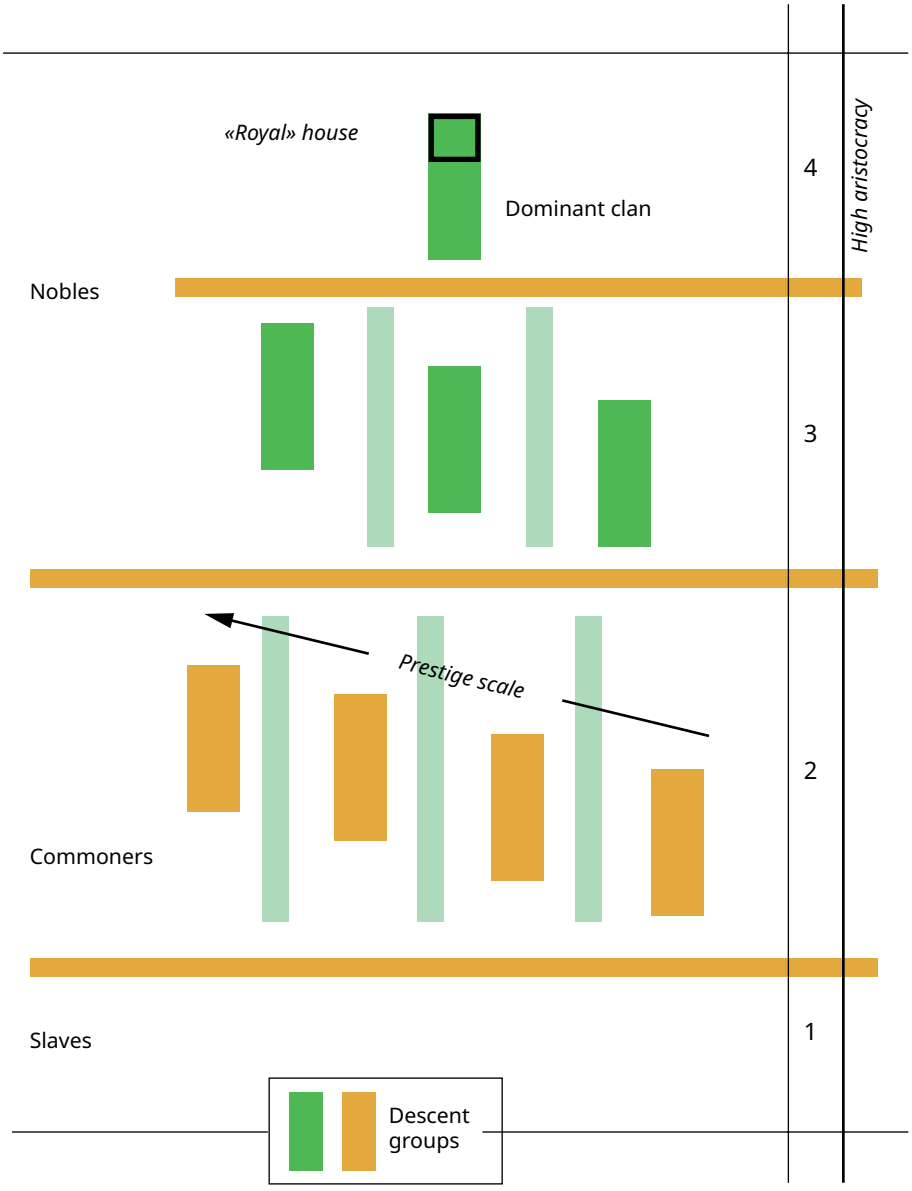


Figure 9. Structure of the stratified societies. Due to endogamic practices (marriage with members of dominant clans from neighbouring domains), the dominant clan tends to form a subclass within the aristocracy.

In the area including South East Asia and Melanesia segmented and stratified clan societies are part of a continuum of types of social organization, besides big men society and principalities, the latter lying beyond the limit of state organization (Fig. 11). The whole range was, for instance, represented on the island of Borneo at the time of the first contacts with Western travellers (Sellato 1987). The main change between the segmented and the stratified forms is the appearance of political power.

Ethnologists used to oppose the segmented societies of the west and the stratified domains of the east. Actually, the two forms are geographically partly imbricated: the second also exists in West Sumba, illustrated by the Mamboro domain, and the first can also be observed in East Sumba, where we can find at least one independent and non-stratified village (Prailiang), and where at least one districts (Waijelo) shows no evidence of a stratified society (Fig. 12). Gregory Forth, the author of the only monography devoted to East Sumba, mentioned the existence, besides the domains of 'more or less independent clusters of villages headed only by persons of lower noble rank or by commoners' (Forth 1981, 45).

This kind of configuration, with two different social systems cohabiting within a culturally homogeneous area, is quite common in South East Asia (Fig. 13). The first to describe it was Leach, in his monography about the Kachin of Burma (Leach 1954). He also highlighted that the opposition was not stable, which means that a given fraction of the Kachin could live alternatively under the *gumsa* (the aristocratic version) or the *gumlao* (the egalitarian version) systems. Within the first one, all the descent groups are considered equal and all villages are politically autonomous. In the *gumsa* system, all the descent groups are ranked relative to one another and villages of the territory he controls are grouped under the authority of a single chief, who controls all land.

A

Lineages	*Number of slaves*	*Number of free members*
Uma Andungu	201	24
Uma Jangga	267	54
Uma Kopi	110	12
Uma Kudu	103	19
Uma Penji	478	12
Uma Wara	39	23
Sum	1198	134

B

East Weyewa district
(573 households):
(descendants of -)

125 nobles	25%
379 commoners	67%
54 slaves	9%
15 priests	2%
Free: 524	Slaves: 54

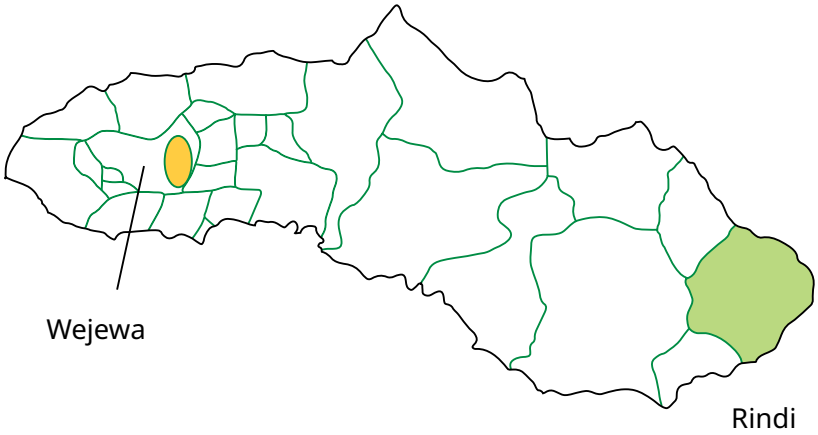


Figure 10. Number of descendants of slaves towards the middle of the 20th century in (A) the royal clan of Rindi (East Sumba) and (B) the East Wejewa district (West Sumba), in the context of a segmented society (A: after Forth 1981, appendix 3; B: after Kuiper 1990).

Big man societies	**Hierarchized societies** (Tribe)	**Stratified societies** (Chiefdom)	**Principalities** (State)
egalitarian	segmentary society (politically independant descent groups) class society (3 levels) «ranked acephalous societies» (Shrauwers 2016)	confederation of descent groups with a dominant DG class society (4 levels)	confederation of confederations of descent groups class society (5 levels)
achievment based society	ascribed status	ascribed status	ascribed status
Baruya Melpa *(New Guinea)*	Kadi *(Sumba)* Toraja *(Sulawesi)* Kachin (gumlao) *(Burma)* Konyak (thenkoh) *(India)*	Rindi *(Sumba)* Mamboro *(Sumba)* Kachin *(gumsa)* *(Burma)* Konyak (thendu) *(India)*	Makassar *(Sulawesi)* Wajdo *(Sulawesi)* Shan *(Burma)*

Figure 11. The main types of social organization in South East Asia and Melanesia.

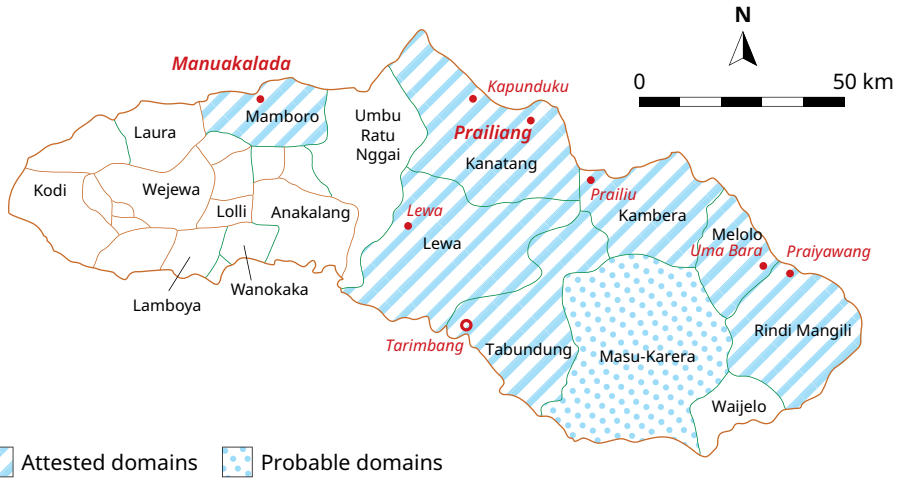


Figure 12. Distribution of the 'royal' domains in Sumba.

The same contrast was observed by Fürer-Haimendorf (1969) among the Konyak Naga with Thendu communities representing the stratified system and the Thenkoh communities the segmented-egalitarian system. In addition, these two ethnic groups show the same division into three classes as in Sumba. The Konyak villages are divided into clusters of clans called *morung*. In the Thenkoh communities, each *morung* acts independently like the clan in the segmented societies of Sumba, while in the Thendu communities the *morungs* are clustered in a confederation ruled by a dominant *morung* whose chief is the paramount chief of the village. The Thenkoh villages are ruled by a council including prominent people from the different *morungs*. In the Thendu villages, the chief rules in an autocratic way. He has numerous privileges, is the dispenser of justice, can force people to work for the community or in his own gardens or fields. He is the head of a domain including his own village, secondary villages founded by members of his village and others that have been conquered through war expeditions and have to pay tributes. Like in Sumba, the ruling family practises class endogamy, which leads

	Sumba	Konyak Naga	Kachin
Stratified society (Chiefdom)	Domains	Thendu	Gumsa
Hierarchized society (Tribe)	Segmented societies	Thenkoh	Gumlao
		Fürer-Haimendorf 1969	*Leach 1954*

Figure 13. The segmented-stratified dualism within a single cultural complex: South East Asian comparisons.

progressively to the emergence of a kind of upper aristocracy. There are no monumental graves, but there are important differences in the treatment of the body and the importance of the funeral ceremony. The skulls of nobles are painted and put in a stone cist covered with an imported bronze gong. In some villages, two effigies representing the chief and one of his servants are erected in front of the platform on which his body decays. The idea of the reversibility of the system, in the way described by Leach for the Kachin, is considered by Fürer-Haimendorf to be a solid hypothesis. The same opposition exists in the Toraja of Sulawesi, where small domains called *puang* show great affinities with the "aristocratic" domains of Sumba.[3] This duality of social organization within the same group seems thus to be very common within the 'hill tribes' of South East Asia. The reversibility principle suggests that the two configurations could actually represent the two faces of the same coin.

Reflection of the two different kinds of social organization in the material culture

Graves

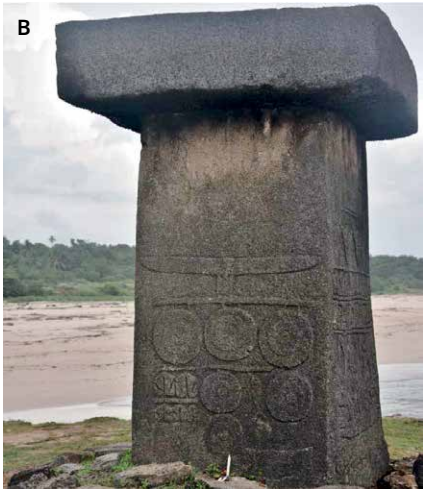
So let us now try to see how this duality is reflected in the cultural landscape of the Sumba island, beginning with the funeral architectures. In the segmented societies, in which every free man has the right to build a dolmen, there are thousands of small to medium megalithic graves sheltering collective graves (Fig. 14). The differences in size and quality of the construction are mainly connected with wealth. There used to exist an upper limit and people who tried to exceed it were accused of having broken the limits of common decency. Some of the dolmens are decorated, but with poorly elaborated patterns (Fig. 15). The decoration sometimes shows the belongings of the deceased (stylized buffaloes, gongs, metal ornaments), but it is often simply made of geometric patterns.

In the aristocratic domains, the *raja*'s significantly larger graves are flanked or topped by spectacular sculpted pillars, both traits being royal privileges (Fig. 16). There are thus far less megalithic graves than in the segmented societies, where their number can exceed one thousand for one village.[4] In the royal cemeteries of East Sumba, there are seldom more than ten dolmens. The grave is still collective (which means that it welcomes at least two individuals that are buried succes-

3 Bibliography in Jeunesse 2016.

4 The most impressive case is that of the village of Wainyapu (Kodi), where there are about 1,400 dolmens scattered inside and in the close vicinity of the village (calculation: University of Kiel 2016. Project leader: Johannes Müller).

Figure 14. 'Egalitarian' funerary architecture: Dolmens in Wainyapu (Kodi, West Sumba).



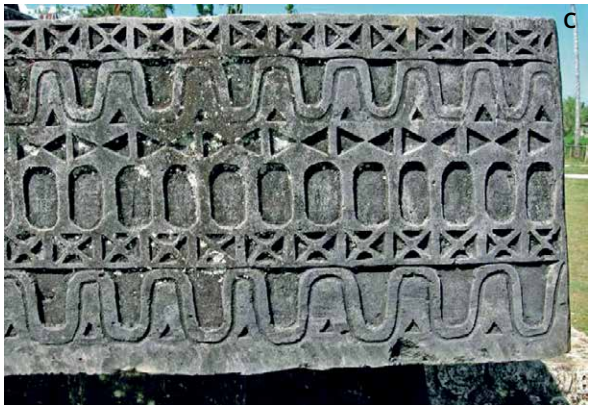


Figure 15. The segmented societies of West Sumba show a wide variety of architectural types and ornamentation patterns. (A) Gollu Kadelu (Lolli). (B) Ratenggaro (Kodi). (C) West Sumba.

Figure 16. 'Royal' graves in East Sumba. (A) Praiyawang (Rindi, East Sumba). (B) Prailiu (Kambera, East Sumba).

sively) but, with one exception,[5] is clearly linked with one generation only. The collective logic that characterizes the segmented egalitarian societies is thus less active. Instead of reflecting the prestige of one house over several generations, the monumental tombs are now royal attributes that symbolize the political power and prestige of the *raja* in the eyes of his subjects. The royal graves are separated from the other graves and form genuine royal cemeteries. They are dedicated to one sovereign, whose most famous deeds are celebrated during the funerals and through scenes sculpted on spectacular pillars or on the top of the capstone (Fig. 17). Instead of geometric motifs or simple representations of material goods, we have now realistic representations of humans and animals made by specialist

5 The Mamboro domain, with royal graves (in the Manuakalada village) containing human remains belonging to up to four generations.

Figure 17. 'Royal' graves in Praiyawang (Rindi, East Sumba).

Figure 18. Royal iconography in East Sumba: crocodile and tortoise as symbols of kingship, and representation of the hunting king.

Figure 19. Masters and slaves: complexes composed of a megalithic grave of an aristocrat and several graves of dependents. (A) Kabonduk. (B) Pasunga (both Anakalang sub-district, Sumba, Indonesia).

craftsmen, among which there are the symbols of kingship like the crocodile and the tortoise (Fig. 18). This political dimension of aesthetics is also reflected in the monopoly of the manufacturing of metal valuables made by the court gold- and silversmiths. It is interesting to notice in this matter, that the most spectacular valuables of the clan treasure are exhibited during the funerals, but never put in the grave.

They are manufactured by gold- and silversmiths, who represent, beside the sculptor, the second category of court craftsmen. These specialists use sophisticated techniques like lost wax to produce several kinds of metal ornaments. Some of them, those of lower quality, are imported by the aristocrats of the segmented societies which do not have their own fabricants. In the stratified societies, some of the most precious pieces were imported from outside Sumba; they witness the

Figure 20. The paired villages of Uma Bara (north) and Pau (south) (Melolo, East Sumba). (A) Royal graves. (B) Main slave cemetery. (C) Secondary slave cemetery. (D) Main domestic building of the royal house.

Figure 21. Pau (Melolo, East Sumba): view of the cemetery devoted to second category slaves. Cf. C at Fig. 20.

manifold relations of the ruling houses with their counterparts in the neighbouring islands.

The division between nobles and slaves (or descendants of slaves) is clearly visible in the funeral landscape. In the Anakalang district, place of residence of a traditionally segmented group, the new elites that appeared after the end of the colonial era have tried to imitate the aristocratic practices. There are typical small grave complexes including one big dolmen flanked by several flat graves sheltering descendants of slaves (Fig. 19). In the stratified societies of the east, court slaves

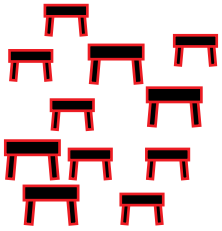
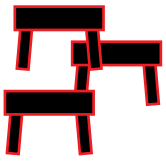
Big man societies	Hierarchized societies (Tribe)	Stratified societies (Chiefdom)	Principalities (State)
egalitarian	segmentary society (politically independant descent groups) class society (3 levels) «ranked acephalous societies» (Shrauwers 2016)	confederation of descent groups with a domenant DG class societies (4 levels)	confederation of confederation of descent groups class society (5 levels)
achievment based society	ascribed status	ascribed status	ascribed status
no megalithic graves no collective graves	 collective graves	 «royal» priviledge «royal» cemetry collective graves	

Figure 22. Correlation between megalithic/collective practice and types of social organization in South East Asia and Melanesia.

used to be buried next to their masters.[6] In the settlement complex formed by the villages of Uma Bara, capital of the domain of Melolo, and Pau, there are two distinct groups of graves (Fig. 20). The first, in Uma Bara, gathers the royal graves and in addition the flat graves of the court slaves. The second lies in Pau and only includes slave graves, more precisely graves of the second, lower, category of slaves. In both slave cemeteries, graves consist of a single pit covered by a small stone slab (Fig. 21).

In short, we can claim that there are two clearly distinct kinds of megalithic practices correlated with the two forms of social organization: a few large and richly decorated dolmens gathered in royal necropolises associated with slave cemeteries in the aristocratic domains, numerous small to medium dolmens in the segmented societies of West Sumba (Fig. 22).

The 'social landscape'

This impact on material culture and cultural landscape of different forms of social organization within the same cultural environment (what the archaeologists used to call an 'archaeological culture') is also visible when one considers the case of houses. The size of the houses is quite homogeneous in the villages of the segmented societies. The contrasts are far more spectacular in the stratified societies, as shown by the examples of two villages from the Mamboro domain (Fig. 23). The royal houses can be eight to nine times larger than the ordinary houses, but all the buildings, whether they are occupied by noble or commoner, by members of the segmented societies or of the stratified societies, show exactly the same structure, with the whole building resting on those four main posts (Fig. 24). The same is true

6 We also know that, in at least one domain, one or two of them were sacrificed to accompany their master (Forth 1981).

Figure 23. Contrasts in house sizes in the Mamboro sub-district (Sumba, Indonesia). (A) Manuakalada, former main village of the domain (1: residence of the royal house). (B) Palindi (2). Residence of a member of the royal lineage).

for the inner organization, that is to say, the partition between public and private spaces and the distributions of spaces according to gender either in ritual context or in daily life context, which stays the same regardless of the size of the house or the socials status of its inhabitants (Fig. 25).[7]

As we have already seen, the royal house used to marry its children to those of the ruling families of the neighbouring domains. But sometimes they transcend the limits of the island to find a son-in-law or a daughter-in-law in a foreign, non-Sumbanese royal house. The case of Mamboro has been thoroughly studied by Rodney Needam (1987). He determined regular commercial contacts (especially for the slave

7 Important size differences have also been observed among the Konyak Naga, with one example of a chief's house in a Thendu community reaching the amazing length of about 120 m (Hangha village, Fürer-Haimendorf 1969, 59). In this case, the architecture of the house of the paramount chief is inspired by one of the community houses (*morung*) of the villages following the 'democratic' system (Thenkoh).

Figure 24. The homogeneity of the material culture is well illustrated by house architecture. The same structure is to be found all over the island, with four central, often richly decorated, powerful posts forming the main part of the structure.

trade) and matrimonial exchanges with the islands of Sumbawa and Flores (Fig. 26). The size of people is another tangible sign of social differences. In the East Sumba aristocratic domains, members of the ruling houses are on average 20 to 30 cm taller than the descendants of slaves, a sharp contrast that does not exist within the segmented societies of West Sumba. This difference is linked with class endogamy, with the aristocratic way of life in domains where hard work is made by slaves, but also, in the last two or three generations, with marriages with European or Australian partners, which are the contemporary form of the ancient matrimonial strategy consisting of searching for allies in high-status families living outside the limits of the island.

Graves, cultural boundaries and forms of social organization in European late prehistory.

So what we observe on Sumba is an interesting model when we have, as archaeologists, to deal with a configuration with one culture (one 'archaeological culture') in which two distinct forms of social organization coexist. This kind of configuration existed in European late prehistory; the best-known case being that of the Hallstatt Culture and more broadly that of the period including the Hallstatt Culture and the

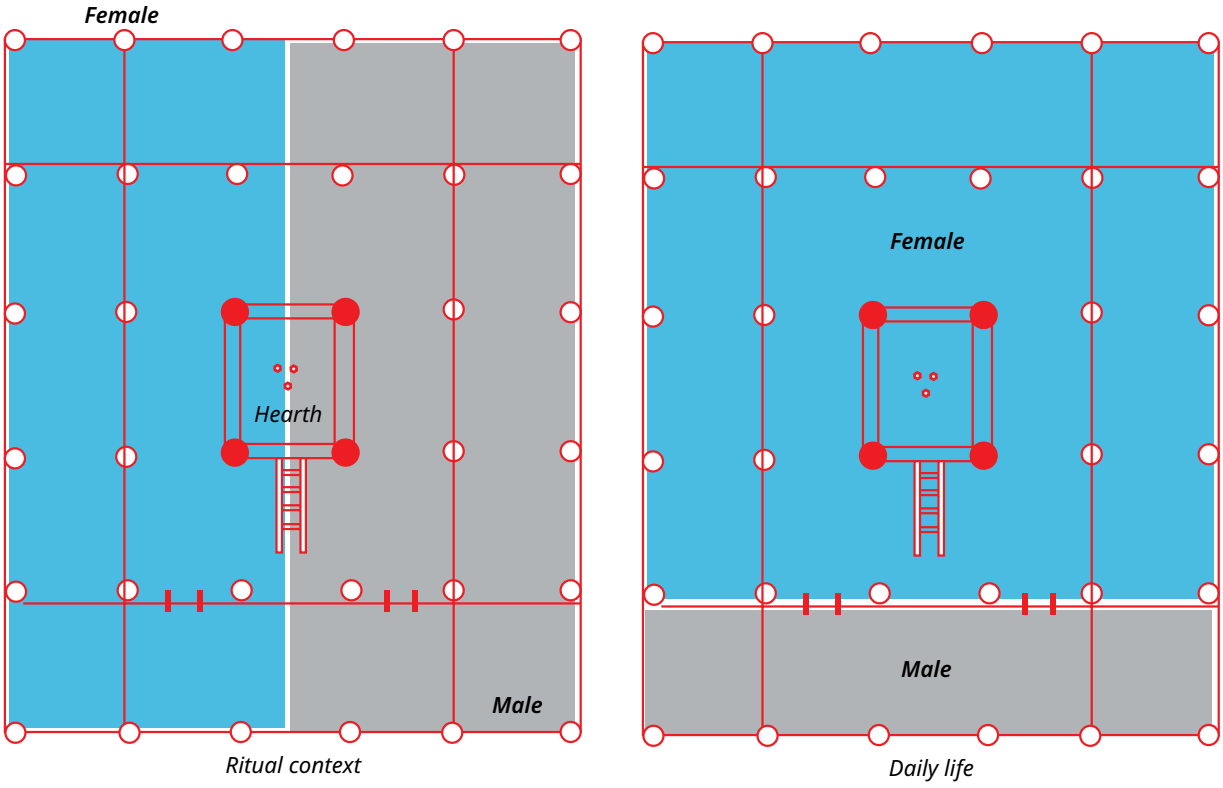
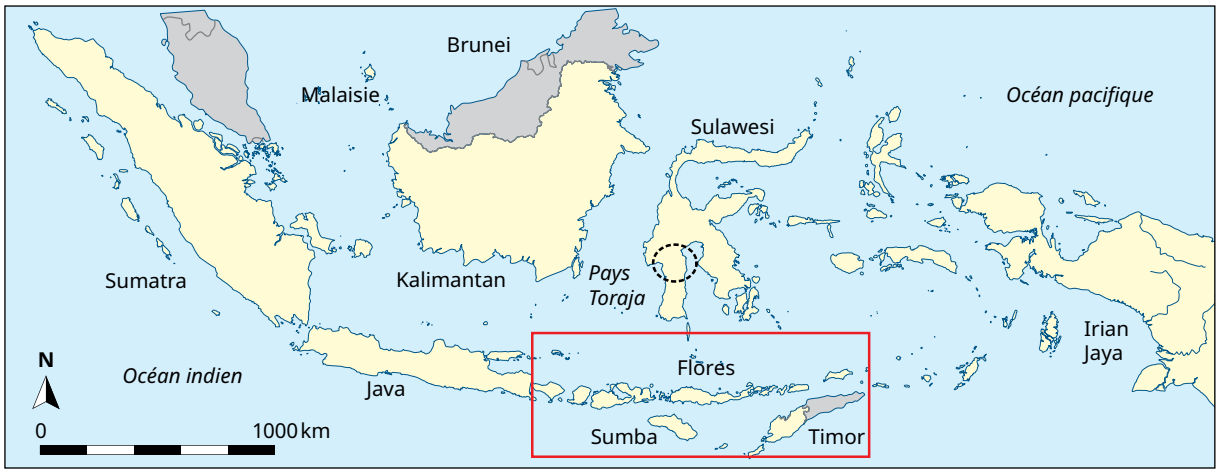


Figure 25. Internal organization of the Sumbanese house (after Forth 1981).



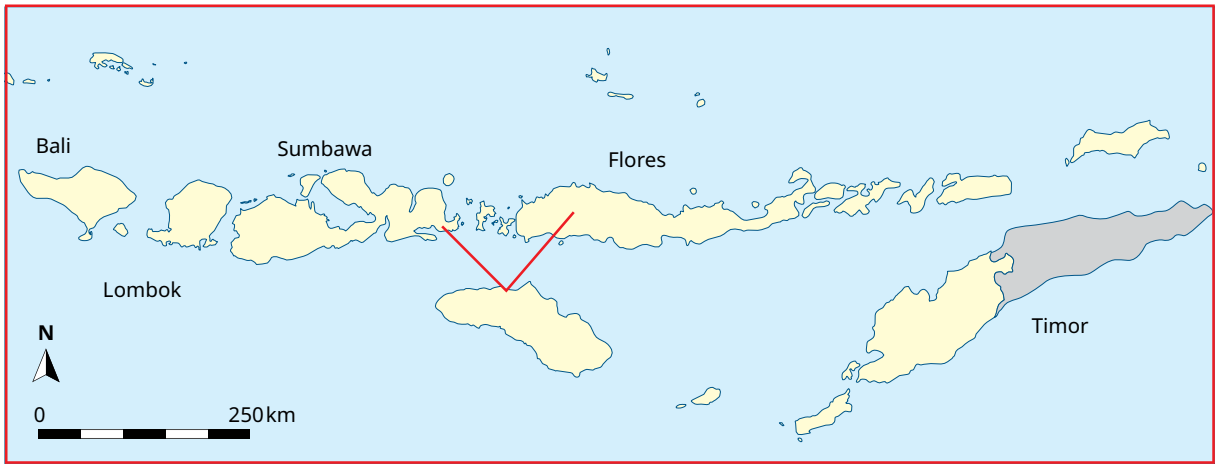


Figure 26. Commercial and matrimonial interactions between the Mamboro domain and the neighbouring islands (after Needham 1987).

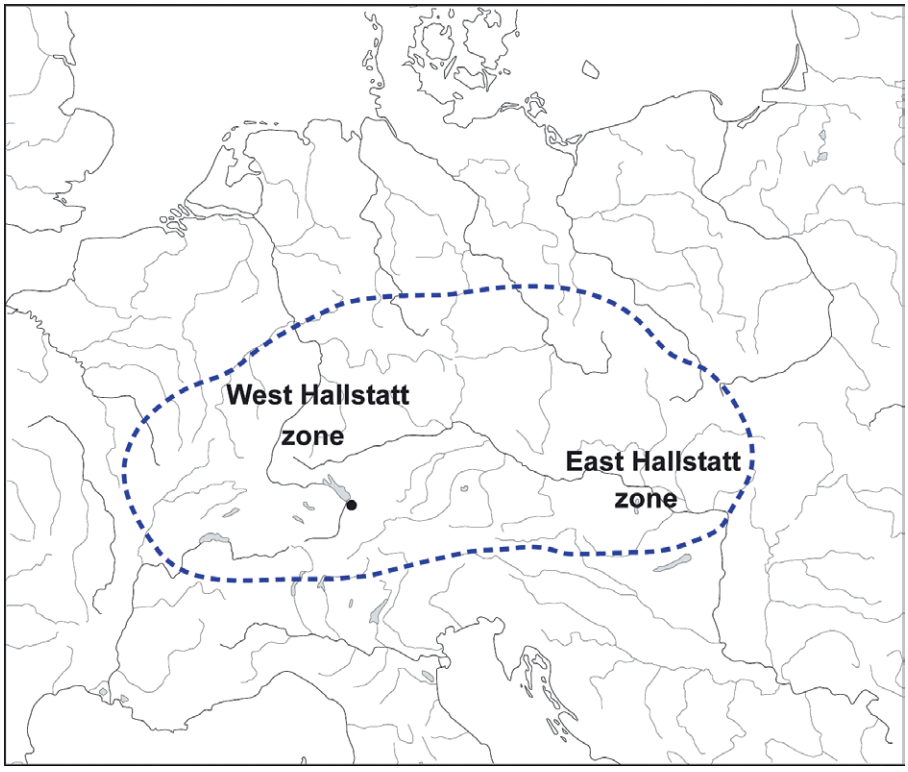


Figure 27 Distribution of the Hallstatt Culture.

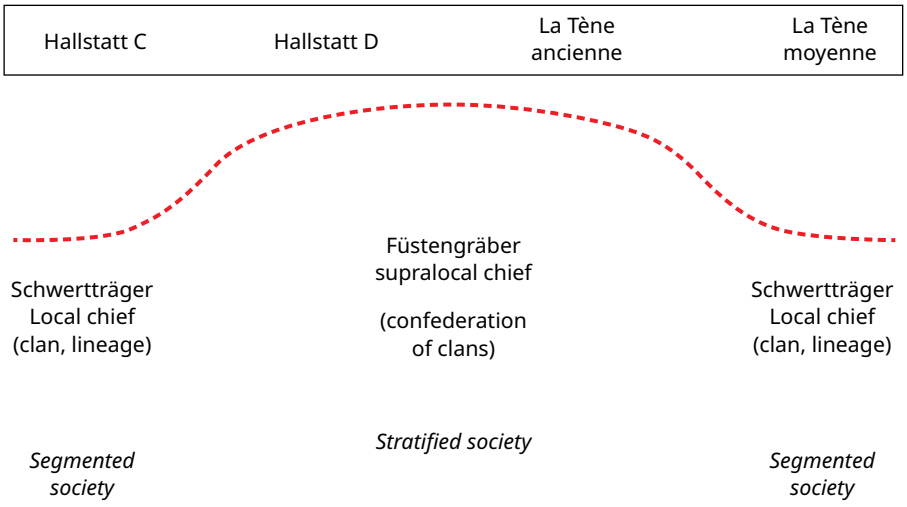


Figure 28. Evolution of social organization between the beginning of the Hallstatt Culture and the Middle La Tène Culture in western central Europe. Red line: evolution of the degree of vertical social differentiation.

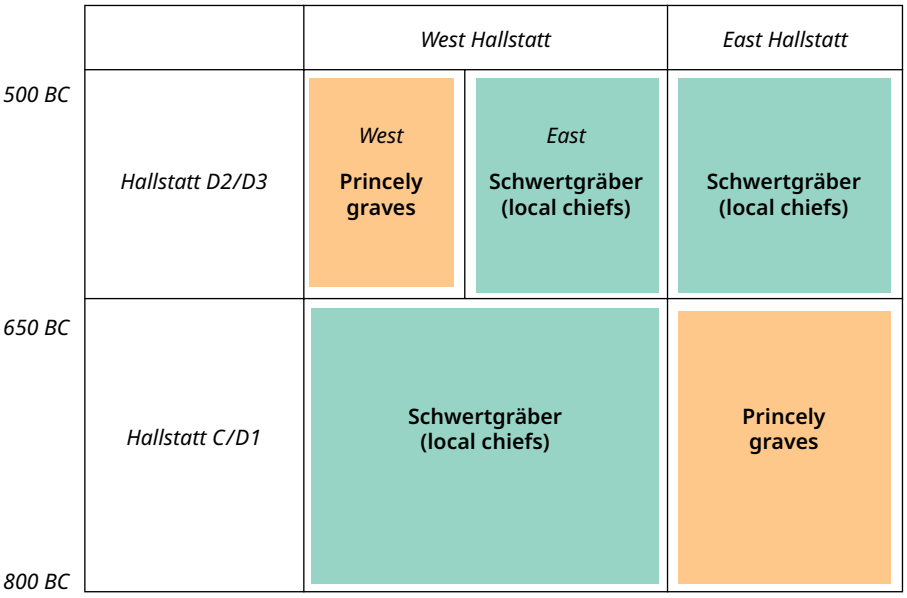


Figure 29. Social dualism in the two main phases of the Hallstatt Culture.

early stage of the following La Tène Culture. The princely graves (*Fürstengräber*) and the princely settlements (*Fürstensitze*) are today common knowledge, as is the still ongoing debate about their social context and the significance of the changes that led to such spectacular achievements.

The territory of the Hallstatt Culture (Fig. 27) is divided into two main regions, with some differences in the material culture and in the funeral practices, the most visible in the body treatments of the elites: cremation in the east and inhumation in the west. The cycle that runs between the Hallstatt C and the Middle La Tène period in the western part is quite well known (Fig. 28). It begins with a sword-bearer (*Schwertträger*) society (Ha C-D1), continues with an aristocratic society with *Fürstengräber* (Ha D2-Early La Tène) and, after the collapse of the latter, ends with a new a sword-bearer society (Middle La Tène). Like others but using my own concepts, I interpret the emergence of the aristocratic society as the emergence of a stratified society out of a segmented organization.

The situation is a bit more complex when we take into account the whole Hallstatt Culture. Actually, the contrast between the two social systems exists already in the early Hallstatt period, opposing the egalitarian West Hallstatt Region to the aris-

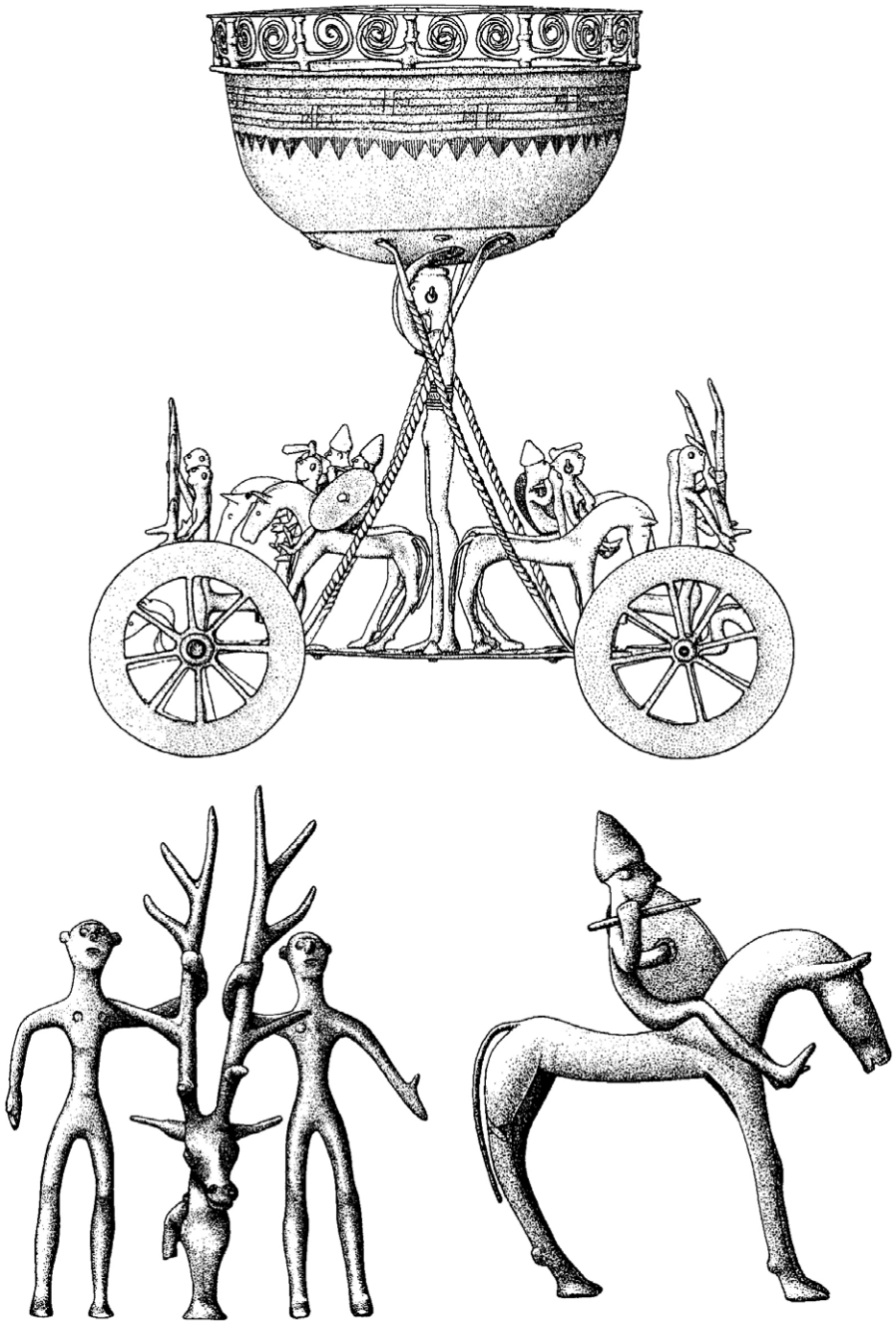


Figure 30. Cult miniature wagon from Strettweg (Austria) and details (after Egg 1996).

tocratic East Hallstatt Region (Fig. 29). A totally different configuration appears from the Hallstatt D2 phase, continuing then until the Early La Tène period, with no princely graves any more in the east zone, the continuation of the *Schwertträger* grave variant in the eastern part of the west zone and the appearance of a new cluster of princely graves in its western part of the west zone. The sword-bearer graves, whether they date from the Bronze or the Iron Ages, are usually interpreted as those of local chiefs. For some authors, like for instance Kristiansen (1998) or Egg (2009), the *Fürstengräber* shelter rather kings and belong thus to what can be called royal cemeteries.

One of the deepest changes which accompany the emergence of the *Fürstengräber* is the appearance of specialied craftsmen, whose productions are sometimes

Figure 31. Grave furnishing of the Krollkögel princely mound (Kleinklein, SE Austria). (A) Complete furnishing (after Egg & Kramer 2005). (B) Detail of the bronze mask and of one of the two bronze hands (after Egg & Kramer 2013).

discovered in the princely graves, like this fantastic example of the miniature cult wagon buried in the Strettweg *Fürstengrab* in Murtal, Austria (Fig. 30). In parallel, remains of workshops for specialist craftsmen have been found in the aristocratic settlements of the Heuneburg (Baden-Württemberg, Germany), in southern Germany and Bourges, on the western periphery of the Hallstatt territory. And, finally, the excavation of the princely grave of Hochdorf, in Baden-Württemberg, has revealed traces of the activity of a goldsmith that was implied in the layout of the funeral chamber (Hansen 2010). On the contrary, there are no evidences es of specialist craftsmanship for the Ha C/Ha D1 sword-bearer period.

Near the Glauberg *Fürstengrab* (Hessen, Germany), the excavator found a stone statue wearing the same kind of golden torc as the prince who was buried under that mound (Frey 2008). Such sculptures do not exist in the previous phase. They directly reflect, in my opinion, the new princely status of the ruler. The same phenomenon (appearance of figurative works representing the ruler) exists in the princely graves of the East Hallstatt zone, for example in the Krollkögel mound, one of the graves of the princely cemetery of Kleinklein, in south-east Austria (Fig. 31); this time it is not a statue, but a bronze mask and two bronze hands, the former connected with the golden masks of the contemporaneous princely graves of the southern Balkans (David 2014). Like the thousand years older exemplars of the Mycenaean grave circle A, those masks were found in graves belonging to what I call the first category of elite graves and reflect the regional way to individualize rulers' graves through anthropomorphic representations. The main characteristic of this first category (G1

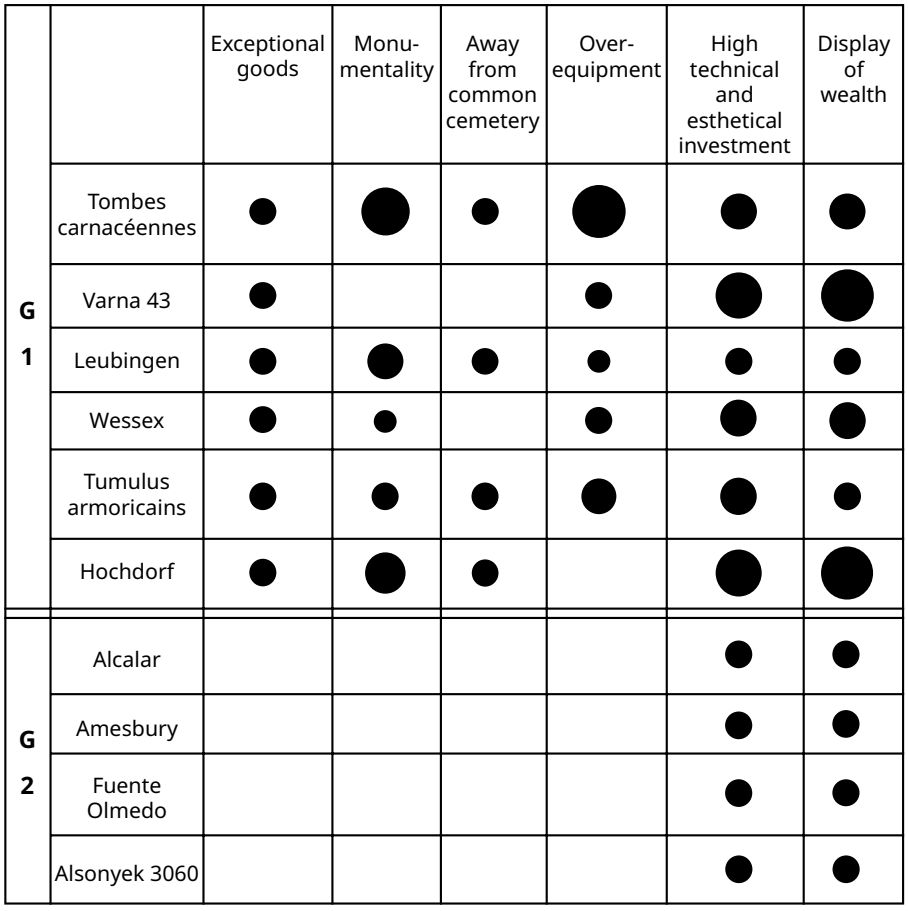


Figure 32. Some examples of the two categories (G1 and G 2) of elite graves in European late prehistory. Tombes carnacéennes: South Brittany, 4500 cal BCE. Varna 43 (Bulgaria): Varna Culture, c.4500 cal BCE. Leubingen (Thuringia, Germany): Early Bronze Age Ùnětice Culture, 20th century BCE. Wessex (southern Brittany): Early Bronze Age princely graves of the Wessex Culture. Tumulus armoricains: Early Bronze Age princely graves of the culture des tumulus armoricains. Hochdorf: princely grave of the Hallstatt Culture (~530 BCE) (Baden-Württemberg, Germany). Alcalar (Faro, Portugal): Chalcolithic, end of the 4th or beginning of the 3rd millennium. Amesbury (England): 'archer's grave', Bell Beaker. Fuente-Olmedo: Bell Beaker (Valladolid, Spain). Alsónyék (Hungary) 3060: Lengyel Culture (~4800-4500 cal BCE).

graves) and how they are differentiated from the second category of elite graves of late prehistoric Europe (G2 graves) is shown in Figure 32.

The first category, 'G1', covers the outstanding graves, often referred to as 'princely' burials, usually distinguished by monumental architecture, construction away from the ordinary cemeteries and the presence of extremely rich grave goods, notably rare types of objects and exceptional items of sacred value. The second category, 'G2', refers to burials with precious but stereotypical grave goods (weapons for men and ornaments for women) which stand out from other burials at the same cemeteries, even though the difference with other graves is never very strong. Examples of this G2 category are the graves of the sword-bearers in the Middle Bronze Age, Hallstatt C or Middle La Tène and, once we expand the chronological focus, the battle-axe-bearers of the Corded Ware or Lengyel Cultures and also Bell Beaker graves with archery equipment and daggers. Good examples of early G1 graves are the *tumulus carnacéen* of southern Brittany (*c.*4500 cal BCE), the Maikop eponymous mound (*c.*3700 cal BCE) and the richest graves of the Varna cemetery, all of them undoubtedly being Neolithic and Chalcolithic equivalents of much later graves like the Iron Age *Fürstengräber*, and, at the other end of the chronological scale, the most prominent graves of the early medieval period, for example that of Childeric I in Tournai (Belgium), the last archaic non-Christian king of western continental Europe. The distinction between G2 and G1 graves is closely connected with the distinction between precious and exceptional goods. The latter are distinguished by material, high quality and distinctive decoration of the ornaments, use of sophisticated know-how like the lost wax technique, sometimes uniqueness, and they are often non-utilitarian items. The already mentioned cult wagon of Strettweg is a good example of an exceptional good.

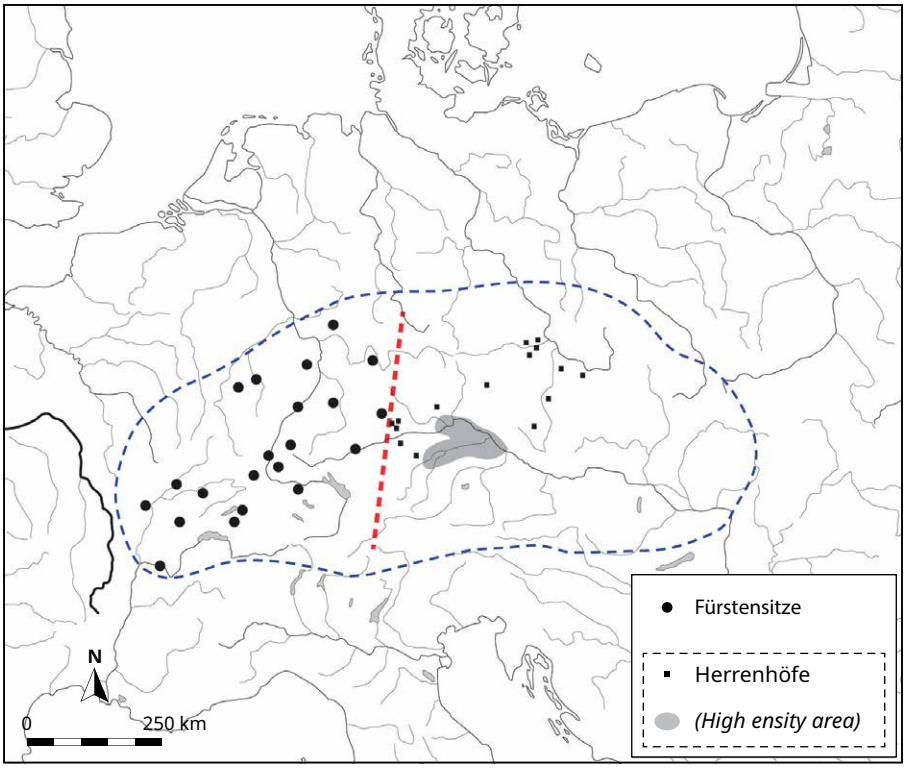


Figure 33. Hallstatt Culture. Distribution of the Fürstensitze and the Herrenhöfe (after Reinhard 2004).

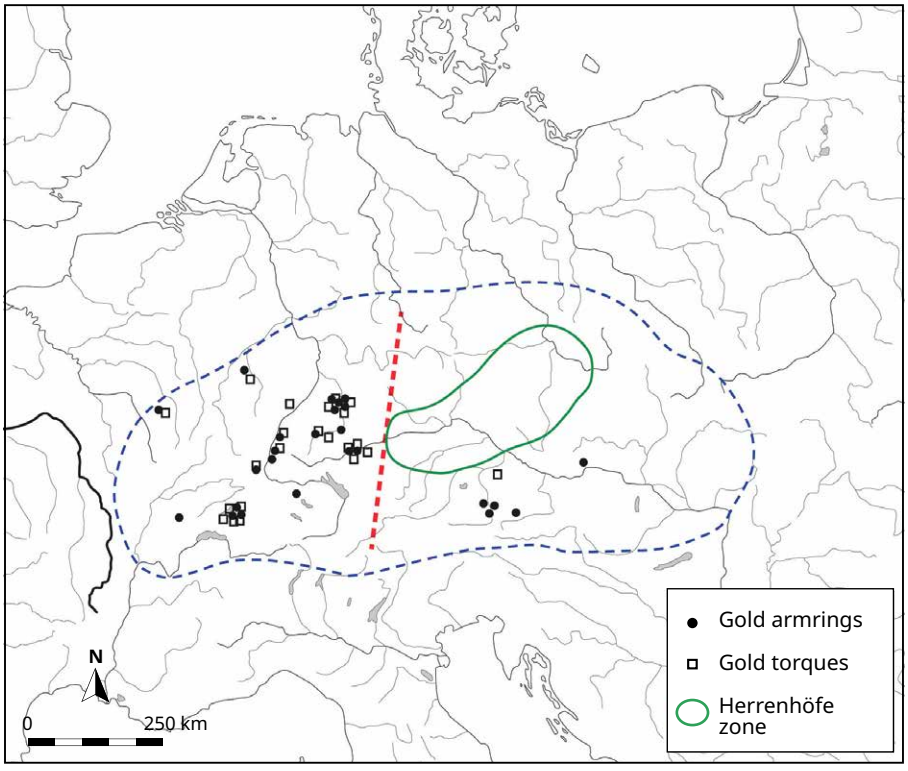


Figure 34. Hallstatt Culture. Distributions of gold bracelets and gold torcs (after Hansen 2010).

The distribution of the *Fürstensitze* and the *Herrenhöfe*,the latter being small rural settlements surrounded by a ditch, gives us a good overview of the situation in the Hallstatt D2-D3 period (Fig. 33). The so-called 'principalities', in the west emerge precisely in the areas with the highest density of *Schwertträger* graves in

the preceding Ha C-Ha D1 period. The latter disappear when the first *Fürstengräber* appear. The contrast between the low density of the *Fürstensitze* in the west and the much denser clusters of *Herrenhöfe* in the east clearly reflects differences in the degree of concentration of power. In the western part, the emergence of quite large and fortified central places (100 ha in the case of the Heuneburg) coincides with the abandonment, in the same region, of a dense network of smaller fortified settlements. Thanks to the many recent rescue excavations, we now know that there are also *Herrenhöfe* in the western periphery (Ha D and LTA), especially in northern France, and this type of settlement can now be seen as a specific attribute of the non-kingship-like (ore non-stratified) societies of the West Hallstatt area. The same pattern appears when you map two of the most precious objects used as status symbols; by those I mean gold torcs and gold bracelets (Fig. 34). The spatial correlation with the distribution of the *Herrenhöfe* is just perfect.

We thus have a configuration which is quite similar to the one I have described for Sumba, with a large area showing a remarkable homogeneity of the material culture, but divided into two provinces that show contrasting forms of social organization. Concerning the European Iron Age, this opposition has already been observed by several specialists, for instance Eggert, who wrote in 2007 that the societies of the Hallstatt area 'were organized either on the principle of a segmentary lineage system or as chiefdoms', adding that 'probably both systems existed side by side' (Eggert 2007). Recently, Fernandez-Götze and Krausse added that we can imagine a certain social diversity also in the area with stratified communities, pointing out that we have to reckon with the possible existence of 'other communities in which the structure of power was less clearly defined and which present evidence for a more heterarchical and decentralized landscape' (Fernandez-Götze and Krausse 2013). We thus would have something very close to the imbricated geographical structure of socio-political systems that I mentioned about Sumba.

Local scale surveys show that the stratified communities never last very long and that their respective length can be quite variable. The two longest series of princely mounds are those of Kleinklein, with five generations (four successive mounds plus the generation responsible for the building of the fourth one), and of Kappel am Rhein, southern Germany, with four generations. So there is nothing like a socially homogeneous region even in the western part of the Late Hallstatt-Early La Tène Culture, but a series of local sequences that are only partially contemporary and settle territories that can be potentially separated by regions occupied by segmented societies. In the region of the Heuneburg (Upper Danube, Baden-Württemberg), the collapse of the stratified system occurs around 450 BCE, in other areas either earlier or later, with time differences that represent sometimes several generations. At the very end of the princely phenomenon (at different moments of the Early La Tène period, according to the region), the decentralization of the power and the collapse of the central places leads to the reappearance of the sword-bearer graves (G2 graves), which are this time actually graves of sword- and spear-bearers. This means the reappearance of the old social substratum made of segmented societies that existed from the 5th millennium and was only sporadically interrupted by ephemeral stratified societies.

G2-G1-G2 cycles exist in Europe from the middle of the 5th millennium. So we can say that the two Late Neolithic (or Early Chalcolithic) G2 central European graves shown on figure 35 belong to the same category as the metal ages "sword-bearers' graves and to a social configuration that is structurally identical to the one we have described for the Iron Age. The alternation of 'segmented' and 'stratified' moments is summarized in Figure 36. In a recent article I have summarized my model using the following words: 'Periods of relative balance between independent local lineages or clans are disturbed on a regular basis by episodes during which wealth and powers are concentrated in the hands of charismatic supralocal chieftains transcending

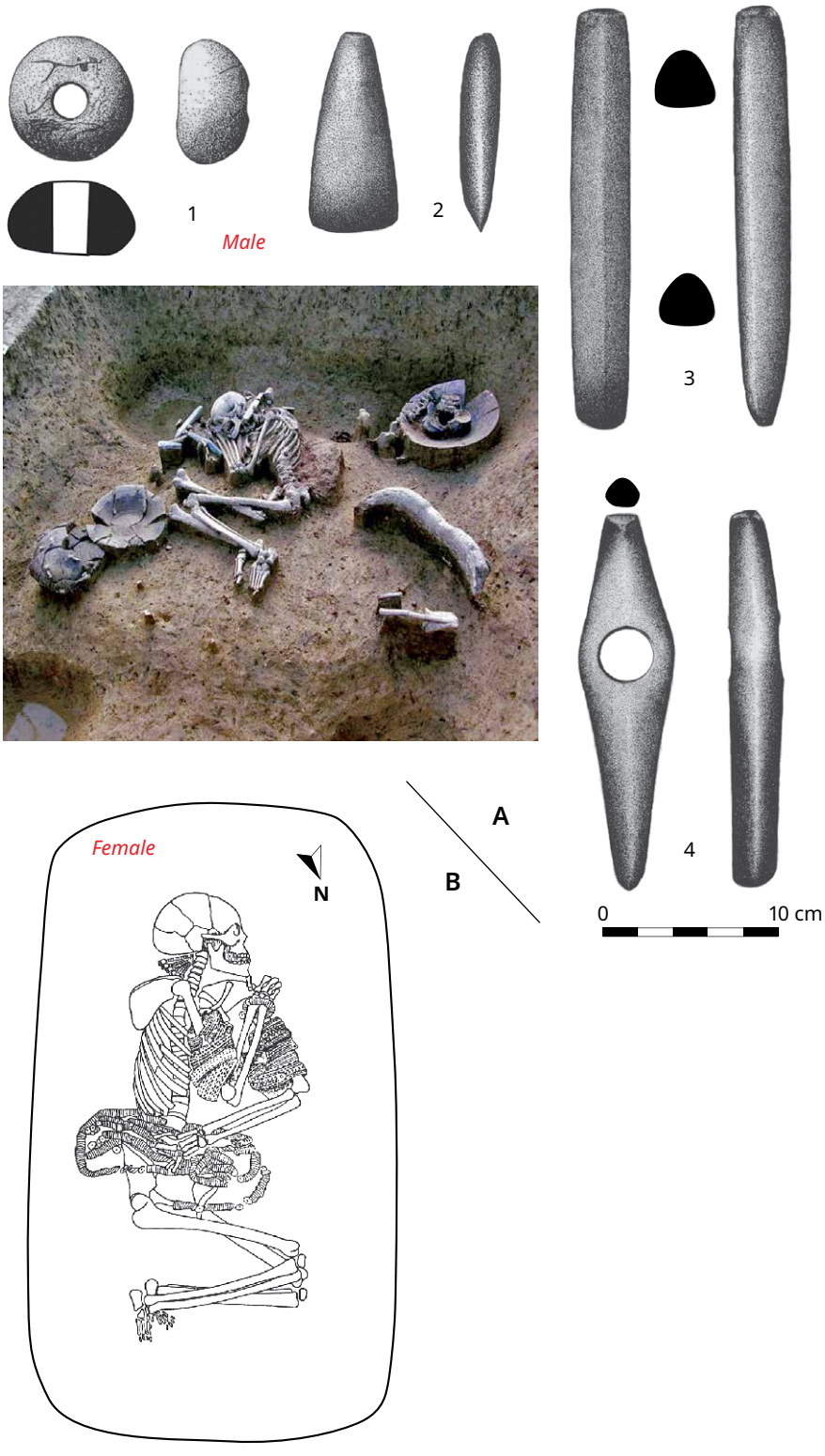


Figure 35. G 2 Neolithic graves. (A) Alsónyék 3060 (Hungary). (B) Brześć-Kujawski (Poland). (A) after Zalai-Gaál et al. 2011. (B) after Gimbutas 199.

traditional divisions and, judging by some objects usually intended for hoards and found in their graves, transgressing the norms which usually regulate the triangular relationship between humans, exceptional goods and supernatural beings' (Jeunesse 2017). One of the characteristics of this system is its tendency to mechanically drift towards producing charismatic, supralocal 'chiefs' buried in G1 graves, even though

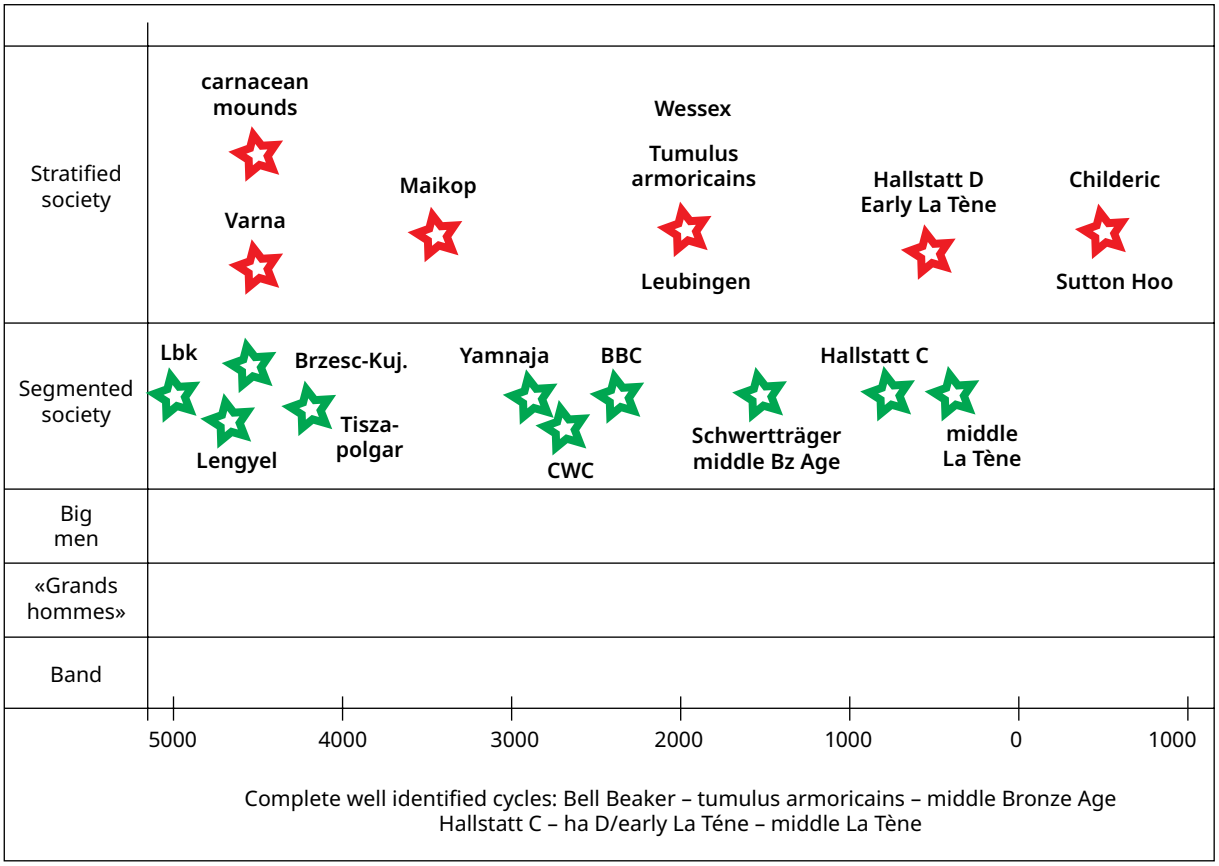


Figure 36. Succession of forms of social organization in the European late prehistory. An alternation between segmented societies (the social 'substratum') and stratified societies (brief climax periods). Red: G1 graves; green: G2 graves (after Jeunesse 2018).

each time the resulting small 'dynasties' rapidly fall prey to a rejection mechanism, itself an integral part of the social system. The Sumba model, but also the most recent research into the princely phenomenon in Iron Age central and western Europe, strongly suggest that to try, like so many colleagues did, to identify one form of social organization that would count for the whole Hallstatt/Early la Tène cultural complex can only lead to deadlock. Actually, such a thing as the Hallstatt society (*i.e.* a single form of social organization covering the whole duration and the whole territory of the Hallstatt archaeological culture) has never existed.

Conclusions

What I would like to show through this paper is that it is still worth building ethnoarchaeological models, and not only for the purpose of solving some modest technological problem. I know there is much criticism of the use of ethnoarchaeology. And these criticisms are justified criticisms when they target a superficial use of ethnological dates, made from vague assumptions based on the neoevolutionist classifications. It is indeed easy to assert that we cannot really use the neoevolutionist classifications, pretending that late prehistoric Europe has its own historical trajectory. The problems lies in the fact that the categrories s their authors have defined are too vague, too general and do not bring any answers to many questions raised by archaeologists. That is why it is up to us to enrich them by realizing ambitious ethnoarchaeological projects devoted to the study of the correlation between material artefacts and social systems. Concerning the reconstruction of late prehistoric societies, the models are still to be constructed. What has been made up to now, based on the reading of the ethnological literature, is sometimes very useful, but

always incomplete, showing many gaps that can be filled only by new field research led by archaeologists with their own problematics and reading grids. And my conviction is that when we do this detailed research we obtain models that are much richer than the existing. It is at least what I have tried to demonstrate here.

I would like to conclude with two remarks about the main topic of this paper. The first is about the absolute necessity to forget the frontiers of archaeological culture when we try to understand the forms of social organization. The second is about the most common idea in German research about the interpretation of the differences between periods with and without princely graves in the Bronze and Iron Ages, for instance between the different stages of the Ha C/D1-Ha D2-Early La Tène-Middle La Tène cycle I have described above, and especially in the case when the differences occur within one and the same archaeological culture. For most specialists, the corresponding differences are only superficial, the social structure remaining untouched. They are presented as stylistic rather than structural differences, as the material remains of two different ways to display wealth and prestige, with the argument that in the periods without princely graves the valuables belonging to the rulers are deposited in hoards and offered to supernatural beings. The opposition stressed by Renfrew between group-oriented and individualizing societies (Renfrew 2001) is often cited. But the examples cited by this author are, however, not relevant for our frame of investigation, because the two systems are never practised by communities belonging to the same culture, or sharing the same material culture and the same religious values.

So I do not think that this idea of differences simply reflecting two ways of displaying the same social reality really fits with the empirical observations. One of its origins is precisely the implicit will to have a homogeneous image: one culture, one form of social organization. The cases of South East Asia show us that this coincidence is not necessary at all. Actually, we have to deal, for instance in the Hallstatt-La Tène case, with two clearly distinct realities, on the one hand a segmentary-egalitarian organization, on the other hand a stratified organization. And what we learned through our field researches in Indonesia and the study of the other South East Asian cases in Burma and north-east India is that these two systems are not superficial at all, but generate deep differences in the life of the communities and the individuals. The daily life and the social and political relations are definitely not equivalent: freedom and equality on the one hand, oppression and inequality on the other hand, democracy on the one hand, paramount autocratic chiefs with extended powers (including genuine political power, with coercion) on the other hand, and this even if people speak the same language, use the same type of pots and live in identical architectures. Sacred chief, forced labour, obligation to follow the king to war, abdication of individual freedom and so on : all this is part of the daily experience of people in the stratified societies.

The model we try to elaborate on the basis of our observations in Sumba, with extended comparisons with other 'hill tribes' of South East Asia eloquently shows the existence of sharp contrasts of this kind. And I do not know any ethnographic example of the opposite configuration, with, in the same cultural context, two different ways to display wealth and power but without any differences in the social structure and in the way people interact politically. That is why I considered, at the current stage of research, this model totally unrealistic.

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The diversity in a theory of cultural genesis for the eastern European Bronze Age

*Valentine Pankowski**

Abstract

The paper explores two different approaches within the seemingly holistic theory of cultural genesis developed for eastern European prehistoric studies. The first approach puts at the forefront the vast areal and continuous diffusive pulsation from the huge complex centres outwards to the periphery, while another one focuses on rapid accumulation on an insular scale, with subsequent fading invasion into the multiple competitive centres far outside. The innovative technologies as well as flourishing mining and metallurgical centres controlled by self-aggrandizing notables and clans of craftsmen seem to have a great deal to do with both sets of ideas. Yet with this, the similarities seem to end and a branching of ideas is expected.

Keywords: Bronze Age, cultural genesis theory, metal production, Pulsatile Centres Theory, Accumulative Centre Theory, Focus/Foci Theory

The issue

According to Bochkariov, long-lasting cultural change, with all diversity, must have had conditions, space, and time, so that it could deploy and become a reality. Here, the change itself includes some variety of components interacting spontaneously and/or being stimulated within a *centre of cultural genesis* with its far-reaching emanations. That is why such a construct for a convergent and divergent process is introduced as the *Pulsatile Centres Theory* (PCT) (Bočkarev 2013, 62-64).

A fleeting phenomenon of a sudden jump to a new way of life has been enclosed in a circuit of unheard assertiveness once displayed by some purposeful human population, as per Otroschenko's notion. Here we have a new local standard implemented impulsively and then almost totally wasted when exiting a centre of cultural genesis. So this construct of an ascending/descending level is called the *Accumulative Centre Theory* (ACT). From time to time the assumptions arose that this conception is a derivative of the PCT. Recently, it has been briefly suggested that it tends to use the

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PCT to promote its own vision (Lytvynenko 2015, 138). As a special concept, the ACT under its name has been decidedly separated here from the PCT for the first time, since both theories were thought to be almost the same thing before now.

The basics of only these ideas which authors think are significant have been outlined, yet they do not allow themselves to go that far beyond self-reflection and then to support an intercomparison.

As soon as the PCT is considered and the ACT is conceptualized, this review will turn for more ideas to technological innovations and social change in eastern European prehistoric archaeology.

The Pulsatile Centres Theory

A centre of cultural genesis is defined to be a vibrant wellspring of technological and social innovations. Such a centre, especially while in its formative phase, may depend on some older one by which the younger was preconditioned. The natural conditions in a centre's primary core inevitably differ from those across its province. Some divergent processes do not result in the extinction of a centre, but finally it may become one of regional-scale significance (Bočkarev 2013, 48, 49, 50, 55, 62-64; 2015, 79-85; Bochkarev 2013, 61-62, 67, 75-76; Bochkariov 1991; 1995a; 1995b).

The Caucasian centre of cultural genesis was the most active during the Bronze I and II periods (the 38th-21st/20th centuries cal BCE) when the northern steppe province was formed to act. It was migration that triggered the centre – the impulse came from Eastern Anatolia to form the Maikop Culture, which was advanced enough to make the eastern European Bronze Age to begin in the mid-4th millennium BCE. By the Bronze III period, this centre had become a regional one, for the old contacts with south-western Asia were lost, and the Maikop Culture's erstwhile pre-civilizational position was levelled down to the grade of the rest in the province. From that time, the former province was still supplied with copper and metal products.

A core of t*he Volga and Urals centre of cultural genesis* includes the Middle Volga Region, the Don Region, and the South Urals with Trans-Urals. By the Bronze III/1 period (the 20th-18th centuries cal BCE), a block was formed there with the Sintashta, the Potapovka, the Pokrovsk, and the Petrovka Cultures. These were shaped due to the Seima and Turbino military equestrians, who probably joined an earlier shifting of the Abashevo Culture away from the Middle Volga down to the Urals and the Don. Such a milieu was compounded by some Post-Catacomb and Epi-Corded Ware parties to compose the aforementioned Post-Abashevo block led by the charioteers' aristocracy. The Volga-Urals cultural province stretched from Kazakhstan to the Eastern Carpathians during the Bronze III/2-3, to form the eastern European and the Asiatic provinces. These both flourished, while from the Bronze III/4 to III/5 a stasis gave way to decline (Bronze III/5-6) and downfall (Bronze III/7). Animal breeding and metal production underwent a crisis across the eastern European province, which had been reduced in size for the benefit of the North Pontic province of the *Carpathians and Balkans centre of cultural genesis* (that is to say, the Carpathian and Danubian). The most active phases east of its primary core fall on the Bronze III/4-7, with buffer formations of the Noua, the Sabatinovka, and the Belozerka Cultures, which filled an intercentric zone. *The central European centre* and the one including *the South Siberia and the Altai* were not defined in detail in the PCT; these both, nevertheless, are of certain significance due to multiple migratory contributions they have made during the Bronze I-III.

The PCT tries to coordinate models of the past with analysis of archaeological objects; it involves mutual verification of the procedures and inferences in prehistory and archaeology. The concept of space and time for the convergent and divergent genesis of a living culture as well as means and ways of such a process sets the

rules for typological and chronological schemes; on the other hand, the evolutionary typology of artefacts and complexes serves to reveal change in a culture. The PCT distinguishes between (1) past cultural genesis, and (2) archaeological formation process, and does the same for (3) the universals and categories of archaeological reality and (4) prehistoric concept of the culture in the past. The similarities of all these components are due to the fact that they are derived in different ways from the archaeological material. The emergence of a centre of cultural genesis is linked with a mining and metallurgical centre, although it does not mean that these two, as well as an archaeological culture, are similar agents in a whole process.

An advent of the Accumulative Centre Theory

The ACT (Otroschenko 1996a; 1996b; 1997; 2002) takes the Sintashta Culture to pose an archaeological equivalent to the past cultural genesis, which took place in 'The Land of Burgs' of the South Trans-Urals. The *South Ural centre* is a small and short timescale centre based on civilizational, namely proto-urbanistic, and consolidation criteria, due to its linkage with local mineral resources of great attraction for many who came from afar to break the rules and build a new world. An exodus of the charioteers replaced this short-term accumulation and all Sintashta manifestations far outside extinct centre are thought of as its remote effects in a very different milieu.

In fact, the ACT acts as a highly revised remake of the PCT. The South Urals centre is neither part of the Volga-Urals centre nor its compressed release. Both centre and the process it has to represent look reduced enough in time and space. As Lev Gumilyov might have said, it could form a thrust zone on the passionarity thrust axis (Otroschenko 1996b, 30; 2002, 169). After the South Ural centre vanished, some other centres must have received the thrust surges from there across eastern Europe. The point is that such self-sufficient centres seem not to form anything similar to the Volga-Urals province. What were they supposed to be?

Let us discuss them further.

The Accumulative Centre Theory at its best

In the above version of the ACT, a small-scale centre of accelerated cultural genesis was postulated. Yet another version arose next to it, an accumulative in kind as well, just to highlight the long-term successive growth that once occurred elsewhere in eastern Europe (Molodin and Priakhin 1998, 4-5). These two should be renamed from now on as the Accumulative Centre Theory's Brief Version (ACT-B) and the ***Accumulative Centre Theory's Long Version*** (ACT-L) respectively. The Long Version, unlike the Brief one, openly opposes itself to the PCT, but it does not recognize that it was itself motivated by the PCT's narration (Priakhin and Savrasov 1994, 31).

The ACT-L sticks to the idea of the native copper deposits as a resource background for the gradual local growth resulting in a widespread expansion. It takes the core region of the Rivers Don and the Donets and the Middle and Late Bronze Ages taken almost entirely to provide conditions that the generative interactions would run on. Within the frameworks just mentioned, the Catacomb Grave and the Don and Volga Abashevo Cultures, with some Epi-Corded Ware and Post-Catacomb constituents added, were involved in forming the western half of the Wood-Framed Graves Cultures area. Being evolutionary in its essence, the ACT-L moved the beginnings of the eastern European LBA away to the MBA. Also, it redirected the PCT's stream of cultural genesis eastwards. As a result of such a volte-face, the Sintashta Culture and beyond became the innovation recipients, not the disseminators, so these formed a basis for the eastern Wood-Framed Graves as well as the Alakul Culture (Priakhin 1976; 1992; 1997; Priakhin *et al.* 1998, 3, 9, 17, 18, 21, 23, 26-30;

Priakhin and Besedin 1998, 60-71; 1999, 35-59; Matveev 2005, 139-143). Thus the ACT-L, just like the PCT before, provided itself with its primary core and its very own province. Yet it stopped just where the PCT did not. The ACT-L's cultural genesis (although it is not referred to in this way) seems to cease when the Wood-Framed Graves Culture, as well as its mining and metallurgical centres, collapsed. Here, the very end of the LBA is considered to prologue the Early Iron Age.

While defining centres of cultural genesis, another release of the ACT-L states that these *'may become, for some reason or another, zones of stable formation of the new archaeological cultures or, even, cultural and historical complexes'* (Otroschenko 2005a, 36).

The *Dnieper and Donets centre of cultural genesis* (the DDC; Otroschenko 2005a, 36-38) seems to adapt some principles from the PCT as well as the ACT-B, and in particular:

(a) The core of the centre is closely associated with mineral raw materials of the Donets Ridge mountain system to form a resource precondition of the cultural genesis.
(b) The core of the centre is enlaced with the river networks of the Dnieper, the Don, and the Sea of Azov to form a communication precondition of the cultural genesis.
(c) The cultural genesis, that is to say, the formation of the archaeological entities, is an upheaval breaking with traditions.

There are more fundamentals in the conception to catch on, such as facilitating agents for a centre to commence, some more centres instead of the two in the PCT, and a mountain-riverine area instead of some other bigger. Since the cultural genesis is seen as the production of cultures and entities, then centres are expected wherever some rich natural resources as well as living-friendly landscapes match cultures' primary core sequences with the earliest types and complexes of these cultures.

Here, an archaeological culture is presumably a model of a living change in the past. Howbeit, it is hardly that there has ever been a society formed naturally or regulated from outside which would not have a living everyday culture with at least a few inherited, not borrowed, elements and, at the same time, did not make any cultural deposits at all (cf. Bochkariov 2014, 50-51). The very fact that an archaeological culture is formed seems not enough to call a vast intercentral zone a real centre, since culture, cultural genesis and deposition are evidenced wherever human society ever existed. And indeed, to identify a centre, the ACT-L may use not every cultural genesis, but the one moderating dependence on resources and achievements of influential centres and, ideally, eliminating it. Yet by paying much attention to a fate of primary innovations, with its discreteness, gradation, mixing, transitional smoothness, and fuzzy boundaries, one may only confuse everything. So, while persistently looking for shrinking spaces without local innovation, the ACT-L is filling out innovative self-sufficient regions by using 'grey zones' image to pose a people who*'are not capable of creating new cultures and only mechanically perceive the achievements of more advanced neighbours'* (Otroschenko 2005a, 36).

This is, of course, a utility designed to exaggerate a situation polemically, a proxy built to highlight status of a sought-for centre, to emphasize that the lack of such status is absurd when sufficient environmental conditions are available. After all, according to the ACT-L, the grey zones existed somewhere, but at least not in the south of eastern Europe. Every centre here emits influence on another centre. These are placed more densely than those of Bochkariov's PCT, especially in the North Pontic area. Moreover, there is no use assigning a status of grey zone to the adjacent Don and Donets region with its Don-to-Volga province of the post-Abashevo/Pokrovsk Culture which gave birth to the Wood-Framed Graves phenomenon. Does one need to distinguish between 'high-born' and 'low-born', 'one's very own'

and 'someone else's', and so on, cultural genesis, then? The point is that the ACT-L with its extremely compact notion of a centre, which is not larger than the bundle of a big river and a mountain plus an area of archaeological culture, occasionally tends to skip the scope of the outbreak deployment by filling it with more centres.

Any upheaval or break must signify either rapid innovative jump (as the ACT-B implies it) or a kind of retrograde, archaizing process. There is neither one nor the other in the DDC but an idea of a continuous technological and social uplift in a particular region. Milestone-shifting may happen as soon as archaeological culture arises anew to launch an epoch-making entity. As it goes from preconditions (a) and (b), there is a 'zone of stable formation' of the Late Stone to the Early Metals stretching from the Dnieper to the Donets (Otroschenko 2005a, 36). On the face of it, here is just another name for the DDC; in fact, this is a concept of different content and volume. Could it be a cultural genesis zone, or likewise, one just similar to the PCT's province? And what is the difference (if any) between a zone and a centre, then?

Let us start with the centre and maybe it would be enough to puzzle out a zone issue too.

It seems preferable to collate centres in the ACT-L and the PCT in terms of metal production and its resource base, since such an indicator appears both here and there. In the 'Dnieper-Donets' ACT-L release, from this point of view, the DDC seems only to make sense of room for innovative change during the Late Bronze Age because of the nexus it displays between the Donets mining and metallurgical centre and the Berezhnovka-Mayivka Wood-Framed Graves Culture. The incipience, development, and breakdown of the culture are conjugated with emergence, consolidation and decline of the mining and metallurgical centre and vice versa (Otroschenko 2005a, 36, 37). It is assumed, of course, that local copper deposits were in use there from the Chalcolithic (see Otroschenko 2005a for more references). Nevertheless, the Donets mining and metallurgical centre looks to stand as a system no earlier than the Late Bronze Age periods from III to V, representing the Berezhnovka-Mayivka Wood-Framed Graves in the eastern half of the Ukraine. In the 'Dnieper-Donets' ACT-L, the situation discussed is proposed to be one of the latest phases of the centre/zone preceded by very long elaboration from the Late Neolithic. Thus neither centre nor zone coincides, in terms of content, with the centre and the province in the PCT. The DDC only fits the accumulative vision of a centre of cultural genesis with a centre-forming culture (the ACT-B; Otroschenko 1996a). The Dnieper-Donets zone is not the same as the DDC. It works in fact as a set of columnar sequences of regional centres.

The culturocentric essence of the ACT-L is clearly articulated in the form of the *Dnieper-Donets Babino and Berezhnovka-Mayivka centres of cultural genesis* (Otroschenko 2005a, 37). By doing so, Vitaliy Otroschenko seems to follow those monocentric case models put forward for the regional cultural genesis (Bratchenko 2001, 143-162; Bochkariov 2011, 12; Bochkarev *2013*, 53-54; Lytvynenko 2005; 2013, 121-138). In recent years more and more information comes to reaffirm the Volga-Urals origin of both Pokrovsk and Berezhnovka Wood-Framed Graves lines, while the Babino substrata are proved to merge both Caucasian and central European constituents (Lytvynenko 2013, 121-138; 2015, 138-139; Mimokhod 2018, 119). Both the 'Loboykivka-Holovuriv' metal production tradition associated with the Berezhnovka-Mayivka, and earlier 'Wood-Framed Graves' handicraft tradition, in their turn, are closely related to particular trends that came from the Volga-Urals (Bochkariov 2017, 171-173).

It may seem likely that a series of the ACT releases would compose some Big ACT, if the idea that a pulsatile process came from the Volga-Urals had only been accepted by all parties, as one of them did (Otroschenko 1996b). However, the earlier release of the ACT-L transfers the entire energy of the Volga-Urals far beyond the Urals, to Kazakhstan and Siberia (Molodin and Priakhin 2005, 8).

So it turns out that two accumulative centres are in very close contact and even overlap each other on the banks of the River Donets. The centres acting in very close proximity inside a honeycomb-patterned space are strongly welcomed by such hearth-and-home models. The cores of these two centres are thought to have been facing each other by their margins during long-term coexistence, as suchlike could not be done in the PCT. But what is more remarkable is that they claim the one and the same vital ore wealth.

Let us see how this happens.

Sharing metals fifty-fifty: polycentrism teases theory

The architects of the ACTs seem to have but one mind when they refer to the reliance on local copper deposits as a decisive point in what they call 'metal production originality'. The thing is that there are very few such deposits in the particular area they think of and these are the copper-bearing beds of the Bakhmut Trough where the Donets mining and metallurgical centre is situated (Chernykh 1976, 14-17; Tatarinov 2003).

It was Anatoliy Priakhin who first managed to redefine the Donets mining and metallurgical centre in the framework of a new scope called the *Don and Donets manufacturing zone* (Priakhin and Savrasov 1994, 31-35; Priakhin 1995, 34-35; 1996, 132-134). The DDMZ, despite the name it bears, occupies an interfluvial space from the River Donets to the Volga, that is to say, about half the area of the Bronze Age entities that concern the ACT-L. For this reason, the term 'zone' should have a different meaning instead of typological similarity between metal production centres attributed to some closely integrated cultures (cf. Bochkariov 1995b; 2006). Indeed, the manufacturing zone works here as a 'system of sites for production purposes' (Molodin and Priakhin 2005, 7). With this, it looks somewhat similar to the hierarchy of focuses and centres in Bochkariov's classification. At the same time, the manufacturing zone is different from those units by the fact that it not only includes workshops of various kinds, but also necessarily contains local copper deposits as well as clear evidence of ore mining.

Due to its long-lasting activity, the DDMZ exceeds any particular archaeological culture and does not fit entirely into any of the Bronze Ages, for it belongs to some different, albeit successive, entities. The DDMZ, as well as the one of the Trans-Volga with Kargaly ore fields, only partly matches the well-known Wood-Framed Graves' metal production focus (Chernykh 1970, 111-115). The remote metalworking workshops, with vast distribution spaces around, were drawn into each zone having a mining and metallurgical core centre inside. Thus each zone is totally autonomous within metal production focus of the Wood-Framed Graves complex. Furthermore, the typological similarity between these isolates is thought to arise from basic cultural integrity firmly ingrained in the Abashevo metal complex. There is absolutely no such option for the PCT. Hence the ACT-L is very different from the PCT in the notion of what the structure of metal production is and what its significance was for the social patterning in the past.

As we have seen many times before, one of the basics of any accumulative conception may state that cultural genesis must be spatially inseparable from local mineral resources and workshops. It looked therefore quite expected from Vitaliy Otroschenko to introduce the above-mentioned Donets mining and metallurgical centre into the *Dnieper and Donets* metallurgical area instead of the *Don and Donets* one (Otroschenko 2005b).

All the ACT-oriented researchers have long been looking for evidence of early metal production in this land prior to the period when the Wood-Framed Graves

Culture of the Pokrovsk-Mosolovka and the Berezhnovka-Mayivka branches were formed. Without going into details, it is worth noting that so far no traces of ore mining which would have been left there by whomsoever before the appearance of Wood-Framed Graves people are known. At the same time, both the Babino Culture (Lytvynenko 2005) and the Don and Volga Abashevo Culture (Priakhin 1995; 1997; Priakhin *et al.* 1998, 9, 14, 17, 24; Molodin and Priakhin 2005, 8) are famous, with various types of evidence of metalworking activities in the region. It has been argued far and wide that it was the Pokrovsk Wood-Framed Graves Culture who began to specialize in metalworking for the Don Region and mining ores and melting metals for the Donets Region (Priakhin and Savrasov 1994, 31-35; Priakhin 1995, 34-35). It might seem strange, but this culture has never been attested there in terms of mining anything except shale freestone, while all local LBA copper mines are attributed exclusively to the Berezhnovka Wood-Framed Graves Culture. Vitaliy Otroschenko suggests the same cultural attribution for the 'Loboykivka-Holovuriv' metal production trend, which, in turn, is closely related to the 'Derbeden' trend of the Volga-Urals (Bochkariov 1995b, 121-122; 2017, 172-173). It is tempting to assume that the earliest Wood-Framed Graves phase in the region was facing some sort of division of labour existing in metal production until Berezhnovka Wood-Framed Graves people finally seized the situation by introducing their own domination and artisanship. Now it is time to see how the metal production may be linked with such social change.

Perceiving past technological innovations and social change

In doing so, the theories in question seem to try their own ways of comprehending

(1) what traditions and innovations are. The PCT sees that metal production, initially rooted in the Urals mining and metallurgical area as well as sandstone copper deposits from the Volga-Urals area, resulted in the 'Volga-Urals trend'. The innovativeness of the latter is detected by means of typological classification as highly widespread and in the long-term elaborated to produce a variety that was the Eurasian Metallurgical Province, with multiple cultures and manufacturing centres (Chernykh 1978, 72, 75). This entity is best defined as a technocomplex of widespread tool types equipped with closed ('blind') sockets made of tin bronzes cast in ground stone moulds. The formative phase of cultural genesis is marked by the emergence and decline of the early complex societies that decisively promoted these and more technological innovations, such as chariots and cheekpieces amongst others, to initiate a phenomenon of the Late Bronze Age for ten centuries over the vast area. The variability in modes for change in the form of evolution, transformation (spontaneous or else stimulated) or a jump seems to work as a trigger for one or another temporal and spatial version of the eastern European Late Bronze Age.

The ACT-B is about to try and link a single archaeological culture of Sintashta with selected Taş Qazğan ore mines of the Urals mining and metallurgical centre. The conception skips accentuating the innovative significance of such a relationship with respect to the post-centre life. In any case, the earlier traditions are considered to be interrupted or dissolved in the melting pot of change, while the resulting product is doomed to wander and interact with various centres all around. In the ACT-B, innovations are thought to be a brand-new *standard of living in a single land*. Since all antecedents are interrupted suddenly, traditions seem to have had very small value there. Innovations, in turn, are finite within the time range of the centre. While the Sintashta Culture was dissipating, the family vaults' set-up changed, the chariots dropped out of the burial rite, though the practice of furnishing the graves

with bridles and weapons lasted somewhat longer. It is easy to see that these were the intravital and post-mortem attributes of nobility, strength, and power. For this reason, it would be useful to look at how theories seek to see

(2) whether technological innovations could induce social transformations or vice versa. In the PCT, the reciprocity of such a kind is discussed through the idea of irreversible progress in metal production. The latter might be standing still or reducing in scale and quality, but it would never lose the technological developments already gained. Because of that, the cultural genesis change is seen as uneven, cyclical and pulsatile. *The leaders necessarily set control over innovative* metal production with its distant associations in order to base their prestigious status on the stability of this manufacture. The military nature of early complex societies contributed to the development of weapons and fortification; at the same time, the *tribal structures along with transient forms of chiefdoms remained the best social condition achieved behind the pre-state level.*

The ACT-B tends to emphasize proto-urbanistic-style innovations associated with collapsed aristocracy. Yet by the Bronze Age, the fortified settlement, a yardstick tool attesting high quality of life, never became the norm. Hence any attempts at fostering high levels anew are only linked with vernacular people of quality. At the same time, the age of equality with its characteristic innovations is considered to be in a state of decline.

For the PCT, with its cherished idea of social complexity as a transient matter, such change signifies the end of a phase, yet in no way means that the innovative centre has faded away. The PCT can only capture that culture is streamlined typologically by getting rid of archaeological deposition of chieftains' rich graves as well as of building structures indicating the concentration of power in a ranked society. So the PCT looks for ***(3) specific modes by which technology may produce social change.***

It is known, for example, that the modes of Late Bronze Age farming might have been affected by the very fact of emergence and/or withdrawal of specialized bronze tools. The interdependence of the cycles of farming and metal production was combined at that time with some special, albeit changeable, status of craftsmen.

The ACT-L cannot do without technological innovations either. Within earlier phases of culture making, innovations emerge in metal production, carpentry, wheel making, saddlery, and antler carving, to mention but a few. While recharging overall progress until the very end by acquiring statuses of traditions, they fade away gradually and selectively. All that was taken in of distant exchange and gifting is down to a few. As long as the ACT-B sees military polytogenesis as collapsed and charioteers escaped just to perform deeds of passionarity, the ACT-L assumes peaceful expansionism and reciprocal interaction to make the noble persons pacify and symbolize their agencies in such a way that the very idea of the warriors who rule the land soon must have been gone forever. The clans and families of coppersmiths and cast makers were isolated socially and, often, spatially, firmly attached to workshops in the manufacturing zone because of the well-specialized technology they practised (Priakhin and Savrasov 1994, 33; Priakhin *et al.* 1998, 9, 14, 17, 24, 26-30).

Taking a columnar sequence of local archaeological cultures as a centre, the ACT-L cannot abandon the factor of innovations based on resource and environmental security. The stability of a centre/zone suggests some new types and complexes formed tirelessly, in which those gradual, successive or abrupt changes in the past living culture are visible. The significance of mining resources hardly remained unchanged. If the chalk, salt, sandstones, granites and, probably, coal were used in all epochs, then flint as a raw material and object of exchange had a special significance for the Neo-Chalcolithic. The significance of flint knapping and dependence on raw materials sources seems to persist during the Early and Middle

Bronze Ages as well. Copper, antimony, and polymetallic ores came into use in the Late Chalcolithic. Consequently, the epoch-making technological innovations based on accessible abundance of special raw materials are still waiting to be discovered in the knapped flint industry, as well as in copper and bronze manufacture. What makes such a centre/zone innovative? Is it due to an archaeological culture's primary core or some innovative types the complexes of this culture may contain? Or maybe it is some influential innovation such as the Indo-European languages and barrows of the Chalcolithic or also wagons and the megalithic statuary of the Early Bronze Age (Otroschenko 2005a, 36)? Yet in case the development programme is certainly short, the theory may find itself searching for ***(4) the extra forces to promote social change.***

The ACT-B (Otroschenko 1996b; 1997; 2002) finds it quite logical that the earthly bowels, once being mastered, may work as resources yet not as causes for social change. Then, the technological adaptation itself would have been enough reason, among others, for the nobles and craftsmen to build a new habitus. In such a case, the South Urals centre would have a chance to become a huge but trivial accumulative hub, and its history would have lasted very long. Therefore the ACT-B seeks support in a sociopsychological domain. It is the passionarity that spurs the members of charismatic clans to act. Hence the social innovation is that a militarized polytogenesis in the Indo-Europeans was produced by passionarity thrust, the first one in this part of oecumene between 2100 and 1700 cal BCE. In the act of the descent, there were also a crossing of the borderline, the frontier of Asia and Europe, and its own heroic and messianic road map, finally exhausted somewhere on the banks of the Dnieper. This way, of course, is influential, but is not the only possible one among ***(5) the ways migration may affect both emergence and adoption of innovative technologies.***

On the one hand, the ACT-L may challenge its opponents by emphasizing very basic similarities in modes of the animal breeding economy and lifestyle having been seasoned with latitudinal connections. On the other hand, interzonal migrations aimed at revealing pastures and ore fields from north to south may appear just as significant as they do in the PCT. This tends to choose migration rather than diffusion to explain what the fuzziness of attributes in the formative phase is. A centre has its primary core that swallows up migration surges; the outgoing migrants, as well as diffusive agents, in their turn, produce a more or less resistant province filled by locals. Mobility, being induced by overpopulation and focused on searching for ore fields, would have made a society become segmented spatially and in a sense of craft specialization. At the same time, far-distant migration amplified remote associations' networks. The austerity of housebuilding and pottery making invariably turned out to be an unattractive companion of mobility.

It is worth noting that not every migration that brings ready-made advanced technology of forging and casting metals into an ore-bearing area can make a cultural genesis centre emerge there. The Fatianovo Corded Ware Culture of central European origin is a good example. The advent of this in eastern Europe did not face a single active agent in the whole area having had animal breeding, manufacturing and social patterns on a comparable scale. Obviously, the local milieu with a hunting and fishing economy proved to be immune to innovation. Another lesson is about the very fact that eastern Europe is principally poor in copper ores, as opposed to its neighbours, so the peripheral ore fields were in great demand both by locals and distant populations just to affect the whole cultural genesis of the area.

From the ACTs to the Focus/Foci Theory

Primarily, the Don and Donets Region was conceived as equating to that of the Trans-Volga and Urals by the accumulative archaeologists led by Anatoliy Priakhin; however, they totally eliminated the Volga-Urals centre's cultural genetic impact on eastern Europe by redirecting its influence to encounter far-distant challenges of the Seima and Turbino phenomena from West Siberia and Altai.

Vitaliy Otroschenko had to respond to both conceptions at once, so he found a way out by introducing the Dnieper and Donets centre of cultural genesis and the metallurgical area of the same name. His ACT-B became a prologue to his own ACT-L, with the Volga-Urals centre is here to stay to act as the initial impetus in the whole process.

Every accumulative trend seeks to shorten the most active phases of the centres and to constrict their borders, since otherwise the parity would be broken and a pair of influentials would suppress the rest. At the same time, one of them is often left by the ACT-L to stand out for its durable impact.

Both typological classification of metal complexes and the very structure of the 20th-10th-century BCE metal production seem to oppose multicentric division. The same manufacturing facilities can enter the orbits of different centres to maintain metal production by an array of cultures that makes a regional scale of cultural genesis unrepeatable. Let us say that the Middle Dnieper ore deposits were evidenced for some time, a fact that blurs a local resource-oriented monocentricity (Dergaciov 1997, 16, 45) to revisit an idea of the Volga-Urals province that meets a suchlike of the Carpathians and Danube/Balkans in this part of eastern Europe.

The output is that for the phenomena like those of the Don and Donets Region or also the Dnieper and Donets centre of cultural genesis an idea of the *focal spot* or a *hub* is reserved to conceptualize their functions within trajectory and kinematics of technological innovations and social change. In the same way, for the entities such as the Don-Volga Province with the Don and Donets manufacturing zone and the Dnieper and Donets zone of cultural genesis/metallurgical area, a concept of a *focal space* is offered here. It seems likely that it is this subdivision that may work its best to do with fluctuating convergent-to-divergent states and change in cultural genesis. I would call this *the Focus/Foci,* ***or*** *Hub, Theory*.

It is Roman Lytvynenko who seems to come close to such a conception (Lytvynenko 2005, 122-123; 2013, 121-138).

An innovation-oriented conception of cultural genesis would have gained additional support in assessing its integrity and consistency by means of the habitus concept applied to a large spatial and temporal scale (Bourdieu 1972/1995; Barrett 2005; Marciniak 2012; Marciniak and Chwieduk 2012). The great adventure of innovation in manual metal production with its clan-patterned structure, specific technical settings and functional set-up, can be regarded as some functional modules being gradually reproduced and reduced to symbolic rudiments on their way from lush actualization to an expedient minimalism. Such technological behaviours seem to work as on-site chain variations within inherited patterning, which, under certain conditions, seem to develop into a small-scale more or less unified technical requirements controlled by a craftsman or a craftsmen's dynasty; but the present-day typologist is the only one who can grasp the entire process, with its values, gaps and trials through the ages. The elaboration in eastern European socketed axes is an example of a thousand-year continuum starting from primary Seima impetus and then modified by a series of local alterations (Dergaciov 2013). The patterns once invented have been changed within focal spaces and hubs and, however, the nexus has never been lost between innovation and tradition, being only partly dependent on transient individual will.

Some remarks to conclude

In order to substantiate the Focal vision and do it properly, it would be good to discuss more issues related to how the Centres Theories have been developed as well as what specific ideas of concentration and dispersal for prehistoric archaeology have been used to promote certain trends in explaining change. The principles of naming and spatial positioning of the centres/foci are also of great interest. Also, a long series of case studies applying the principles of the Centres Theories still remains outside the scope of the paper.

The PCT, albeit postulating uneven cyclical development with devolution of the social and the economic here and there, seems to rely mainly on processualist and post-structuralist approaches instead of carrying on with cyclical theories that the eastern European prehistoric archaeology likes applying increasingly (Tsimidanov 2006). The ACT-L, in turn, while proceeding from the hypothesis of passionarity ethnogenesis to the idea of charismatic clans, takes its accumulative centre as a kind of social depository for charismasity to be a secret key for progress.

The Pulsatile Centres Theory is a concept of epoch-making innovations acting across vast spaces.

The Accumulative Centre Theory is about a whole array of innovations getting together in much more confined spaces to stand out from the rest by attesting an older local tradition next to them.

The multiple diversity of the two conceptions seems to operate with the same typological notions such as type, types combination (a complex) and a regularity of complexes, that is to say, an archaeological culture. Yet I would try and presume that the ideas under consideration may contain basically different motives and strategies for systematizing archaeological entities to promote divers formulae for social change and thus must be demarcated by fields of application in prehistoric studies, although their frames of reference may sometimes coincide in both sections of the research procedure. In any case, it is not always possible to remove a theory and place another instead of it unconditionally; however, one cannot always refrain from preference.

It is unlikely that the archaeologists who deal with a diversity of evidence of cultural genesis would say that they do not care what the idea of these conceptions is, either of which they face with each step they take.

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Valentine Pankowski, born 1976, is a research fellow at the Institute of Archaeology, National Academy of Sciences, Kiev, Ukraine. Having majored in Late Bronze Age studies, he is now promoting the artefactual osteoarchaeology of the Early Metals, a specific archaeological discipline which concerns the morphotraceogenesis in prehistoric worked bone and antler finds. Since this research field is closely related to an array of principles and issues in systematizing archaeological records as well as in conceptualizing archaeological entities, Pankowski tries to make new sense of some current trends in the theory of cultural genesis developed for the eastern European prehistoric and early historic archaeology.

HABITUS? The Social Dimension of Technology and Transformation

The issue of the social dimension of technology and transformation, seen from the perspective of 'Habitus', has repeatedly been discussed in the scientific discourse exploring prehistoric and archaic communities. However, the complexity of related phenomena constantly provokes new approaches in different archaeological contexts, which leads to interesting findings.

By presenting the latest studies on the social dimension of technology and transformation, this book contributes to a better understanding of a system of embodied dispositions hidden within Bourdieu's concept of 'Habitus'. These studies mainly cover European areas; from Scandinavia to Italy, the Balkans to the British Isles, and Ukraine to the Northern Caucasus. In addition, ethnoarchaeological field studies from distant Indonesia are used to interpret the Hallstatt Culture in Europe. The papers span a chronological dimension from the Neolithic to the beginning of the Iron Age and in summary include a diachronic perspective. Rock art, Trypillian megasites, stone axes and adzes, metallurgy, wagons, archery items, ceramics produced on potter's wheels, mechanisms of cultural genesis and dualistic social systems are examples of the topics discussed. This book also provides comments on Pierre Bourdieu's theory of practice, including the concept of 'Habitus'.

This book is addressed to international academia, presenting an important set of information and interpretations for archaeologists and readers interested in European prehistory. It comprises contributions to the CRC 1266 International Workshop 'Habitus? The Social Dimension of Technology and Transformation', held in 2018 at Kiel University.

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