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The eighteenth Neolithic Studies anthology comprises selected papers presented at the seventeenth Neolithic Seminar 'Eurasian Neolithics: Perspectives from Culture, Population and Climate' that took place at the Department of Archaeology, University of Ljubljana in November 2010. We also publish papers on: (i) concepts of probability in radiocarbon analysis; (ii) ^{14}C dates of Early Neolithic pottery dispersals in North-Pontic and Povolzhye forest-steppe regions; (iii) Kebaran sites, Pre-Pottery Neolithic sites, and petroglyphs in Near East and Central Asia; (iv) demography of Late Neolithic in Central Balkans; (v) figurines as methaphors for Copper Age ideology, social structures and organisation; (vi) vocabulary and metaphors in Copper Age macrolithic blades production.



'Vinča figurines'
(see Crnobrnja, this volume).

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Marek Zvelebil (09.01.1952–07.07.2011)

Professor of Archaeology, University of Sheffield

No more than 59 years was he given. Even though we were aware of his ill health, the notice that Professor Marek Zvelebil has passed away is still shocking. We have lost a colleague and friend, a bright light in prehistoric archaeology, who will be painfully missed.

He was professor of archaeology in a British university, but also a citizen of the world, and, one should stress, especially a Central European person. Born in Prague, he migrated with his family to the Netherlands, and soon thereafter to Britain, where he graduated in Sheffield (1974), the university where he returned to teach after gaining his PhD at Cambridge (1981). According to his many scientific projects and his teaching at different stages of his career, he was mainly at home in Finland and Russia, in Scotland and Ireland, at both the East and West Coasts of the United States, where he was a guest professor giving courses at Boston University and the University of South Carolina, as well as at UC Berkeley. But meanwhile, or perhaps above all, he kept up intensive contact and cooperation with his Czech and other Central European colleagues.

He was a devoted teacher, whose students came to learn from him from many parts of the world, and he never refused to share his knowledge with anyone who he felt deserved it. As a teacher, he was not only engaged in tutoring and organising university life, but was always open for new challenges, whether raised by students or simply by the *Zeitgeist*. Thus, some of his courses and publications focused on agency and identity in the Mesolithic, some on modern hunter-gatherer societies, or even on archaeological research related to ethnicity and nationalism. Several of his teaching courses, lectures or chapters, such as *Who were we 6000 years ago?* (2004), discuss these issues.

One of the focal points of his research was the transition to food production and sedentary life. He researched Postglacial hunter-gatherers in Europe and the transition to farming. He first investigated the origins of agriculture from a North European viewpoint, based on Late Mesolithic and Earliest Neolithic research projects that culminated in monographs



Marek Zvelebil
This photo, and the text relates to it, can be found in Mariana Cooks'* Faces of Science *Norton (2005).

such as *From Forager to Farmer in the Boreal Zone* (1981), and edited volumes, *e.g., Hunters in Transition* (1986), *Harvesting the Sea, Farming the Forest* (1998).

This meticulous work made him one of the best Mesolithic experts. Apart from the study of the chipped stone industry, he also analysed other key elements of material culture, such as antler tools, or ground and polished stone tools, and did pioneer work on pre-Neolithic pottery. One splendid outcome of this interest is a recent volume (co-edited with P. Jordan), *Ceramics before farming. The dispersal of pottery among prehistoric Eurasian Hunter-gatherers* (2009). Further, his research was extended to Mesolithic and Neolithic human skeletal remains, including their pathology and biomolecular analysis, especially from regions such as the East Baltic and European Russia. Since he thrived on seeking to understand complex processes, the scope of his research involved palaeoenvironmental, faunal and palaeobotanical remains, and the survey of sites and offsite areas. This soon led to him studying the ancient landscape as a whole, hence the two major landscape projects, including GIS, aerial photography and survey, in Ireland and Bohemia, together with a large team of Irish, American, Scandinavian, British and

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Czech scholars. He was one of the first archaeologists who saw the potential in ancient DNA analysis in the context of the spread of farming in Europe, as reflected in studies such as that in the volume on Archaeogenetics, edited by C. Renfrew and K. Boyle, *The social context of the agricultural transition in Europe* (2000), and a further summary in Documenta Praehistorica, *The agricultural transition and the origins of Neolithic society in Europe* (2001).

Marek Zvelebil's work was not restricted to a wide range of teaching and publication; he gave guest lectures at many universities, and was an enthusiastic session organiser and speaker at various conferences and meetings. As a long-standing and devoted member of the European Association of Archaeologists, many of his sessions, papers and discussions served as the basis for future volumes, chapters and further collaboration. My first real discussion with him took place at one of the now famous Ljubljana Neolithic Seminars in 2000, which, as usual, was the scene of a real workshop for prehistoric problems in the broadest sense – unforgettable for all those who participated.
In researching the Neolithic transition, his initial, North European approach was soon extended to other areas, because of the growing evidence for the importance of Central European processes in the spread of farming. This new dataset made him focus more on the Linear Pottery culture (LBK): the papers of a session organised by him at the Thessaloniki EAA meeting were published in a BAR volume (co-edited with A. Lukes), *LBK dialogues. Studies in the formation of the Linear Pottery culture* (2004). One of his last projects was the evaluation of a Neolithic settlement and cemetery at Vedrovice in Moravia, where the research objective was to trace the areas of origin of the LBK. Accordingly, the next project, now never to be completed, was already in his head, the excavation and evaluation of a similar cemetery in Western Hungary.

One of his latest publications, on the Vedrovice biological and cultural identity (together with P. Pettitt), on *Human conditions, life, and death at an Early Neolithic settlement: Bioarchaeological analyses of the Vedrovice cemetery and their biosocial implications for the spread of agriculture in central Europe* (2008), concludes in a unique and plausible reconstruction of late 6th Millennium calBC generations and families. This is one of the highlights of recent prehistoric research: a most welcome combination of hard science, traditional archaeological methods, of empathy and wisdom in its inferences – a real historiography.

The international scientific community, and within this the European 'Mesolithic-Neolithic family', has lost a distinguished colleague and friend. But Marek Zvelebil's ideas and his immense achievements will continue to influence the trajectories of European archaeology.

Eszter Bánffy

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Concepts of probability in radiocarbon analysis

Bernhard Weninger [1], Kevan Edinborough [2], Lee Clare [1] and Olaf Jöris [3]
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ABSTRACT – *In this paper we explore the meaning of the word* probability*, not in general terms, but restricted to the field of radiocarbon dating, where it has the meaning of 'dating probability assigned to calibrated ^{14}C-ages'. The intention of our study is to improve our understanding of certain properties of radiocarbon dates, which – although mathematically abstract – are fundamental both for the construction of age models in prehistoric archaeology, as well as for an adequate interpretation of their reliability.*

IZVLEČEK – *V članku raziskujemo pomen besede* verjetnost*, ne na splošno, temveč omejeno na področje radiokarbonskih datacij, kjer ima beseda pomen 'verjetnost datiranja dodeljena kalibrirani ^{14}C starosti'. Namen naše študije je izboljšati naše razumevanje določenih lastnosti radiokarbonskih datumov, ki – čeprav so matematično abstraktni – so temeljnega pomena tako za gradnjo modelov starosti v prazgodovinski arheologiji kot tudi za ustrezne razlage njihove zanesljivosti.*

KEY WORDS – *radiocarbon calibration; Bayesian inference; noncommutative algebra; noncommutative probability; chronology*

Introduction

We begin with a remark attributed to the philosopher and mathematician Bertrand Russel in which he states, clearly not just anecdotally, "*Probability is the most important concept in modern science, especially as nobody has the slightest notion what it means*". We take this citation from the book 'Paradoxes in Probability Theory and Mathematical Statistics', in which the mathematician Gábor Székely (*1990*) discusses some of the many curiosities that may result from the invalid application of statistical theory. Of immediate relevance to our topic is the date attributed to this anecdote. It appears to have been formulated in the year 1929. If assigned to Russel and correctly dated, albeit that Székely (*1990*) expresses some doubt concerning both these points, Bertrand Russel would have made this comment some four years prior to the first (German language) publication of Andrei Nikolaevitch Kolomorow's probability theory (*Kolmogorov 1933*). After its translation into English (*Kolmogorov 1956*), mathematicians were soon to accept Kolomorov's theory, although there were exceptions, including the philosopher of science Karl Popper, who was always dissatisfied with the manner in which Kolmogorov presupposed its foundation in Boolean algebra (*Popper 1934; 1959; 1976*). In the theory of Kolmogorov, which has three basic axioms, the concept of probability is introduced in Axiom I as a non-negative real number. In Axiom II, this number is limited to a minimum value 0 and maximum value 1. Axiom III defines the mathematical operations (*e.g.*, addition, multiplication) that can be applied to given probabilities in order to produce new probabilities. This is a simplified version of Kolmogorov's theory,

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but one which in our judgement adequately mirrors the manner in which the concept of probability is introduced in the majority of school textbooks today.

It is perhaps of little surprise that statistics and related fields are often experienced as boring and dull. Indeed, and following some three hundred years of advanced and often quite controversial mathematical, philosophical, and even religious discussion, today's widely accepted definition of probability is slightly disappointing. Probability is a number, no more, no less. Some may stress that probabilities are not just any numbers, but rather special, random numbers. Others may emphasise that it is only we, as humans, who have random experiences with numbers, and that numbers themselves cannot support such experiences, in which case the discussion becomes more lively. The problems we address in the present paper are not, however, related to such discourse. We do not participate in the discussion – however far-reaching – as to whether a subjectivist, objectivist, frequentist, or even Bayesian interpretation of probability is the most preferable. Instead, we are quite happy with the notion that probability is nothing more than a number (with a value less than 1) and nothing less than a number (with a value greater than 0), *i.e.,* $0 \leq p \leq 1$.

The noncommutative properties of radiocarbon ages

In the course of the following paper, we assemble some observations to illustrate why, in our judgement, present methods of ^{14}C-analysis do not provide a mathematically sufficient (in the sense of complete) description of the properties of calibrated ^{14}C-ages. We focus here on those properties of ^{14}C-ages that are relevant to the construction of ^{14}C-based archaeological chronologies. Unfortunately, the mathematical properties of archaeological ^{14}C-data can be quite subtle as well as misleading, even to the extent of being deceitful, and a clear understanding of these properties is difficult to achieve. Fortunately, the mathematical background to these subtleties can at least be introduced in simple terms, and this is the focus of the following paragraphs.

Generally speaking, mathematical operations are termed *commutative* when study variables can be combined in any order without changing the result. This means that when applied to the addition operation (+) the following equation must be valid: $a + b = b + a$. The same applies to the multiplication operator (x) with $a \times b = b \times a$. We easily confirm that both the operations of addition and multiplication are commutative, at least for the following two integer numbers $a = 2$ and $b = 3$. The test for the commutativity of addition is: $2 + 3 = 3 + 2 = 5$ (confirmed) and for multiplication: $2 \times 3 = 3 \times 2 = 6$ (confirmed).

In mathematics, an operation is called *commutative* if changing the order of the operands does not change the end result. Conversely, *noncommutative* variables are known as *ordered*. Let us now test whether radiocarbon calibration, when represented as a mathematical operator, can be deemed commutative. Note that in the following, we run the commutativity test for numbers, although these are, of course, in place of probabilities (more precisely, probability densities, since probabilities are assigned to intervals).

To simplify the test, we take as an elementary frequency distribution only two numbers on the calendric time-scale, which we call (samples) a and b. Fol-

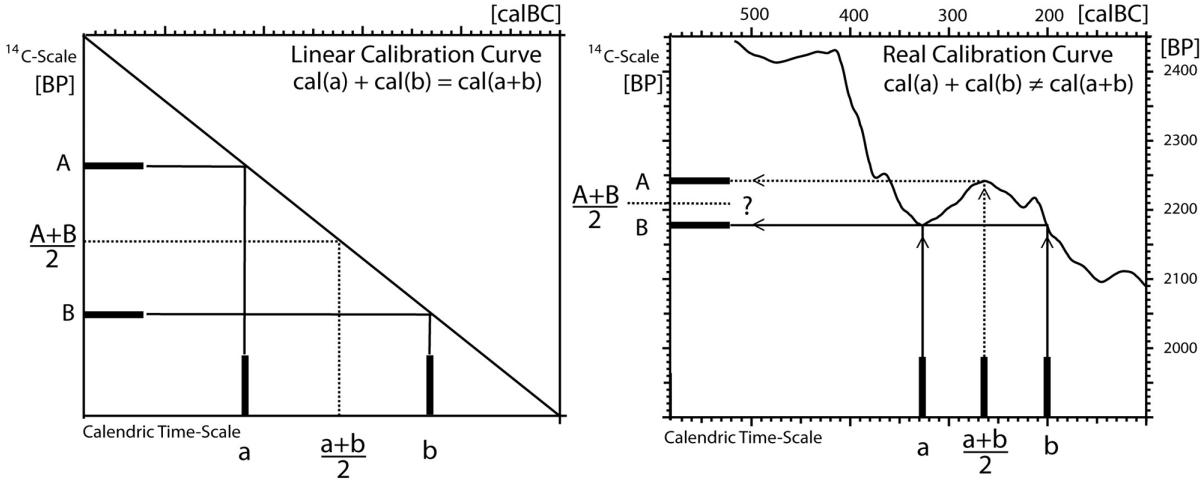


Fig. 1. Commutativity test for the radiocarbon calibration operator.

lowing idealised (error-free) ^{14}C-measurement, samples a and b provide ^{14}C-ages *A* and *B*. Assuming that *A* and *B* have been correctly obtained, then the initially unknown calendric ages (a and b) can be reconstructed by comparing *A* and *B* with previously measured ^{14}C-values for known-age samples taken from the tree-ring ^{14}C-age calibration data-base. The commutativity test for the radiocarbon calibration operator as illustrated in Figure 1.

We test the commutativity of the calibration operator *cal* in terms of the addition of dates/samples on the two scales (^{14}C- and calendric) by analysing Equation 1:

$$\frac{A + B}{2} = \frac{cal(a) + cal(b)}{2} = \frac{cal(a + b)}{2} \qquad (1)$$

This equation may be read as follows: when the measured ^{14}C-age *A* (for sample a) and the measured ^{14}C-age *B* (for sample b) are added on the ^{14}C-scale and divided by 2, we obtain the ^{14}C-scale value *(A+B)/2*. This represents the average ^{14}C-age of the two samples. Similarly, the average sample age is calculated on the calendric time scale, where it is defined as *(a+b)/2*. It should be stressed that, due to inherent difficulties concerning the graphic representation of the problem at hand, both in Figure 1 and in Equation 1 the operator *cal* is in actual fact the inverse calibration.

As shown in Figure 1, for two differently shaped calibration curves, the calibration operator has the property of being commutative *only* under the condition that there is a linear relation between the ^{14}C-scale and the calendric time-scale. Indeed, for the linear calibration curve (Fig. 1, left) identical results are achieved irrespective of whether we first measure the ^{14}C-ages for samples a and b and calculate their average ^{14}C-age on the ^{14}C-scale, or put the carbon of both samples together and measure the ^{14}C-age of the combined sample. For the linear calibration curve the calibration operation is commutative. However, as shown in Figure 1 (right), in the realistic case that the calibration curve is not linear, but wiggly, results obtained by averaging are dependent upon whichever of the two scales the operation is first performed. We abbreviate this by stating that the calibration operator is *noncommutative* in respect to the *addition* of dates and samples on their respective scales.

But why should we be interested in ordering properties of the calibration operator? In archaeology, we are interested in (1) the transfer of ^{14}C-ages from the ^{14}C-scale to the calendric time-scale and (2), in a second scaling direction, the transfer of sample ages from the calendric time-scale to the ^{14}C-scale. Only the first direction is known *sensu stricto* as ^{14}C-age calibration. However, in archaeological modelling studies, the second operational scaling direction is also of importance, *e.g.*, when the aim is to reconstruct the (theoretical) frequency distribution of samples from the given (measured) distribution of ^{14}C-ages.

Let us further evaluate the commutativity of the calibration operator, but now in terms of multiplication. The multiplication operation is of particular importance in archaeological ^{14}C-analysis, *e.g.*, in Bayesian sequencing methods, when the aim is to constrain the range of calendric ages initially obtained for a larger set of individual ^{14}C-ages. This is accomplished by a combination of the given ^{14}C-data with external (archaeological) information, such as the known or assumed relative-age position of the dated samples. Depending on many details of the specific Bayesian application, the combination of ^{14}C-radiometric and archaeological information inevitably requires the formulation of a mathematical equation, often a complex undertaking. However, a common feature of all such equations is that they contain sums and products of (measured) ^{14}C-scaled probabilities, and of associated (measured or assumed) calendric-scale probability distributions. An example of how complex such an equation can be is illustrated by a case study taken from Christopher Bronk Ramsey (*2009*). A typical application of the Bayesian sequencing method, in this case applied to a set of ^{14}C-ages from a multiple phase archaeological site, is shown in Equation 2.

$$p(\mathbf{t}) \propto p_H(t_b, t_c) \prod_i \frac{p_H(t_a, t_i, t_b)}{(t_b - t_a)} \prod_j \frac{p_H(t_c, t_j, t_d)}{(t_d - t_c)} \qquad (2)$$

We do not provide a description of variables used in this equation, since these are given in detail by Bronk Ramsey (*2009.348*). We are interested in the mathematical syntax. As noted above, in Kolmogorov's theory, probabilities are defined as variables with values in the range $0 \leq p \leq 1$. Applying such notions to the above equation, where the different symbols *p* represent different probabilities, and where the symbol Π is used to abbreviate their multiplication, it becomes evident that Equation 2 contains not only products of probabilities, but – more complicatedly – actually contains products of these products. Nevertheless, and irrespective of the overall complexity of these calculations and whatever the result could mean in archaeological terms, ultimately the resulting overall probability must be a

number in the range $0 \leq p \leq 1$. What is the meaning of the proportional symbol '∝'? Clearly, it connects the left and the right side of the equation. Normally, in mathematics the symbol '∝' is used as a dimensionless scaling number (and not as a function), although is this the case here? In Equation 2, the symbol '∝' is apparently used to define a secondary linear scaling operation to be applied at the end of the task. But why should this final scaling operation be necessary? Is there, perhaps, something missing from the equation? As a result of applying the axioms of probability theory, we would usually expect the equation (or algorithm) to be complete in terms of all operations, including scaling (*e.g.*, graphics –> paper size) and – in particular – in terms of the necessary normalisation of probabilities ($0 \leq p \leq 1$). We will return to this question later, but note that the formulation of Equation 2 using this proportional symbol '∝' differs from Bayes' theorem where it does not appear (see below).

Clearly, when developing Bayesian sequencing models that include integral-products for probabilities as illustrated by the above equation, great care must be taken that results are not dependent on the order in which the multiplication is performed. To ensure this, the following mathematical equation must be valid:

$$[p_1, p_2] = p_1 \cdot p_2 - p_2 \cdot p_1 = 0 \qquad (3)$$

This equation, using Paul Diracs' commutator notation, can be read as follows: *We call two probabilities* p_1 *and* p_2 *commutative when the result of their multiplication is independent of the order in which the multiplication is performed*.

An example would be: [0.4,0.8] = 0.4 x 0.8 – 0.8 x 0.4 = 0.32 – 0.32 = 0.00

Since ^{14}C-measurements are defined as rational numbers on the ^{14}C-scale, it is possible – for example, in radiocarbon inter-laboratory exercises – to define ^{14}C-scale probabilities in terms of a Boolean (commutative) event algebra. However, in light of the above observations (Fig. 1) this should not be generalised. To be clear, the problems of commutativity addressed in this paper only arise when the two scales are connected, *i.e.,* as is required for radiocarbon calibration. In light of these observations, we conclude that the calibration operator is noncommutative, both in respect to addition and to multiplication.

Although seemingly rather elementary, the observation that radiocarbon calibration is noncommutative will resonate as music in the ears of mathematicians and physicists, who – we expect – will be immediately reminded of topics such as quantum mechanics, non-linear geometry, uncertainty principle, wave-particle complementarity, Hilbert Space, C*-algebra, Lie-algebra and non-classical probability theory.

Looking back, these mathematical properties of the calibration operator indeed resonated, if only as a warning bell, in the ears of the first generation of ^{14}C-calibration software-developers. This we deduce from comments by Minze Stuiver and Paula Reimer (*1989*), Mieczyslaw Pazdur and Danuta Michczynska (*1989*), and Bernhard Weninger (*1986*), all of whom emphasised the unusual character of the mathematical problem to be solved: "*There are some mathematical pitfalls to be avoided ... We conclude that distortion of* [age-calibrated] *histograms is unavoidable, even with the most precise mathematical procedure and high-precision ^{14}C dating* (*Stuiver, Reimer 1989.818, 823*).

The specific mathematical pitfalls in radiocarbon calibration addressed here by Stuiver and Reimer (*1989*) pertain to the large number of clearly unacceptable oscillations that appear in the calibrated distribution when the calibration is performed from the perspective of the ^{14}C-scale (Fig. 2, right). Fortunately, these oscillations can be avoided by a change in perspective, in which the calibration is performed from the viewing direction of the calendric-time scale (Fig. 2, left).

As illustrated in Figure 3 (right), the technical problem is to see if a horizontal line drawn parallel to the calendric time scale during calibration hits a point on the calibration curve or not. This problem, *i.e.* whether a (2-dimensional) line can actually hit a (1-dimensional) point, or not, is a long-standing problem in the history of geometry.

Yet, this is not the end of the story, as can be recognised from the following comments on this method by Mieczyslaw Pazdur and Danuta Michczynska (*1989.831*), who state in dismay: "*The resulting* [calibrated] *probability distribution in most cases significantly differs from the initial* [^{14}C-scale] *Gaussian distribution and general rules for simple presentations of calibration output cannot be formulated. Moreover, because of the same reason, the concepts that are widely used and familiar to non-experts in statistics and probability (*e.g.*, mean value, median, confidence interval) begin to lose their seemingly unshakable credibility*".

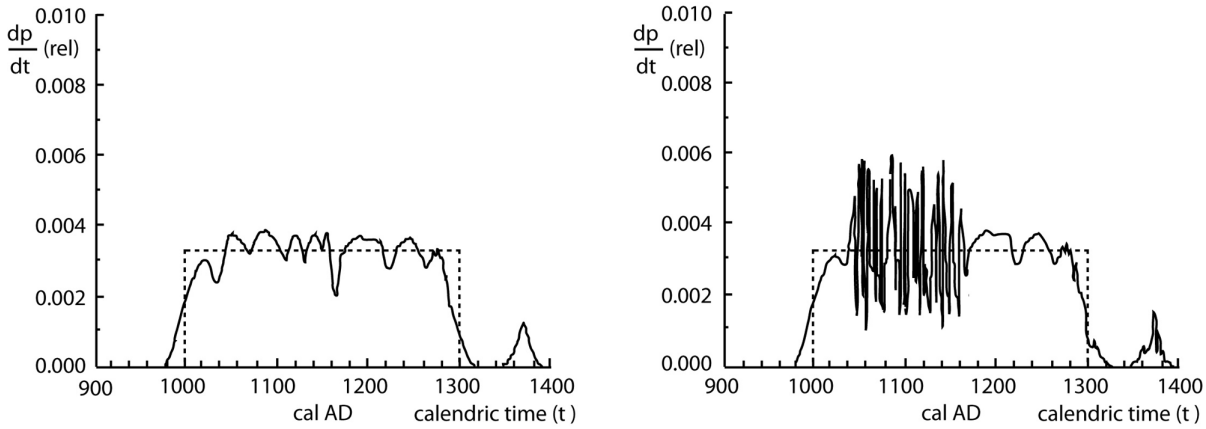


Fig. 2. (Left) ^{14}C-age calibration a ^{14}C-scaled Gaussian probability from the perspective of the calendric time-scale. (Right) ^{14}C-age calibration of the same Gaussian from the perspective of the ^{14}C-scale. Note the existence of unacceptable oscillations in the calendric-scale distribution, when calibration is performed from the perspective of the ^{14}C-scale. Redrawn (with changes in scaling) from Stuiver and Reimer (1989).

To conclude these opening comments on the mathematical problems encountered in ^{14}C-calibration, here is the explanation for the observed effects provided by Bernhard Weninger (*1986.27*): "*A graphic representation of calibrated dates based on Euclidian geometry is not possible. Any method of mapping calibrated dates necessitates construction of a non-linear picture of dating probability*".

In the following years, the approach by which ^{14}C-data are inversely calibrated from the perspective of the calendric time-scale was quickly taken up by the Radiocarbon Community. This approach, since termed *probabilistic* or *Bayesian*, is schematically illustrated in Figure 4. The caption to this figure contains some comments as to the existence of a remaining, and rather awkward, normalisation problem.

Initially, in the late 1980s and early 1990s, only technical reasons were put forward in support of this calibration approach. Clearly, there was a need for its more general foundation in probability theory. This foundation was soon to be identified with the Theorem of Bayes (*Pazdur, Michczynska 1898; Michczynska* et al. *1990; Niklaus 1993; Dehling, van der Plicht 1993*). In retrospect, this decision possibly rests on the simple fact that Bayes' Theorem is described in much detail in text-books on classical statistics (*cf.* below). Even today, it is taken for granted that Bayesian Theory is applicable, without amendment, to the calibration of radiocarbon ^{14}C-ages. For example, according to Bayliss (*2009*), Blockley and Housley (*2009*), Bronk Ramsey (*2009*), the Bayesian dating methodology provides a coherent framework by which essentially any kind of ^{14}C-

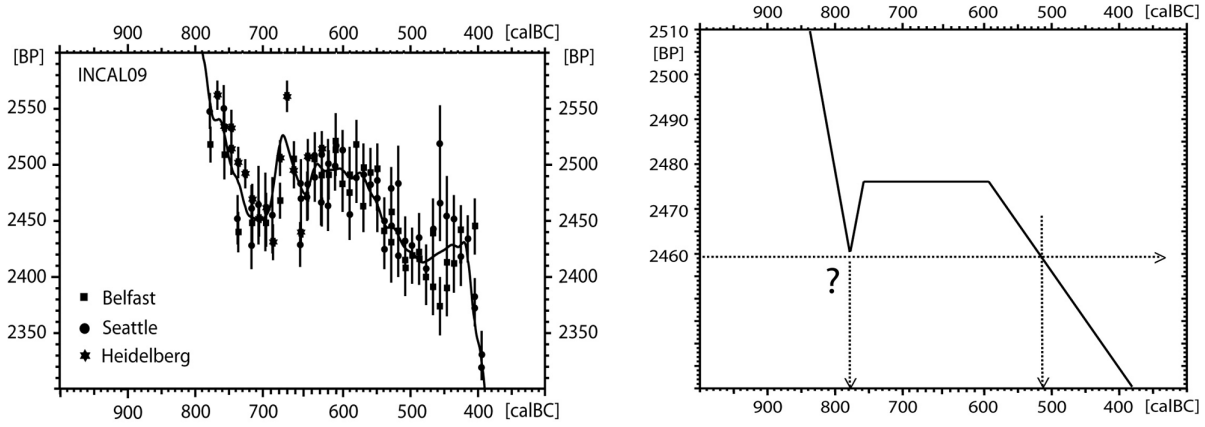


Fig. 3. (Left) Zoom into the 14C-age calibration curve INTCAL09 (Reimer et al. 2009) showing underlying raw data of the High-Precision Laboratories Belfast, Seattle and Heidelberg. (Right) Hypothetical calibration curve with downward spike followed by an extended plateau. Note the difficulty (indicated by the question mark) in providing a unique reading for the ^{14}C-scale value of 2460 BP at the lower end of the spike, but which only exists from the perspective of the ^{14}C-scale. The horizontal dotted line with arrow indicates the reading direction.

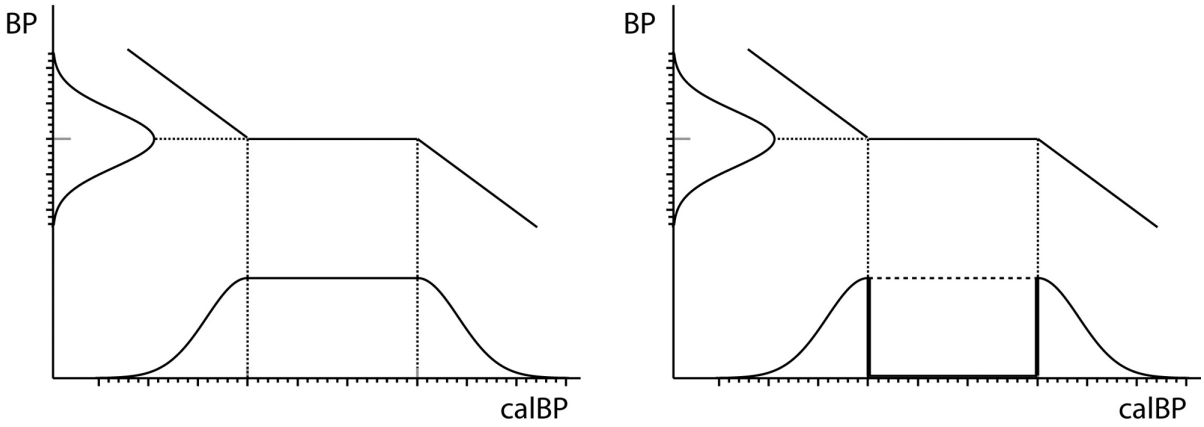


Fig. 4. Schematic application of Bayes' Theorem to the calibration of a Gaussian-shaped ^{14}C-age distribution. For a calibration curve with extended plateau (*e.g.*, 800–400 calBC) there are two (extreme-case) possibilities of transferring a Gaussian shaped ^{14}C-probability from the ^{14}C-scale to the calendric timescale. (Right) The input Gaussian is divided into two halves in an effort to maintain Kolmogorov's definition of probability as number $0 \leq p \leq 1$. (Left) The plateau region (800–400 calBC) is assigned additional probability. (Right) The resulting archaeological chronology contains artificial gaps. (Left) The archaeological chronology contains artificial enhancement. In both cases, a secondary correction of the chronology is required, the correct application of which is impossible since the true sample age remains unknown. Graph redrawn from Weninger (1986.Fig. 11).

analysis can be performed. Quite unanimously, these authors postulate that the future of ^{14}C-analysis will be a continuation of existing Bayesian calibration concepts. Further to this point, Bronk Ramsey (*2009*) notes that although a high degree of refinement is still possible, Bayesian analysis of ^{14}C-dates today is a mature methodology sufficiently flexible for adaptation to future needs. We will return to these points, later.

Terminology

Before continuing, our study at this point requires some terminological clarification. In the mathematical sciences and perhaps most clearly in modern physics, the meaning of the term *classical* is quite specific, but it differs significantly from the use of this term by contemporary Radiocarbon scientists. To clarify this issue: in this paper, we use the word *classical* in the sense it is used in quantum physics. In quantum physics, and related mathematical studies, the term classical is used to describe the striking dichotomy between the purely probabilistic (*classical*) physical laws that govern (or appear to govern) the macroscopic world, in contrast to the curiously unexpected *non-classical* (*quantum mechanical*) properties that emerge when a closer look is taken at the underlying microscopic properties of the same world. Further, when the term *classical* is used in quantum physics, the intention is to provide a contrast with the results of earlier (*e.g.*, 18th and 19th century) physics theory. Let us take as an example (which will reappear later in our study) some physical measurements made on certain paired and constrained variables such as energy/time and position/momentum. For these variables, as stated in the Heisenberg uncertainty principle, it is not possible to simultaneously measure the present position and momentum of a quantum-mechanical wave-particle, at least not to unlimited precision, since any measurement of the position of the wave-particle will strongly influence its present momentum, and vice versa. In particular, regardless of the ingenuity of the physical device that is constructed in an effort to avoid measurement uncertainty, the uncertainty principle also applies to the future values of these variables. This was shown in the so-called '*EPR-Gedankenexperiment*' thought experiment (*Einstein, Podolsky and Rosen 1935*).

The immediate analogy to EPR, and for radiocarbon dating if only *cum grano salis*, is that it is equally impossible to actually correct ^{14}C-data for atmospheric ^{14}C-variability. This might appear possible, since the term *radiocarbon calibration* is often (misleadingly) referred to as meaning 'correction of atmospheric ^{14}C-variability'. However, in reality, there is really nothing out there that could be corrected: we can neither eliminate the disturbing atmospheric ^{14}C-variations by any method, nor do we want to change nature. What is actually meant by the term correction is that we must allow for past fluctuations of atmospheric ^{14}C-levels in the construction of ^{14}C-based age models in archaeology.

The main point in terminology to be made here, however, is that empirical observations exist whose interpretation may be dependent (sometimes unexpectedly) on the order in which they were made. In physics, as is well-known, the existence of noncommutative variables was first discovered in the early 20th century. However, even before Heisenberg, the study of noncommutative systems was an important branch of mathematics. With research interest increasing strongly in the 1950s, and as such parallel to the study of Bayesian statistical theory, today there are research departments with buildings inhabited from top to bottom with mathematicians whose research is dedicated to the study of noncommutative systems. However, beyond the fact that many people (subjectively) experience the properties of noncommutative variables as curious, in more objective terms there is nothing unnatural about them, although we need to familiarise ourselves with their properties. We will take a closer look at corresponding traits of ^{14}C-dates below.

The radiocarbon interferometer

Continuing with such analogies, and as '*Gedankenexperiment*', we now introduce the concept that the calibration system can be interpreted as a hypothetical device which we call a radiocarbon interferometer. As with the many devices developed in physics to study the complementary character of wave-particles, in the following we use the radiocarbon interferometer (RI) to observe what happens when ^{14}C-dates are age-calibrated under controlled conditions (Fig. 5).

For example, we may be interested in studying what happens on age-calibration of a Gaussian-shaped ^{14}C-scale probability when the shape of the calibration curve is varied. To this purpose, we can choose a certain value on the ^{14}C-scale, assign to this value a measuring error, let the Gaussian enter the radiocarbon interferometer, and observe its exit on the calendric time-scale. Such an experiment can be performed either on a macroscopic level by choosing a measuring error that is *large* in relation to the amplitude of the calibration curve wiggles, or else on a microscopic level, by assigning dating errors to the Gaussian that are *small* in relation to the amplitude of the calibration wiggles. All that we require in order to run such experiments is corresponding software. In the present paper, we use software called CalPal (*Weninger, Jöris 2008*).

Radiocarbon calibration at the macroscopic level

A simple model for what we mean by macroscopic level is provided by a linear calibration curve, in which case the calibration operator is commutative. In general terms, on the macroscopic (linear curve) level, we observe that the input-Gaussian is transformed into an exit-Gaussian, *i.e.,* nothing of much interest happens: the input and output Gaussian have the same shape (Fig. 5, Left). However, this situation changes significantly when dates are entered on the microscopic level: We note both a (slight) bimodal change in the shape of the calibrated Gaussian in comparison to the input ^{14}C-Gaussian, as well as an emerging problem of how to define a central value for the calendric-scale probability distribution, here indicated as a vertical line (Fig. 5, right).

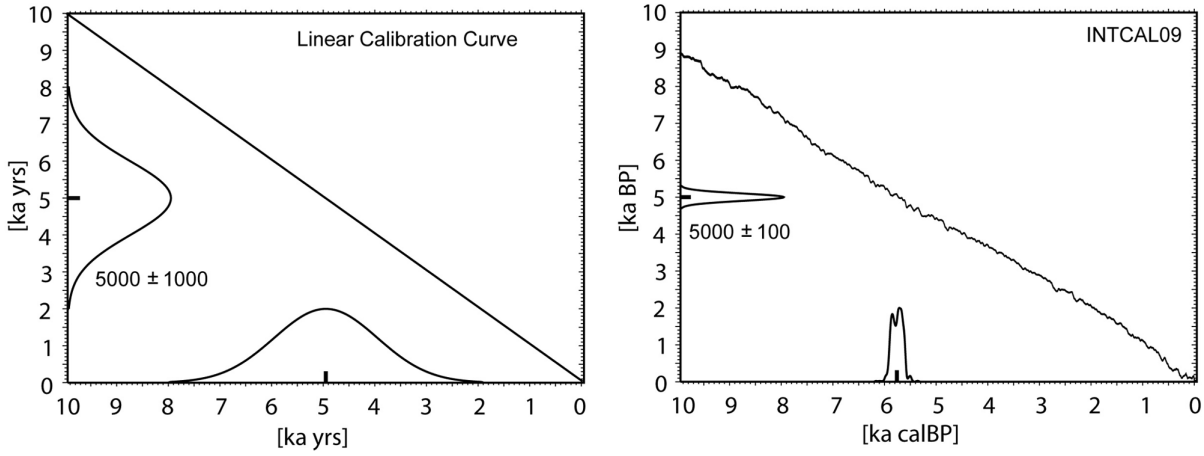


Fig. 5. (Left) Radiocarbon interferometer with linear calibration curve (diagonal line) showing the transfer of a Gaussian-shaped probability distribution from the ^{14}C-scale (vertical axis) to the calendric time-scale (horizontal axis). (Right) Radiocarbon interferometer with wiggly calibration curve. Note the slightly bimodal change of the calibrated Gaussian compared to the input Gaussian, and an emerging (small) offset of the median values (vertical lines) on the calendric time scale.

Radiocarbon calibration at the microscopic level

We define the term microscopic level for cases in which radiocarbon study data show effects (whether in their statistical, geometrical or other properties) that can be attributed to the noncommutative character of the calibration operator. Whether the data show these effects or not is largely a function of dating precision. To this specific point: whereas it is impossible to recognise the atmospheric ^{14}C-variations with single ^{14}C-ages, this proves easier for larger data sets, and easiest when an independent absolute chronology is available for purposes of comparison. In historical terms, the microscopic level that we assign to radiocarbon analysis was already reached around 1970, *e.g.*, with the publication by Hans Suess of the first widely applied treering based ^{14}C-age calibration curve (*Suess 1970*). Using this curve, it was possible for the first time to recognise the existence of secular fluctuations in the global atmospheric ^{14}C-level. The underlying ^{14}C-measurements have standard deviations in the order of σ ~80 BP. However, a later paper by Arie de Jong *et al.* (*1979*) entitled 'Confirmation of the Suess wiggles: 3200–3700 BC' shows that it is no easy task to differentiate conclusively between atmospheric ^{14}C-variability and chance statistical effects in any given data, even for high-precision ^{14}C-measurements (σ < 25 BP). This is further indicated by the many papers published over the years in which searches to identify the atmospheric ^{14}C-fluctuations in the archaeological ^{14}C-data have been undertaken. The invariable problem lies in the differentiation between atmospheric ^{14}C-fluctuations and chance statistical fluctuations of the study data.

By extension, we might even today expect difficulties in recognising the atmospheric ^{14}C-variations in any given set of real archaeological ^{14}C-ages. For real data, the analytical challenge is to evaluate whether the observed data frequencies are due to the underlying temporal spread of samples, the reconstruction of which would be the analytical goal, or not simply due to a) chance statistical effects, b) the folding properties of the calibration curve, and also – perhaps the most difficult to evaluate – c) the noncommutative properties of the calibration operator as implemented in the specific analytical methodology (software) used.

To begin, a clearly reliable differentiation between atmospheric ^{14}C-fluctuations and chance statistical effects is only possible once the study data have sufficient measuring precision. In physics, the effects associated with the noncommutativity of certain physical measurements were only recognised once a microscopic level of sensitivity was reached. The same applies to radiocarbon analysis, where the microscopic level is attained only for data with standard deviations in the range of σ ~80 BP, but the smaller the better. Once the data have this precision, then all sorts of interesting effects become apparent on both time-scales (^{14}C- and calendric), not only for larger data sets, but also for single dates.

List of effects caused by the noncommutativity of radiocarbon calibration

Although all the effects caused by the noncommutativity of the calibration operator can be shown for individual ^{14}C-dates, to simplify matters they are introduced in combination in Figure 6. For individual dates, they can be listed as follows:

- dispersal of the exit-Gaussian and its separation into different components on the calendric time-scale;
- lateral shift along the calendric time-scale of the calibrated median;
- dispersal and lateral shift of the area normalised Gaussian also on the ^{14}C-scale;
- separation of calendric-scale confidence intervals into multiple disjunct regions;
- lock-in of numeric-values for confidence intervals (*e.g.*, 95% or 68%) that are used to abbreviate calendric-scale age distributions, also for multiple disjunct intervals;
- the 'probability values' assigned to these multiple disjunct intervals seldom sum to 100%.

For larger sets of radiocarbon dates, these properties of individual ^{14}C-ages combine to produce the following new effects (Fig. 6):

- clustering of ^{14}C-ages on the ^{14}C-scale;
- clustering of readings on the calendric time-scale;
- attraction of ^{14}C-ages towards predefined intervals on the ^{14}C-scale;
- attraction of calendric readings towards predefined intervals on the calendric scale.

The effects listed above are readily observable both for individual ^{14}C-dates and larger data sets, with no restrictions. In the course of the last three decades, many authors have reported on such properties of ^{14}C-data.

A more complicated issue relates to the question whether it is possible to correct for such effects, as was proposed by Stolk *et al.* (*1989; 1994*) for the widely used ^{14}C-histogram method (*e.g., Geyh 1969;*

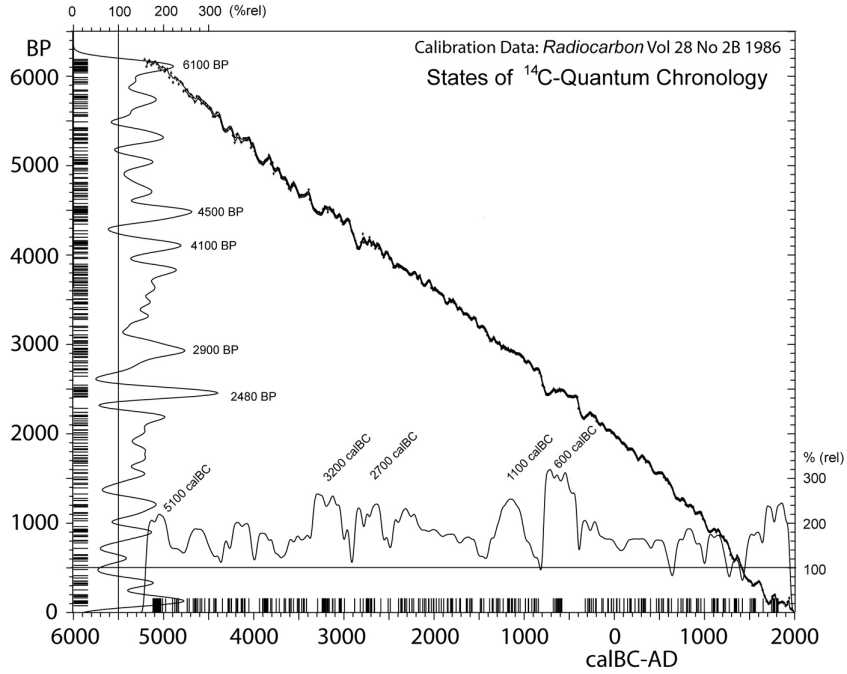


Fig. 6. The Radiocarbon interferometer, showing the folding properties of the calibration curve for σ = ± 50 BP. The initial data entry is a set of N = 700 samples artificially placed in decadel increments on the calendric scale, and constructed to provide an error-free uniform calendric-scale sample distribution (not shown, but would be a horizontal line at 100% rel). The ^{14}C-histogram shows a sequence of peaks (e.g., at 6100, 4500, 4100, 2900, 2480 BP) and troughs (not marked) on the ^{14}C-scale. Following the back-calibration of the ^{14}C-histogram, the calibrated age distribution shows a sequence of related peaks (e.g., at 5100, 3200, 2700, 1100, 600 calBC) on the calenderic time scale. Normalisation (First Step): each individual ^{14}C-Gaussian is divided by the ^{14}C-histogram and the individually shape-corrected ^{14}C-Gaussians are added on the ^{14}C-scale. The result is a uniform distribution on the ^{14}C-scale (vertical line at 100% rel). Second step: on the back-calibration, a uniform distribution is obtained in the calendric-scale (horizontal line at 100% rel). Note: this normalisation is hypothetical and only appears to work correctly (cf. text). The small vertical lines represent the median values of the individual dates on both time scales. These lines cluster at peak-positions on both scales. Calculations based on INTCAL86-data (Stuiver, Kra 1986). Redrawn from Weninger (1997).

1971; 1980; Jaguttis-Emden 1977; Breunig, 1987; Weninger 1986; 1997; 2009; Gkiasta et al. *2003; Collard* et al. *2010*). The underlying idea is to counteract the artificial clustering of ^{14}C-ages, which show up quite clearly in many ^{14}C-histograms, by applying corrections to the histogram shape. This appears possible, since the histogram shape can be calculated to any degree of precision required, for any assumed sample distribution. Hence, it seems necessary only to reduce the histogram amplitude for ^{14}C-values that are known to be artificially enhanced (*e.g.*, calibration curve plateaus) and to enhance the amplitude when the calibration curve is steep (or has few wiggles). In practise, however, this correction introduces an additional distortion of the data frequencies, with an intensity that is typically well beyond that of the initial distortion. This curious problem can be described as follows.

● A uniform age distribution on the calendric time-scale translates into a non-uniform distribution on the ^{14}C-scale. Hence the (entire) ^{14}C-scale histogram can be corrected on that scale, by division by itself, to produce a uniform ^{14}C-distribution. Upon back-calibration, the uniform distribution leads to a uniform distribution on the calendric time-scale *i.e.* the correction appears practicable.

● However, real archaeological data sets contain ^{14}C-ages with admixtures of many different standard deviations. Hence, the necessary shape-correction must be applied to each individual ^{14}C-age. This is technically possible, although it entails considerable number-crunching, since the normalisation function must be calculated and applied to each ^{14}C-Gaussian individually. Alternatively, the shape correction can be performed on the individual age distributions, on the calendric time-scale. But the real problem lies yet deeper: although ^{14}C-histograms may *appear* to be continuous, in fact they show a sequence of discrete events. Hence, in Bayesian analysis we must be cautious in the formulation of prior expectations, since the law of large numbers is not necessarily applicable. If applied, it may produce erroneous results. We further exemplify this particular property of radiocarbon dates in an example below (Fig. 7), and for cases where radiocarbon analysis is taken to what we call the 'high energy' extreme.

To conclude the present paragraph, there are a number of analogies between the properties of ^{14}C-ages and corresponding observations made for other non-commutative systems, *e.g.*, in quantum physics. We therefore feel it is legitimate to introduce the notion that radiocarbon dates are 'quantised'. However,

there is the remaining question as to how the uncertainty principle makes its appearance in the properties of calibrated ^{14}C-data. We address this specific question further below.

Classical Bayesian concepts of radiocarbon analysis

The concepts we are developing in this paper are not necessarily in accord with contemporary notions held by The Radiocarbon Community. As already noted above, according to Bayliss (*2009*), Blockley and Housley (*2009*), and Bronk Ramsey (*2009*), the Bayesian dating methodology already provides a coherent conceptual framework in which essentially any kind of ^{14}C-analysis can be performed. Further to this point, Bronk Ramsey (*2009*) notes that, although a high degree of refinement is still possible, Bayesian analysis of ^{14}C-dates is already now a mature methodology. This is indicated by the wide variety of existing software that allows for increasingly advanced Bayesian ^{14}C-analysis (software: *e.g.*, BCal; BWigg; CALIB; CalPal; OxCal; *cf. Blaauw* et al. *2007; Bronk Ramsey, 1994; 1995; 2009; Buck* et al. *1996; 1999; Buck 2011; Buck* et al. *2008; Christen 1993; Christen* et al. *1995; Danzeglocke* et al. *2007; Jones, Nicholls 2003; Parnell* et al. *2008; Reimer, Reimer 2011; Stuiver, Reimer 1993; van der Plicht 1993; 2011*). We can indeed follow all these many authors in their largely unanimous judgement concerning the usefulness, wide applicability, and flexibility of the Bayesian calibration methodology. However, problems remain as to certain mathematical properties of radiocarbon data, *e.g.*, how to adequately define concepts such as *mean value*, *median*, *confidence interval*, and also in view of what the word probability really means when applied to calibrated ^{14}C-ages. Following some twenty years of research in the development of Bayesian concepts of ^{14}C-analysis, we now step back again to the early 1990s to look at the concepts underlying Bayesian ^{14}C-modelling in its very earliest developmental stage.

Although seldom cited, one of the very first applications of the Bayes Theorem to radiocarbon calibration was undertaken by Thomas R. Niklaus, who – in the early 1990s – was compiling his PhD thesis at the Radiocarbon Laboratory of the ETH-Zürich (Eidgenössische Technische Hochschule) in Switzerland. In his PhD, Niklaus (*1993*) covers technical aspects of the new ^{14}C-AMS-dating method, as well as the development of ^{14}C-age calibration software. With respect to the calibration approach, Niklaus provides two different but complementary formulations of Bayes Theorem. In a first step, he introduces the basic Bayesian concepts in terms of set theory (*cf.* Equation 4), and in a second step, he translates these concepts to achieve an integral equation (*cf.* Equation 5) into which any requested ^{14}C-age distribution can be entered, *e.g.*, Gaussian, in order to achieve a calibrated age distribution.

$$P(X|Y) = \frac{P(XY)}{P(Y)}$$
$$P(XY) = P(X|Y)P(Y) = P(Y|X)P(X) \qquad (4)$$

"*Die Wahrscheinlichkeit von X unter der zusätzlich erfüllten Bedingung Y wird als bedingte Wahrscheinlichkeit von X unter der Hypothese Y definiert. Die bedingte Wahrscheinlichkeit X lässt sich aus der Wahrscheinlichkeit für die Hypothese Y und der Wahrscheinlichkeit für die Ereignisse X und Y berechnen, wobei direkt daraus das Multiplikationsgesetzt {typo: correct would be Gesetz} für bedingte Wahrscheinlichkeiten folgt* (*Eadie* et al. *1971*)." (*Niklaus 1993.68*).

$$f(y|x) = \frac{f(x)\ f(x|y)}{\int f(x)\ f(x|y)\ dx} \qquad (5)$$

"*Entsprechend der bedingten Wahrscheinlichkeit lässt sich eine bedingte Wahrscheinlichkeitsdichte definieren. Für die bedingten Dichten gilt das folgende Bayes'sche Theorem, welches den Zusammenhang zwischen der Wahrscheinlichkeitsdichte für X unter der Hypothese Y und der entsprechenden bedingten Dichte für Y liefert.*" (*Niklaus 1993. 68*).

Again we are interested in mathematical syntax, not in probability semantics. Hence, we cite here the original German translation of Bayes' Theorem as given by Niklaus (*1993*), and have therefore not removed the typo of *Multiplikationsgesetzt* (correctly, *Multiplikationsgesetz*) *i.e.* the product rule for probabilities. This typo is understandable, since Gesetz means 'law', and gesetzt means 'to put'. What is important is the introduction of the conditional probabilities *P(X|Y)* and *P(Y|X)*, in German *bedingte Wahrscheinlichkeiten*. Note, Bayes Theorem is formulated here without requiring the proportional symbol '∝' (*cf.*, above, Equation 2). Interestingly, when applying Bayes' Theorem to provide a mathematical background for radiocarbon calibration, Niklaus (*1993*) apparently regards it as sufficient to reference a standard statistics text-book (*Eadie* et al. *1971*), 'Statistical Methods in Experimental Physics', in which the concept of probablility is introduced as a conditional probability. This is quite in accord with

the approach taken in the present paper. On this point, we make specific reference to Popper (*1934*). After studying in detail the meaning of the term probability in the empirical sciences, Popper concludes – in his *Logik der Forschung* – that probability can always (even in quantum physics) be interpreted as conditional probability.

Due to this restriction of Popper's research (to the 1930s), we feel it useful to provide a more recent perspective. The question of whether – or not – the probabilistic calibration method can be derived from classical probability theory was first addressed in a seminal paper by Herold Dehling and Hans van der Plicht (*1993.244*): "*Calibration of radiocarbon dates involves the transformation of a measured ^{14}C age (BP ± σ) into a calibrated age distribution (cal AD/BC range). Because of the wiggly nature of the calibration curve, the correct procedure to obtain calibrated age ranges and confidence intervals is not straightforward. Mathematical pitfalls can cause calibration procedures to contradict classical formulas. We show that these ambiguities can be understood in terms of classical and Bayesian approaches to statistical theory.*

The classical formulas correspond to a uniform prior distribution along the BP axis, the [Bayesian] *calibration procedure to a uniform prior distribution along the calendar axis. We argue that the latter is the correct choice,* i.e*. the* [Bayesian] *computer programs used for radiocarbon calibration are correct*".

Whereas the first of the above excerpts substantiates the earlier observations made by Stuiver and Reimer (*1989*), Pazdur and Michczynska (*1989*), and Weninger (*1986*), in the second, Dehling and van der Plicht (*1993*) use the word *classical* to differentiate between two alternative calibration strategies. Whilst the first strategy – calibration from the perspective of the ^{14}C-scale – is referenced to *classical* statistical theory, the second – calibration from the calendric time-scale perspective – is referenced to Bayesian theory. In effect, Dehling and van der Plicht (*1993*) implement the term classical to emphasise the significance of the Bayesian approach in comparison to earlier approaches. An alternative use of the term *classical* is noted in Bronk Ramsey (*2009*), who states that whereas classical probability theory is aimed at hypothesis testing, the specific idea underlying Bayesian theory is to promote the development of new ideas; however, he often also stresses the non-classical status of Bayesian theory.

In our view, however, it is neither adequate nor important to differentiate between classical and Bayesian probability theory in this manner. Clearly, the classical theory deserves to be called classical. As goes for Bayes' Theorem, the underlying probability concepts can also be derived from classical theory. In strong contrast to the terminology introduced here by Dehling and van der Plicht (*1993*), in our view the classical version of probability theory is one that uses commutative variables *i.e.* the classical version represents a rather restricted (special) case of a more general formulation of probability theory which is capable of analysing noncommutative variables. The question is how to provide a mathematically acceptable foundation for noncommutative calibration analysis.

Noncommutative Bayesian concepts of radiocarbon analysis

As indicated by a web-search for topics such as *noncommutative quantum theory* or – more directly – in search of the code-word *noncommutative Bayesian probability*, due to the large number of hits, it immediately becomes clear that mathematical research in this field is widely established and rapidly expanding on a global scale. It is nevertheless difficult to find an elementary introduction to these topics. What we must mainly take into consideration, however, is the existence of some flourishing and even controversial discussions in these fields. In the following paragraph, as exemplification, we provide a brief and comparative review of studies undertaken by Miklos Rédei (Faculty of Natural Sciences, Loránd Eötvös University, Hungary) and by Giovanni Valente (Philosophy Department, University of Maryland, USA). Although both authors address the same question, they come up with entirely different conclusions (*Rédei 1992; Valente 2007*).

The question, as initially put forward by Rédei (*1992*) in a paper entitled '*When can noncommutative statistical inference be Bayesian?*' relates to the possibility of extending the concepts of classical Bayesian inference to allow for noncommutative variables. To this aim, Rédei introduces the notion that an abstract rational person (thereafter called 'agent') may exist – at least in theory – who is capable of ideally logical thinking. The agent can change his opinion when confronted with some previously unavailable information. We may quantify the agents' initial degree of belief in event *E* by assigning to it probability *p*. Based on some new information, the agent changes his opinion to *p'* (*i.e. p –> p'*). By ap-

plying Bayes' rule, this change in opinion can be formulated as follows:

$$p'(x) = \frac{p(xE)}{p(E)} = p(x/E) \qquad \text{for all x in S} \qquad (6)$$

To begin, probabilities *p* and *p'* are assumed to be defined on a Boolean (commutative) algebra S which contains events *E* (= Evidence) and other events *x*. We introduce brackets '()', and call the bracketed events (*x*) *conclusions*. Initially, the conclusion (*x*) is supposed to be true (*i.e., p(x) = 1*), but this can change in view of new evidence *E*, in which case the conclusion (*x*) may be conditionalised (*xE*) to provide a revised probability *p(xE)*.

As a '*Gedankenexperiment*' devised to allow for the existence of multiple logically disjunct calibration readings (we may also call *E*) – let us now allow the agent to review his initial degree of belief (*p'*) in the light of the *same* evidence *E*, which is put forward a second time. To allow for this 'new' evidence, we further conditionalise (*xE*) (Equation 5) by including a second *E i.e.* (*xE*) –> (*xEE*) (Eq. 7).

$$p''(x) = \frac{p'(xE)}{p'(E)} = \frac{\frac{p(xEE)}{p(E)}}{\frac{p(xE)}{p(E)}} = p'(x) \qquad (7)$$

Since the agent is not provided with different information, on learning a second time of evidence E, he does not have to change his opinion and therefore concludes that *p''(x)* is identical to *p'(x)*. Although this stability seems to be essential in Bayesian statistical inference, according to Rédei (*1992*) it does not necessarily apply to the case that the study events are defined for a noncommutative algebraic space (*e.g.*, von Neumann). Given such an algebra, in which the derived probabilities depend on the order in which the events are observed, it may well be the case that *p''≠p'* rather than *p'' = p'*. Having reached this point in his discussion, Rédei (*1992*) makes reference to the Takesaki Theorem (*Takesaki 1972*) and concludes there is no satisfactory (*i.e.*, inferentially stable) solution to the problem. In direct analogy, since the events derived from radiocarbon calibration also belong to a noncommutative algebraic space, following Rédei we could now conclude that mathematics does not allow the application of Bayes' Theorem in radiocarbon analysis. As mentioned in the introduction, Popper was never satisfied with the manner in which the Kolmogorow axiomatic theory of probability is founded in (commutative) Boolean algebra. Indeed, in view of the above arguments, his critical notions appear well-founded, all the more since they apparently apply even to the more general (noncommutative) case.

A significant objection to these notions is provided by Giovanni Valente, however, and his arguments are of immediate relevance to our studies. To begin, Valente (*2007*) accepts the introduction of a Bayesian agent capable of ideally logical thinking. We note a change in the agents' gender from male (*Rédei 1992*) to female (*Valente 2007*), which we adopt in the following. The main point made by Valente (*2007*) is that – due to the uncertainty principle – in quantum-mechanical experiments the agent cannot be presented with the same evidence, twice. As such, she is never confronted with the conflict scenario, described above, at least not in quantum physics (the topic of Valente's paper). Apparently, even under extreme logical pressure, the agent can always retain her capacity for rational statistical inference. However, this should not be interpreted such that Rédei's arguments are wrong. Simply, according to Valente (*2007.840*), "*the fact that one cannot have the same evidence twice implies that the stability condition is not applicable in quantum mechanics. Hence ... if the rationality constraint does not apply, one cannot claim its failure*". The analogy to radiocarbon analysis would be that, whenever radiocarbon measurements for the archaeological event-space are replicated, the agent may rationally expect to obtain the same set of ^{14}C-ages, hence – by implication – the same set of calendric time-scale readings.

To sum up, assuming that these arguments (which we have greatly simplified) may be applied to radiocarbon calibration, which we consider reasonable, statistical inference can always (*i.e.* even for noncommutative systems) be formulated within a Bayesian framework.

We raised the question above, of how to obtain a mathematically acceptable foundation for radiocarbon calibration. We conclude this already exists – in Bayes' recipe – and by which we confirm a subset of statements recently made by Bayliss (*2009*), Blockley and Housley (*2009*), and Bronk Ramsey (*2009*) in the 50th Birthday Anniversary edition of the Radiocarbon Journal (Vol. 51, Nr. 1). As it appears, Bayesian calibration analysis is indeed sufficiently flexible to allow for all future refinements in radiocarbon dating, and this includes its necessary reformulation to allow for the noncommutative algebra of radiocarbon calibration. The question remains: are the results of contemporary Bayesian analysis

correct? To be as clear as possible on this point: it is not necessarily the numerical output of available Bayesian calibration software packages that are the immediately critical issue (they can be tested *cf. Steier, Rom 2000*). The crucial question is to identify the (forecast) effects of the uncertainty principle in the properties of calibrated ^{14}C-data.

Technical issues

Pearson theorem

Certainly, there are some technical issues still to be addressed, such as whether or not to assign disjunct confidence intervals to calibrated data. As applies to the calibration of single ^{14}C-ages, we presently prefer to use only the outermost confidence intervals. It is then possible to "*leave the probability distribution within calendrically converted bandwidths to the statisticians*" (*Gordon Pearson 1987. 103*). This is a visionary statement that we (informally) call Pearson's Theorem (for an application, *cf.* below). Nonetheless, the rapidly increasing precision and accuracy obtained for ^{14}C-measurements leads, at the latest when reaching high-precision (σ < 25 BP), to a stabilisation of the often rather ill-defined disjunctness of the multiple calendric-scale intervals. This problem has a practical and a theoretical component. The practical component is that, when applied to lower precision ^{14}C-dates, the obtained list of confidence intervals is often so long as to be unreadable, if not meaningless. For an ideally historical agent (who can anticipate future revisions in the applied calibration curve) the solution would to be to cite only the conventional ^{14}C-ages and corresponding laboratory code, both of which are historically stable variables.

The second component refers to the problem that, for calibrated age distributions which are often multimodal, *qua* statistical theory it is not possible to define a meaningful '±1 σ' (68%-confidence) value. A practical solution is to assign a rectangular probability distribution to the ^{14}C-age, collect a corresponding rectangular distribution on the calendric time-scale, and then apply *Pearson's Theorem* to its interpretation.

'Görsdorf' theorem

For larger sets of data, an analogous notion we call the 'Görsdorf' *Theorem* is to imagine that the curve represents the "*envelope over all possible sample distributions*" (*pers. comm., Jochen Görsdorf*). This theorem has recently been generalised by Franz Weninger and other members of the Vienna Environmental Research Accelerator (VERA) to allow for Bayesian Sequencing. Although mathematically rather demanding, by introducing a large ('infinite') number of differently shaped prior distributions to work around the intrinsic arbitrariness of Bayesian sequencing based on only one prior, it does seem possible to establish robust Bayesian analysis as a safe sequencing method for ^{14}C-dates (*Weninger* et al. *2010*).

A case study in quantum-theoretical Bayesian calibration

Within the context of the present paper, the following two questions deserve more detailed evaluation: 1) Is it possible to reconstruct the unknown sample distribution by shape-analysis of the corresponding ^{14}C-histogram (*Stolk* et al. *1989; 1994*); and perhaps the most compelling question 2) are there any indications, as forecast by the noncommutative character of the calibration operator, that radiocarbon data show properties that may relate to the quantum-theoretical uncertainty principle? A simultaneous answer can be given to these two questions. This is exemplified in a recently published study by James Steele (*2010*) in which a direct comparison between the chronological results achieved using different software (CALIB, OxCal, CalPal) for a set of N = 628 archaeological ^{14}C-ages (*cf. Buchanan* et al. *2011*) is provided (Fig. 7).

When produced with OxCal, (Steele (*2010*) uses Bronk Ramsey (*1995*; OxCal version 4.1b3) and CALIB (Steele (*2010*) uses Stuiver *et al.* (*2005*; version 5.0), the cumulative data distributions show conspicuous peaks on the calendric time-scale around ~12.9 ka, 11.3 ka, 10.2 ka, 9.5 ka calBP (Fig. 7). Analysing the same data with CalPal, these peaks are virtually non-existent. Steele (*2010.7*) comments quite critically on this finding as follows: "*It is immediately obvious that the CalPal output published by Buchanan* et al. *(*2008*) has not summed the calibrated probability distributions in the same ways as Calib and OxCal, and that this will have had a significant influence on any visual inference of peaks and troughs in event density. A similar observation about CalPal's idiosyncratic smoothing algorithm was already made by Culleton (*2008*).*"

Regarding this second reference, Brendan Culleton (*2008.E111*) indeed mentions that: "*... CalPal applies a smoothing algorithm to the summed-probability distribution which levels out several sharp*

peaks in the true distribution. The result is an insensitive, low-fidelity population proxy incapable of detecting demographic change."

However, neither of the two authors provides evidence for their claim that CalPal smoothes away some otherwise important peaks in the calibrated age distribution. An alternative interpretation is to take this example as an *experimentum crucis* to localise the exact position within Bayesian calibration methodology where the effects of the quantum-theoretical uncertainty principle become apparent.

Clearly, the four peaks are an artefact of the specific Bayesian algorithms implemented in OxCal and CALIB, but differently in CalPal. This becomes apparent when the age distributions are plotted against the relevant section of the relevant ^{14}C-age calibration curve (INTCAL04). It then becomes visible that the peaks at ~12.9 ka, 11.3 ka, 10.2 ka, 9.5 ka calBP are all positioned along the steepest sections of the ^{14}C-age calibration curve (Fig. 7, upper).

In OxCal and CALIB, a uniform prior is applied to the data frequencies based on the (plausible) assumption that all calendric ages have equal dating probability. Mathematically, the implementation of this prior involves providing an equal-area normalisation to the dates. Whether the normalisation is undertaken on the ^{14}C-scale or on the calendric scale is of little consequence. Both are technically possible, and in both cases the normalisation corresponds to the same assumption, namely that it is possible to simultaneously correct both the shape of the ^{14}C-histogram and the shape of the calibrated data frequency distribution in order to allow for its distortion due to the non-linearity of the calibration curve. In contrast to this intention, what actually happens as a result of frequency normalisation is that the distortive effects are further enhanced. As such, instead of the intended correction, the frequency normalisation actually over-corrects the data to an unacceptable degree.

The question at stake is on which of the two scales – if any – should the corrections be applied? OxCal and CALIB both make use of a uniform prior on the calendric scale, and apply corresponding corrections to the posterior data frequency on the calendric time-scale. In CalPal the underlying Bayesian assumption is that, similarly, both on the calendric-scale and on the ^{14}C-scale, there exists a uniform prior dating probability. However, since this double *a priori* assumption is neither plausible nor validated by archaeological reasoning, CalPal does not apply the resulting correction to the posterior data frequency, *i.e.* the ^{14}C-histogram is simply transferred from the ^{14}C-scale to the calendric time-scale without further correction (by applying Görsdorf' Theorem *cf.* above). From a (classical) Bayesian perspective, this approach may appear to be contradic-

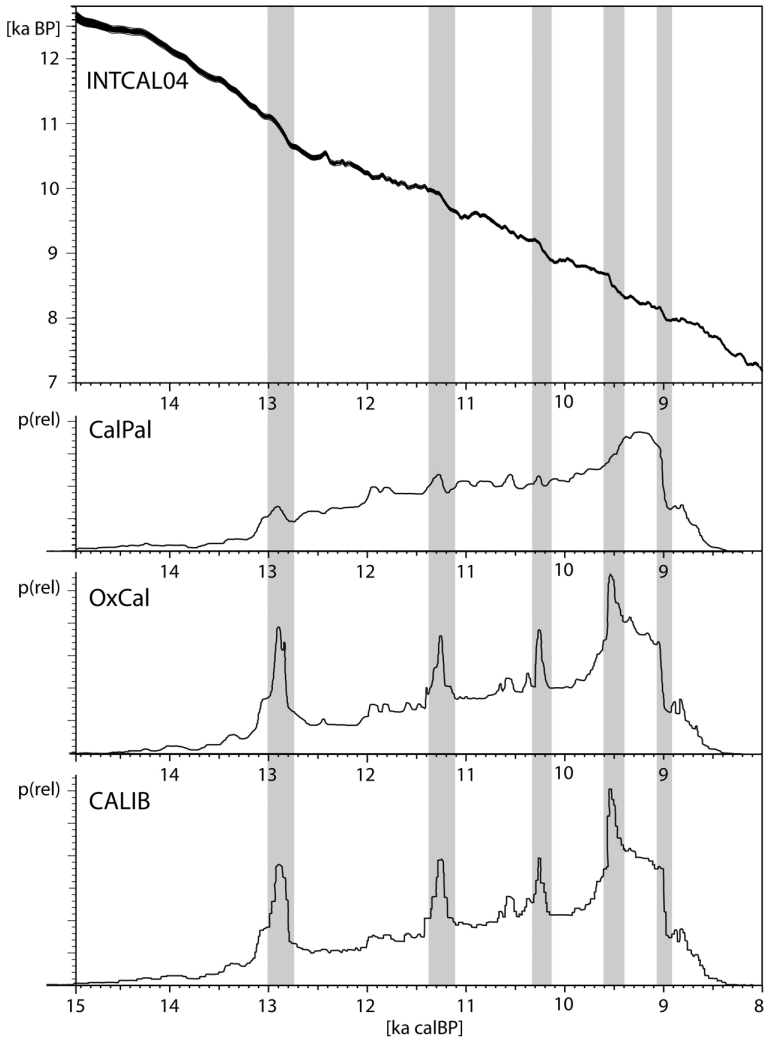


Fig. 7. Cumulative probability distributions, each calculated for the same N = 628 ^{14}C-ages using different software (CALIB, OxCal, CalPal). Shaded areas put focus on the correlation of peaks with steep sections of INTCAL04. Graph redrawn from Steele (*2010. Fig.5*). (Upper) Insertion of INTCAL04 calibration curve (*Reimer *et al.* 2004*).

tory. As argued above, however, the ultimate problem is that there is a noncommutative algebraic relation between the two scales.

In mathematical terms, whereas OxCal and Calib are based on a classical Bayesian approach to ^{14}C-calibration, CalPal applies non-classical quantum-theoretical (QT) Bayesian probability concepts. The uncertainty relation well-known in quantum physics thus re-appears, within the framework of QT-calibration, in the manner that a simultaneously correct measurement (or reconstruction) of data probability functions, on the two time-scales, is not possible. Interestingly, in QT-calibration, the uncertainty relation is one- and not two-sided *i.e.* we can calculate the shape of the ^{14}C-scale frequency distribution perfectly for any given set of calendric-scale events, but not the reverse.

Radiocarbon calibration at the sub-microscopic level

In the following (final) paragraph, by taking radiocarbon calibration to the sub-microscopic level, we turn our attention to the future of Bayesian radiocarbon analysis. Above, we have made repeated use of certain analogies between the noncommutive properties of the calibration operator and of corresponding properties of waves and particles in quantum physics. In extension, and by taking these analogies both seriously and one step further, we may now forecast that radiocarbon dates (alias wave-particles) should actually show further effects, but which can only become apparent when the associated 'energy' is taken to the extremes. In physics, the energy associated with a wave-particle is related to the frequency of the wave, such that the higher the frequency of the wave, the higher the associated energy. In particular, whereas at low energies the wave character of elementary particles is the most apparent, the particle character becomes increasingly more apparent at higher energies. Taken to the extreme, when a certain energy limit is reached, the total energy can – and quite often actually does – allow for the production of new particles. Obviously, we are using such analogies to radiocarbon data really only *cum grano salis*, but nevertheless, it is interesting to apply such concepts to radiocarbon dates. The direct analogy to radiocarbon dates would be to associate their energy-content with the precision of the ^{14}C-measurements. With this analogy, what we would expect is that, when increasingly smaller standard deviations are applied to the ^{14}C-scale Gaussian distribution, the larger and more apparent should be the forecast quantum-theoretical effects.

In a further '*Gedankenexperiment*', again using the hypothetical radiocarbon interferometer as an experimental device, let us analyse what happens when calibrating a Gaussian shaped ^{14}C-scale probability distribution, when only the measuring precision of raw data underlying the calibration curve is taken to an extreme. In this case, the calibration curve could well take on a (hypothetical) zigzag shape as illustrated in Figure 8.

Although the calibrated age distributions show strong oscillations, the forecast particle character does not yet become apparent. In a second '*Gedankenexperiment*', let us therefore simultaneously maximise both the measurement precision of the calibration curve and the precision of the archaeological ^{14}C-ages to be calibrated.

The results are now as forecast. As illustrated in Figure 9 for each of the two independently measured

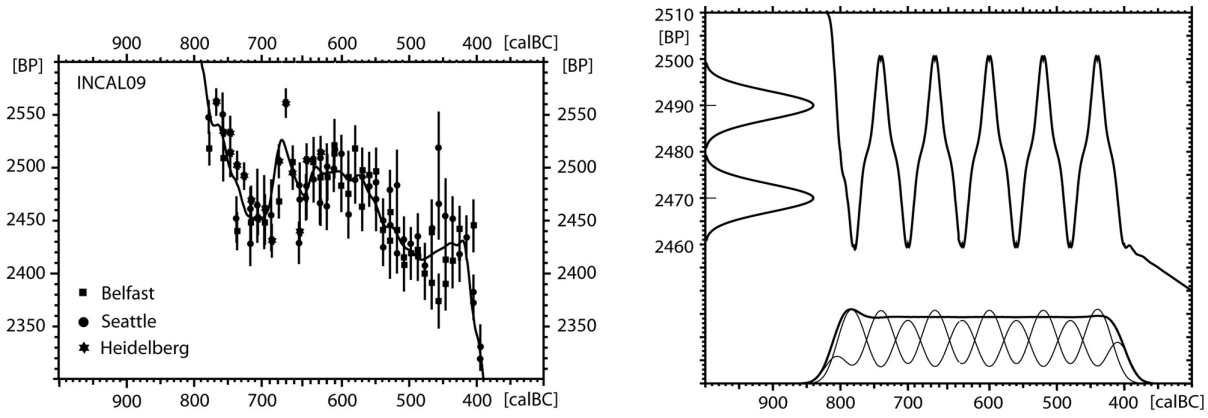


Fig. 8. (Left) Zoom into the presently recommended ^{14}C-calibration curve (INTCAL09) showing underlying raw data of the High-Precision Laboratories Belfast, Seattle and Heidelberg. (Right) Hypothetical zig-zag calibration curve.

'high-energy' ^{14}C-dates (Dates A and B), what we observe is that corresponding readings in the calendric time-scale are now clearly seperated, *i.e.* they show no temporal overlap. The readings attributed to the two different Dates (A and B) also show no temporal overlap.

In effect, at the 'high energy' extreme – although only single (^{14}C-scale) particles have been entered into the radiocarbon interferometer – the noncommutative properties of the calibration operator (and corresponding folding properties of the calibration curve) are now sufficiently strong to produce some previously non-existant particles 'out of a vacuum' on the calendric time-scale.

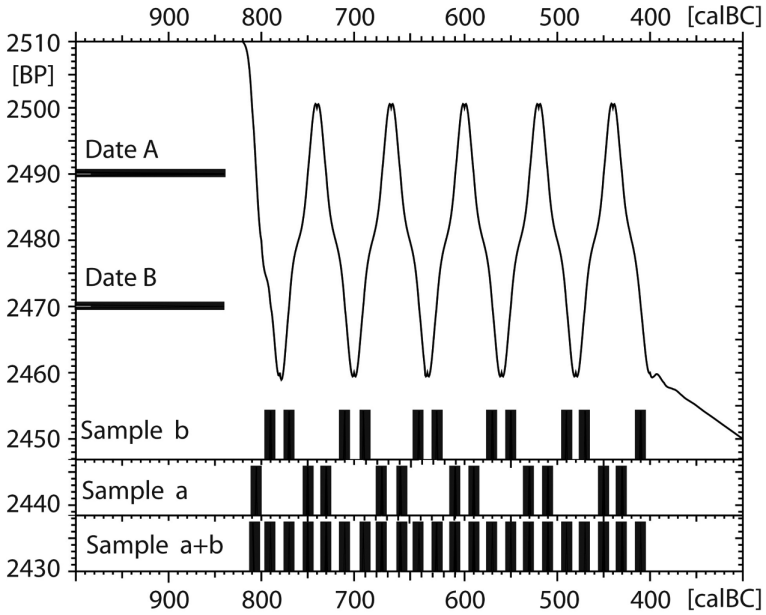


Fig. 9. Radiocarbon calibration at 'high energy'.

We may now re-formulate the question whether – or not – a correction of the ^{14}C-histogram shape (or corresponding shape of the calibrated frequency distribution) to allow for the folding properties of the calibration curve is possible. As already noted above, the correction must be applied to the probability distribution for each individual date. Now that the distribution is reduced to a series of digital 'true-false' (yes-no; 1/0) decisions (Fig. 9), it becomes apparent that the correction – to be applicable – must assign an individual truth-value to each of the alternative readings. Since the readings are mutually exclusive, only one of these values can be 'true'. If this cannot be achieved, the analysis will produce contradictory results, at least if we apply the notion that a proposition is either true or false, and that a third solution does not exist. This would accord with the *tertium-non-datur* of scholastic logic, in which the statement (A and ¬ A) always has the truth-value 'false'. However, in radiocarbon calibration, we must allow for a third possibility: the truth-value assigned to any specific calendric age interval may remain unknown. As it appears, therefore, once the 'high-energy' extreme is reached, the analysis is immediately confronted with a Bayesian inference problem (as described above):

❶ Since there is no temporal overlap of the event sequence (Fig. 9), conditional multiplication of the associated probabilities will *always* produce the value $p = 0$.

❷ Since the number of events greatly increases with the number of curve-wiggles, and in particular, faster than we may (perhaps) be able to provide additional ^{14}C-ages (or other conditional dating information) from the archaeological stratigraphy, perhaps we may never be able to provide a sufficient number of ^{14}C-ages to catch up with the number of readings. Looking back at what Rédei's agent would have concluded when confronted with the same information twice (or even more often), it appears – maybe even more frustrating (*Rédei 1992.2*) – that the noncommutative character of the calibration operator is not even stable, but can vary strongly along the calendric-time scale (*i.e.* within the limits of the non-Boolean algebra as given by the tree-ring ^{14}C-age calibration data set). Fortunately, again following Rédei (*1992.5*), we may disregard this specific problem, since one does not expect mathematical theorems to give insight into the psychological processes of the human mind.

Conclusions

The last '*Gedankenexperiment*' takes us to the very limits of radiocarbon dating. Having arrived at this critical point, we must now emphasise that – even under such extreme analytical conditions – we have no reason to seriously question the applicability of the Bayesian approach to radiocarbon analysis. To be sure, as recently pointed out again by Peter Steier and Werner Rom (*2000*), there are many applications where the prior information necessary to delimit the number of disjunct readings is known in full detail (*e.g.*, in tree-ring 'wiggle matching'). In such cases, the available information can be transformed into a Bayesian mathematical form which is

capable of providing a closed (although not always unique) mathematical solution to the dating problem (*Bronk Ramsey* et al. *2001*). Concerning Bayesian sequencing, the advantage of this method is that it is state-of-the-art; however, it will surely be advantageous to develop graphic methods that allow the user to actually visualise its chronological (quantum) limits. Although a challenging undertaking, this would also provide a solution to the problem that – under certain conditions – Bayesian sequencing is known to optimise the precision of the dating at the expense of its accuracy (*Steier, Rom 2000*).

What archaeologists can do in support of such futuristic efforts is to provide Bayesian sequencing with as much (quantitative) archaeological input as possible, along with correspondingly complete error analysis. Such information may be derived *e.g.*, by careful selection of single-event samples from high-resolution archaeological stratigraphies, by the application of pottery (or other) seriation, by sequencing of samples with well-defined positions in Harris matrices, and – last, but not least – by the development of architectural (*e.g.*, house construction, use, destruction, abandonment) as well as cultural (*e.g.*, demographic) archaeological models. By way of the rule '*the higher the requested dating precision, the more samples must be dated to circumvent the simultaneously increasing number of wiggles*', it may also be necessary to convince funding agencies that such dating efforts are really worthwhile.

Most importantly, however, perhaps we should not overlook the simple fact that it has never been claimed that Bayesian analysis can provide a closed solution to all archaeological applications, under all circumstances. The Bayesian method began as an entirely probabilistic approach some 250 years ago (*Bayes 1763*), was further developed as such by mathematicians to allow for the incorporation of revised probability concepts (*e.g.*, Kolmogorov's axiomatic foundation of commutative probability theory), and has even survived the many (still running) intellectual revolutions in physics and science-philosophy that resulted from the introduction of non-commutative probabilities.

We have formulated our studies in (hopefully) understandable language, such that radiocarbon scientists and archaeologists alike may be interested in their critical evaluation. If there is need for some clearly formulated single conclusion, it would be as follows: In the past, radiocarbon dating probability was taken to represent a value (number) attributed to each interval of the calendric time-scale. We need not change this notion. The new quantum probability is again a number. However, it is no longer valid to assume that the larger this number, the more probable the dating.

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Can we reconcile individualisation with relational personhood? A case study from the Early Neolithic

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ABSTRACT – *In this article, we seek to discuss the tension between relational personhood, characterised by 'dividuals', and the individualisation of persons whose driving force was the creation of new embodied skills learnt to perform the wide range of new tasks which defined the farming way of life. This is, in effect, an exploration of the consequences of a vivid new world itself created by the interactions of a wider variety of individuals with different skills than had ever been seen before, including those required for domesticating animals, potting, building rectangular houses, growing cereals and pulses and polishing stone tools and ornaments.*

IZVLEČEK – *V članku bomo razpravljali o tenzijah med sestavljivim sebstvom, določenim z 'dividualnostjo', in individualnostjo oseb, ki jo določajo nova znanja in spretnosti, povezane s poljedelskim načinom življenja. Gre za raziskovanje posledic dinamike novega sveta, ki so ga ustvarile interakcije posameznikov z različnimi novimi spretnostmi, vključno z znanji o udomačitvi živali, izdelavi lončenine, gradnji pravokotnih hiš, gojenju žit in stročnic ter poliranju kamnitih orodij in okraskov.*

KEY WORDS – *individualisation; personhood; Early Neolithic; Balkans*

Introduction: the absence of individuals

In her contribution to the ground-breaking 'Engendering Archaeology' (*Gero and Conkey 1991*), Ruth Tringham (*1991.94*) famously diagnosed the way she conceptualised people in her earlier accounts of Balkan prehistory as "*...a lot of faceless blobs...*". Tringham's confession had generic application to a wide range of interpretations of the past, including much culture history, most processualist scholarship and not a little post-processualist writing.

The writing of archaeological narratives paying due attention to women has stimulated closer attention than hitherto about persons of different genders and ages (*Gero and Conkey 1991; Gilchrist 1994; Díaz-Andreu, Sørensen 1998; Adovasio* et al. *2007*). One strand of gender theorisation concerned the gendering of task differentiation (*Spector 1991; Sørensen 2000*), although this interest has faded owing to its weak foundations in cross-cultural ethnography. In particular, over the last decade, there has been an explosion of concerns about the principles and practice of being a person – in short, personhood. This debate has generated famous disagreements concerning the forms of personhood proper to studies of the past and the relationship between notions of personhood and modernity (*Thomas 2008; Knapp, van Dommelen 2008*). Nonetheless, the productivity of this debate can be assessed by the large number of new approaches to what is significant about personhood in the past (*Brück 2001; Whittle 2003; Fowler 2004; Kirk 2006*).

A close reading of all of the key papers concerning personhood in prehistory over the last decade has led us to a very similar conclusion to that of Tringham, but in respect of debates over personhood – namely, that very few individuals figure in the debate. Just as post-processualists have blind spots

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in their considerations of identity – in particular status and religion (*Díaz-Andreu, Lucy 2005.8*) – so the blind spots in discussions of personhood hitherto have been social roles and embodied skills. We offer a few examples of the problem.

In Dobres and Robb's (*2000*) collection of essays on agency, the only author who characterises and focuses attention on individual persons is Shackel (*2000*) in his discussion of power relationships in early capitalist communities in 19th century – workers (craftsmen, pieceworkers and wage labourers) and managers. In Whittle's excellent work on Neolithic people, we are encouraged to explore "*a fuller sense of the range of values and goals that motivated different people in different ways, of what bound people together and* what individuals were like *(our italics), of the detail of daily lives...*" (*Whittle 2003.xv*). But the range of individuals mentioned is narrow: ancestors, farmers, foragers, male warriors and women with bad teeth. In Chris Fowler's innovative account of personhood, three examples are given of types of individual – shamans, mothers and priests and the only other type of person mentioned was the 'high-ranking warrior' (*Fowler 2004.4, 95*). In a collection of essays on plural and changing identities, the authors (*Casella and Fowler 2004.2*) list their studies of "*how various axes of race, ethnicity, sexuality, age, class, personhood, health and/or religion contribute to ... material expressions of social affiliations*" – with an obvious gap being roles and personae. Types of individual are discussed in only one chapter – Jamieson's review of caste in AD 17th century Cuenca (*Jamieson 2004*). In parallel to caste, Jamieson discusses the role of the 'chola' – the group of urban, working-class women, including market vendors, domestic servants and washerwomen, *etc.* Otherwise, a random selection of types of individuals mentioned but never discussed includes slaves, prostitutes, berdaches, chiefs, a mining millionaire, workers, swimmers and miners and quarrymen (implied from mines and quarries). In the Durham book on identity (*Díaz-Andreu* et al. *2005*), there is no chapter devoted to roles and skills, although Díaz-Andreu (*2005.27–35*) discusses the gendering of tasks and skills in subsistence and production without ever considering the significance of the tasks themselves. Andrew Jones (*2005*) summarises, but never exploits, the approach termed 'dynamic nominalism' that we shall utilise later in this chapter, mentioning incoming farmers, indigenous hunter-gatherers, kin groups, people with enchained social relations and ancestral populations (*2005.201*) but never discussing types of person in greater detail. A final example comes from Jones' (*2008*) edited volume on 'Prehistoric Europe', in which Borić's (*2008.134*) chapter on households defines the household as 'a collective moral person', but fails to discuss what kinds of social practices went on in those houses and which individuals carried them out. Equally, there is but one reference to a 'potter' – a quotation of K. D. Vitelli's (*1995*) work – in Gheorghiu's (*2008*) chapter on the emergence of pottery, while Ottaway and Roberts (*2008*) give somewhat more detail about individuals engaged with metalworking: mining usually by men; ore processing by women and children; and specialist smelting knowledge retained by specialist males. Hanks' (*2008*) chapter on later prehistoric burials is completely dominated by debates over high-status warriors, while, returning to the Neolithic, Hofmann and Whittle (*2008.287*) hint at the kind of missing person we wish to discuss in a consideration of age, gender and skill differentiation: "*... and indeed any other category of person that there (may) have been.*"

In these and many other recent accounts of relational personhood, the focus is on a narrow range of types of individual, as well as on very general types of individual, without careful consideration of what differentiated one Neolithic woman from another or the difference that living in small homesteads, larger metropolitan tell villages or Tripolye megasites of thousands of persons made to particular persons (*Chapman 2010*). The historical and theoretical reasons for this absence of a vital form of evidence – types of individual – cannot be discussed at length here (but see *Chapman and Gaydarska in prep.*). But overlooking the burgeoning skills of people in the past not only removes a potent source of change from the debate, but also over-simplifies the debate over the creation of relational personhood in prehistory. Here, we identify three key aspects of personhood:

- A whole-life process, changing from birth to death;
- The embodiment of identities based upon relations with places, things and other persons – the creation of 'dividuals';
- The grounding of individual identities in linguistic, social, creative and task-based skills and capacities – the creation of individualised persons.

The twin aims of this chapter are, first, to re-instate the kinds of skills that created individuals at the heart of the personhood debate; and, secondly, to explore the tensions between 'dividual' and 'individualised' personhood in a way that goes beyond the

approach of LiPuma (*1998*). Fortunately, approaches that can help this task have been at hand for over a decade. In this article, we seek to combine dynamic nominalist theory with the operational chain method.

The dynamic nominalist approach

The approach termed 'dynamic nominalism' is, broadly speaking, a form of agency theory developed in the writings of Michel Foucault (*1973; 1979*). The aim is to reconcile structure and agency within a single mechanism through the attribution of a more active role to identity. Ian Hacking (*1995.247–8*) defines the core notion: categories of people come into existence at the same time as kinds of people come into being to fit these categories in a two-way interaction. An example which Hacking draws from Foucault (*1973*) is the way that, owing to the development of new institutional forms of discipline and uniforms, soldiers in the Early Modern period 'became' different kinds of people from Medieval soldiers'. If social change 'generates new kinds of people' (*Hacking 1995.248*), this underlines the essential role of history in nominalism. This approach has recently been used in a study of Sardinian nuraghi by Emma Blake, who maintains that the generative power of self-categorisation means that it is not only a type of agency, but also a structuring device; it is a process which individuals engage in, as well as a framework for other practices (*Blake 1999*). This means that agency and structure come together in the formation of identities, which may be described as the practice of self-description through categorisation. Identity, then, cannot simply be reduced to a function of habitus, but is rather a way of coming to terms with the world and the Other. As Mary Beaudry *et al.* (*1991.154*) note, cultural identity is a public act of mediation between the self and others, through any sign or object that allows a person to 'make his self manifest'. This concept approaches that of Marx' notion of objectification, which has been refined and expanded by, *inter alia*, Danny Miller (*1987*). Miller demonstrates that the object that forms an extension of the person re-introduces the values and status of the object back into the person, through a process termed 'sublation'. These twin concepts clarify the close relationships between persons and objects and their relative status. When we come to discuss the objects characteristically associated with new types of person, it becomes clear that an object of high status can, and often does, transfer its own status to that of its maker or user, while low-status foods cannot but transfer their low status to their consumers.

At the level of the group, identities become a selection of defining characteristics, insofar as to define a group is to map its limits and define it in terms of what it is not, and statuses, insofar as there is a constant re-negotiation of the status of both persons and objects in any cultural milieu. A key cultural resource to which selection is applied is the material world and the places where this is displayed; these storehouses of cultural resources (*Barrett 1988*) provide material for the re-writing of group origins, a process of locating, and valuing, the Other in the past (*Blake 1999*). The self-definition of a group is a selection from one's own history and origins – a narrative of inclusions and exclusions.

This approach differs in two main ways from the agency theories of Anthony Giddens, Pierre Bourdieu or John Barrett. First, in agency theory, agency and structure are distinct, while, in dynamic nominalism, self-categorisation can work only if structure and agency are coterminous. Here, structures are constituted by ingrained practices, which define self and group in quotidian action, but are open to change. This position is consistent with Raewyn Connell's (*1987.94*) criticism of Giddens' ahistorical agency, namely that, where the link between structure and agency is a logical one, the form of the link cannot change through history. Secondly, whereas theorists such as Barrett see human subjects defining themselves through a continuous process of rediscovery of practical knowledge, Blake argues that self-definition channels the process of knowledge acquisition, providing actions with a description which is already part of the process of self-definition. Thus, people and groups are constituted by a reflexive historical process – the creation of categories of people, which leads to the emergence of people who fit the new categories (*Chapman 2000*).

Since terms such as 'social role' (*e.g., Binford 1971*) and 'personhood' (*e.g., Meskell 1999*) have generally been used in rather different archaeological research traditions, it is important to theorise the relationships between these key terms. Lynn Meskell's (*1999.34–36*) differentiation of five aspects of the term 'person' include two aspects of direct relevance to this paper: (1) individuals as distinguished through their actions as artists or craftspeople, or through their use of technological styles (as in *Hill and Gunn 1970*); and (2) representations of individuals in iconography, architecture or documentary evidence (*e.g.*, lists of weavers or metalworkers). Chris Fowler (*2004.4–6*) differentiates 'social identity' – the roles which people held (*e.g.*, shaman, priest, moth-

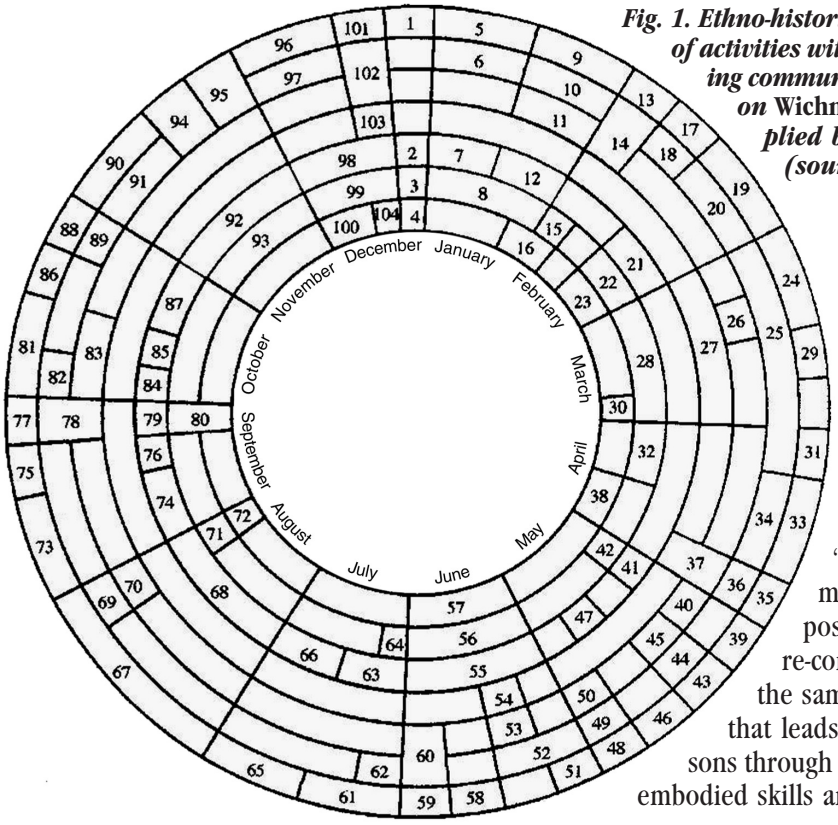


Fig. 1. Ethno-historical account of the annual cycle of activities within a seventeenth-century farming community in Jämtland, Sweden (Based on* Wichman 1968 *and information supplied by L. Rathje, Umeå University) (source* Sørensen 2000.Fig. 6.1*)

distance travel, these practices are the very life-blood of the social relationships through which persons emerge and grow. It is important to underline that we do not adopt an exclusive approach to skills and competences, viz., that an Early Neolithic 'potter' does little other than make Early Neolithic pots. It is the possibility of the combination and re-combination of different skills in the same person, family or community that leads to the individualisation of persons through their distinctive combinations of embodied skills and competences.

er) from 'social personae' – the presentation of any combination of these roles in a specific interaction. His characterisation of personhood as "*the generation of people alongside their social worlds through social technologies*" does not, however, refer to the social identities and personae he discusses at the outset; indeed, what Fowler calls 'social identity' and 'social personae' play little further role in his otherwise excellent book, apart from a mention of "*high-ranking warriors*" (*2004.95*). Nonetheless, the importance in generating personhood that Fowler attributes to the role of bodies, substances, objects and the fields of social relations in which they actively participate indicates that a person's diverse and embodied roles, set within a nexus of quotidian relations, have a significant contribution to make to personhood. Indeed, it is claimed here that it is impossible to draw a complete and nuanced picture of personhood in the past without including the individual skills acquired through the successful performance of social practices.

It is well recognised that the acquisition and development of embodied skills and competences, the linking of actions to knowledge through memory and the effects of training and apprenticeship are key facets of a person's participation in social life. Whether individuals learn from their family, their peer groups, specialists or personal contacts in long-

An example of the proliferation of social practices, each of which required social relationships and individual competences, is Stig Sørensen's ethno-historical account of the annual cycle of activities connected with food production within a 17th century farming community in Jämtland, Sweden (*Sørensen 2000.110–111, Fig. 6.1*; based on *Wichman 1968* and pers. information from L. Rathje, Umeå University) (here reproduced as Fig. 1 and Tab. 1). This list of 104 activities suggested the involvement of different people at different times of the year and at different levels of technological complexity. Many tasks could have been completed only with the shared labour of more than one person, with socially determined agreements on the age- and gender-based division of labour. Sørensen notes that most tasks could have been performed by any adult, whatever their gender.

These Swedish data on agricultural activities reminds us of the importance of technological information from archaeological sources on the operational chain (from the French *chaîne opératoire*). André Leroi-Gourhan (*1964*) introduced the term "*chaîne opératoire*" to lithic studies in the 1960's – at the time, the field was dominated by typological studies, but with new approaches competing for attention. After numerous developments, not least by Jean-Michel Geneste (*1985*), Nicole Pigeot (*1987*)

1 transporting hay	2 shearing sheep	3 teasing wool
4 sewing	5 transporting firewood, fodder and spruce twigs	6 cutting spruce twigs
7 spinning wool	8 preparing hemp and spinning	9 threshing
10 driving for the ironworks	11 working on wagons, wooden containers and nets	12 threshing
13 to the annual Candlemas market	14 transport and cutting spruce sprigs and bark	15 spinning
16 weaving cloth	17 bringing home fodder	18 cutting timber
19 threshing (1-2 days per week)	20 transporting iron ore and coal	21 threshing (1-2 days per week)
22 spinning, reeling and winding	23 weaving cloth or frieze	24 travel to Norway
25 driving for the ironworks	26 hay and wood transporting	27 binding nets and seine
28 hemp spinning	29 travel to the Gregory market	30 flax spinning starts
31 transporting hay and fodder	32 spinning flax	33 end of threshing
34 cutting and transporting firewood	35 transporting manure	36 cutting fence poles
37 sand and ash spread on remaining snow	38 cloth weaving	39 preparing tools for farming
40 grinding grain	41 drying seed grain	42 baking
43 spreading manure	44 ploughing	45 enclosing pastures
46 sowing	47 enclosing pastures	48 weeding the fields
49 enclosing pastures	50 sowing flax and hemp	51 drying and grinding
52 carpentry of hay barns *etc.*	53 weeding the fields	54 closing the field fence
55 linen weaving and bleaching	56 baking summer bread	57 weaving and sewing of different cloths
58 boat repairing, fishing	59 harrowing the fallow	60 preparing scythes, rakes *etc.*
61 harvesting the starrbog in the mountains	62 birch bark collecting	63 harvesting the starrbog in the mountains
64 birch bark collecting	65 harvesting horse hay	66 harvesting horse hay
67 harvesting on hardvalls meadow	68 harvesting on hardvalls meadow	69 leaves harvest
70 possibly harvesting the starrbog	71 leaves harvest	72 possibly harvesting the starrbog
73 collecting the harvest	74 collecting the harvest	75 leaves harvest
76 leaves harvest	77 bringing home the harvest	78 turnips and Swedish turnips harvesting, roots collecting
79 bringing home the harvest	80 turnips and Swedish turnips harvesting, roots collected	81 ploughing of the fallow and fields with straw on
82 threshing and drying	83 grinding grain	84 shearing sheep
85 baking	86 slaughtering	87 knitting socks and gloves
88 clearing of meadows	89 cutting spruce twigs	90 wood, timber and pole cutting
91 cutting wood for handicrafts	92 teasing and spinning wood	93 winter clothes preparing
94 transporting firewood and spruce twigs	95 transporting timber and building timber	96 bringing home starr fodder
97 handicraft	98 spinning wool	99 baking and making food for Christmas
100 cutting spruce twigs	101 travel to Norway	102 transporting and cutting firewood
103 threshing	104 travel to market	

Tab. 1. Ethno-historical account of the annual cycle of activities within a seventeenth-century farming community in Jämtland, Sweden. (Based on* Wichman 1968 *and information supplied by L. Rathje, Umeå University) (source* Sørensen 2000.110–111, Fig. 6.1*)

and Nathan Schlanger (*1996*), the approach is now the mainstream approach to developing rigorous interpretations of Palaeolithic lithic assemblages. In essence, the *chaîne opératoire* seeks to define stages in the fabrication of a product, each of which can be recognised by diagnostic débitage. The refitting of lithic pieces is a fundamental part of this research. Erwin Cziesla (*1990.9–10*) has distinguished three kinds of lithic re-fits: (1) re-fitting artefacts in a production sequence, *i.e.* the reconstruction of core reduction sequences; (2) re-fitting broken artefacts, possibly including non-intentional bre-

Kind of personal skills	Archaeological evidence	Site example
Hunting	projectile points; wild animal bones	Schela Cladovei
Shellfish collecting	shellfish as food debris	Trieste caves
Fishing	fish bones as food debris; fish-traps; hooks; harpoons; carp-stunning batons	Lepenski Vir
Plant gathering	plant food remains; pollen of edible sp.	Ezero pollen diagram
Building	house remains	Lepenski Vir
Plastering	remains of plastered floors	Lepenski Vir
Basket-making	???	???
Grater-board making	high densities of microliths	Lepenski Vir
Bow-and-arrow making	arrowheads	Pobiti Kamani
Flint-knapping	production debris;	Pobiti Kamani
Stone-carving	boulder sculptures	Lepenski Vir
Resource collecting	resources from all zones outside the immediate site locale	Cuina Turcului
Long-distance resource	exotic materials or finished objects procurement	Lepenski Vir
Warring	weapons, weapon-tools and tool-weapons; defensive structures	Ostrovul Corbului
Shamanic practices	totemic rituals	??? but *cf.* Star Carr (UK)

Tab. 2. Kinds of personal skills in hunter-gatherer – fisher societies.

akages; and (3) re-fitting the products of artefact modifications such as axe re-sharpening. The breadth of insights offered by this approach is amply demonstrated in the massive corpus of studies edited by Cziesla *et al.* (*1990*): some of the best technical studies derive from the long-term study of the Upper Palaeolithic, Magdalenian campsites at Pincevent, near Paris (*Bodu* et al. *1990*).

In this study, the operational chain approach is used to identify activities carried out by a person or a group of persons. Using the list of Swedish agricultural activities as a baseline for comparison, it becomes clear that only some of these practices would have been carried out by foragers in the Near East and Europe, while others were more appropriate to Eurasian farmers. In this complex and multi-faceted transition from foraging to farming, the new types of skills and competences developed within the context of unfamiliar social relationships produced new types of individual in this bi-directional process of categorisation. It is now time to turn to the identification of key skills in the Mesolithic and Early Neolithic of South East Europe.

Social roles and categories of individuals I: the Mesolithic

The following series of social identities related to key tasks represents the distillation of the literature on the Mesolithic of South East Europe in successive conference reports on "The Mesolithic in Europe" (*e.g., Kozłowski 1973; Bonsall 1989; Larsson* et al. *2003*). A minimal suite of 15 types of personal skills can be identified (Tab. 2), indicating that individualising forms of personhood were present, if not well-established, in foraging communities.

In the following comments, there will be no attempt to make an essentialising characterisation of such and such a role, nor any claim to a full discussion of persons with such skills as 'hunters' or 'fisherwomen'. These comments are simply pointers in the direction of a whole gamut of complex cultural worlds at which we have space only to hint.

Hunting required long training in the ways of the forest, the behaviour of prey and the co-ordination of individual hunters if working in groups. The reward for success could have been the acquisition of a high reputation, insofar as they were associated with high-status foods (*Sørensen 2000.117*). Their importance was underlined through the sharing of meat back at camp (*Isaac 1978*). Hunters tended to be male and often featured in story-telling, as part of community origin-myths (*Parkington 2002*).

Shellfish-collecting led to the gathering of a sedentary food which was often regarded as tasty if low-status, with the main training relating to its location. This led to the ascription of shellfish-collectors as low-status persons, especially by males in their community (*Claassen 1998*). They rarely featured in community-wide story-telling, but their own group activity often included story-telling. Usually, women and children collected shellfish (*Claassen 1991; 1998*).

Fishing required training in the places where to fish, the habits of the fish and, above all, in patience. The significance of fisher-folk varied with the difference between sea-fishing and river-fishing. Sea-fishing was altogether a much more complex practice, with the construction of seaworthy boats a complex task in itself (*e.g.*, implicated in the Greek Mesolithic by the discovery of Melian obsidian and large fish bones at Franchthi Cave: *Jacobsen 1976*; but see *Perlès 2003*). River-fishing required far less complex equipment. The species of river fish caught made a difference to the prowess of the fisherman: contrast the Lepenski Vir sturgeon, with its large body weight, availability of caviar and symbolic significance (*Radovanović 1997*), with small cyprinids caught in nets from a sluggish stream or dead meander in the Great Hungarian Plain (*Bartosiewicz 2007*).

Plant-gathering was an important practice for the community, because most of a group's food was produced by gathering plants (*Conkey, Spector 1984*). A deep knowledge of local ecology was important in this task (*Watson, Kennedy 1991.184–185*). Nonetheless, the often low status of plant foods could lead to the categorisation of plant-gatherers as low-status persons, again if males dominated processes of social categorisation. These tasks were often performed by women and children (*Zihlman 1989*).

Building gained in importance with the rise of sedentary foragers, although even the construction of seasonal shelters required certain embodied skills which were not shared by every member of a forager community. The importance of builders lay in their creation of the very physical framework of a dwelling – the most intimate place of forager life. The classic Palaeolithic example concerns the mammoth-bone structures made by Gravettian hunter-gatherers in Central and Eastern Europe (*Soffer 2003*). Even more pertinent examples, from the Central Balkans, are the trapezoidal structures of Lepenski Vir, Vlasac and Padina in the Iron Gates Mesolithic (*Radovanović 1996*), whose unusual forms cited the Djerdap landscape in the form of a trapezoidal mountain opposite Lepenski Vir, as well as coeval mortuary practices (*Srejović and Babović 1983.drawings 17–19*). Over a period of 600 years, generations of builders maintained an extraordinary dimensional stability for the trapezoidal house, approaching the harmonious length/width ratio of the Golden Mean, or Fibonacci's series (*Chapman, Richter 2009*). It is inconceivable that each new generation of builders was not inculcated into the symbolic significance and geometric harmonies of the dimensions of the trapezoidal house, as well as the ways in which they were best constructed. A particular mention should be made of the Lepenski Vir plasterers, who were the first foragers in Europe to construct solid, flood-resistant floors using sand mixed with ground limestone heated to over 600° C (*Nandris 1988*).

Basket-making and string-bag-making comprised tasks with long and complex *chaînes opératoires* which involve multiple authorship and where the technology can be seen as a metaphor for society (*Finlay 2003*).

Grater-board making required composite raw materials, including wood, gum and lithic points, indicating long and complex *chaînes opératoires* as with basket-makers (*Finlay 2003*).

Bow and arrow making needed a suite of skills for making arrows and another for constructing bows. Once again, there are long and complex *chaînes opératoires* which involve multiple authorship and where the technology can be seen as a metaphor for society (*Finlay 2003*).

Flint-knapping can, through the *chaîne opératoire*, be differentiated as skilled knappers, novices (children) and moderately skilled workers (*e.g.*, the Magdalenian site of Les Étiolles: *Bodu* et al. *1990*). To the extent that they were capable of making high-quality products, knappers could become high-status persons. Their gender is not clear.

Stone-carving was not common in the Mesolithic period anywhere in Europe, and perhaps the greatest surprise of the Lepenski Vir excavations was the discovery of large boulder sculptures representing humans, fish, the flowing currents of the Danube, meandroid patterns imitating coeval early farmers' pintaderas, and a range of other less decipherable motifs (*Srejović and Babović 1983*). The limestone and sandstone boulders were brought several kilometres from the adjoining Boljetin Gorge, and indicate flaking for approximate shape before grinding, polishing and engraving on the final shape and the motifs.

Resource-collection focussed on a variety of raw material resources, whether local resources or resources from further afield, collected during other foraging or hunting trips. The status of these resources was often positively correlated with distance and degree of exoticity. Once again, the gender of resource collectors is uncertain, but almost certainly varied.

Long-distance resource acquisition represented the extreme of the spatial spectrum of resource acquisition. The persons involved would have been skilled in negotiation and languages and prepared to make long, dangerous trips outside the community territory. If successful, they would have returned with high-status exotics and exotic experiences, cementing their importance as high-status persons who could control sacred resources (*Helms 1993*). The gender of long-distance specialists is unclear, but most prehistorians assume a male identity.

Warring was characterised by the warriors' personal strength and skills and, for that reason, are usually gendered as male. The high concentration of weapons in the Iron Gates Mesolithic, together with the evidence for 'Mesolithic' bone points used to kill other 'foragers', indicates the probability of males designated as 'warriors' along the Danube Gorges (*Chapman 1999; Roksandić 2004*).

Ritual practices involving shamans was an important form of social practice among foragers, with a ritual specialist with powers of shape-shifting and moving between media such as the heavens, the earth and the underworld (*Vitebsky 2001*). There is little doubt that the role of shaman was vital to the social reproduction of the group through the maintenance of proper relations with the ancestors and deities.

This set of types of person is not an exhaustive list of the categorisation of individual skills in the European Mesolithic. Nonetheless, those persons who were identified with the progressive development and ultimate mastery of such skills would have gained a reputation for what they managed to achieve, whether through episodic practices (*e.g.*, making grater-boards), more frequent activities (*e.g.*, food-gathering and shell-collecting), or the construction of enduring frameworks for life (builders and plasterers). To the extent that most individuals in a Mesolithic community would have learnt several of these skills, their social identities would have represented a complex integration of a range of diverse embodied skills. In this sense, foragers would have begun the road to individualising personhood which, later, became more elaborated in Neolithic societies. In the same way, the inter-personal links implicit in all of the multi-authored objects and the enchained links objectified in the biographies of every single artefact would have created and reinforced relational personhood and relational community structures with each day of labour.

Social roles and categories of individuals II: the Early Neolithic

It is widely accepted that the emergence of farming was a fundamental social change in South East Europe (*Whittle 1996; Tringham 2000; Spataro and Biagi 2007*). The emergence of new kinds of social practices arising simultaneously with their definition was therefore of major importance in these times of widespread change (for the emergence of different kinds of skills with diverse individual persons in the 'Climax' Copper Age, see *Chapman and Gaydarska 2006.Ch. 7*). New individual persons of each period would have been created within expanded forms of relational personhood through the impact of new kinds of social groupings, new embodied skills and new raw materials.

A comparison of the types of embodied skills listed in Tables 2 and 3 shows that most of these continued in existence in the early farming period, even if in variant form. An exception appears to be those stone-carvers who produced larger-scale sculptures; smaller-scale ornaments tend to typify the early farming period. Without wishing to go into the detail represented by Sørensen's (*2000*) list (see above, Fig. 1 and attached Tab. 1), it is clear that early farming depended on a far wider range of skills and competences than in the foraging period. These new embodied skills – probably not exhaustive in scope – can be identified as follows (Tab. 3).

Farming consists of a complex set of practices involving new concepts of time and place and new relationships to the land, the soil and often the forest (*Ingold 2000*). Farming requires the co-ordination of intensive labour to produce new resources. These various tasks involve the making and use of new tools (*e.g.*, hoes, sieves, sickles) and new containers (*e.g.*, storage-jars, cooking vessels, serving vessels and, possibly, also baskets and textile bags), especially with the development of brewing (drinking sets). Many of these practices constitute multi-person tasks, each with a long *chaîne opératoire* – only one person of which is the farmer. This set up complex relations of inter-dependency between those participating in the *chaînes opératoires*. Comments follow on only a few selected examples of the most varied of these roles.

Cereal cultivation required experience of a variety of places to select the areas best suited for field cultivation, involving training from an early age; knowledge of the ecological meaning of vegetation on a

Kind of personal skills	Archaeological evidence	Site example
Farming	cultivated grain	Azmashka mogila
Ditch-digging	field boundaries	Ceithi Fields (Ireland)
Hoeing	stone hoe-blades; soil micro-morphological traces of hoeing	Linearbandkeramik
Ploughing	stone or antler plough-shares; soil micro-morphological or macro-traces of ploughmarks	Căscioarele Belgian LBK South Street (UK)
Fence-making	lines of post- or stake-holes round fields	Dubravica
Weeding	purity of archaeo-botanical sample	Chavdar
Baking	domestic ovens	Sofia – Slatina
Brewing	isotopic traces of alcohol; traces of pollen of sweet plants (mead)or honey	???
Animal keeping		
Cow-herding	animal bones	Ovcharovo-Gorata
Swine-herding	animal bones	Ovcharovo-Gorata
Goat-herding	animal bones	Ovcharovo-Gorata
Shepherding	animal bones	Ovcharovo-Gorata
Dairy producing	isotopic traces of milk lipids	Ecsegfalva 23
Cooking	cooking vessels	Schela Cladovei
Potting		
Clay preparing	clay vessels; stored piles of raw clay	???
Vessel forming	clay vessels	Pernik
Pot-painting	decorated clay vessels	Rakitovo
Pot-decorating	decorated clay vessels	Kardzhali
Other crafts		
Figurine-making	fired clay, bone and stone figurines	Azmashka mogila
Figurine-knapping	deliberate fragmentation of figurines	Anza
Spinning	spindle-whorls	Rakitovo
Weaving	loom-weights, mat impressions	Divostin I
Ornament-making	finely made stone and shell artifacts	Kardzhali
Basket-making	basket-impressions in pottery	Endrőd 119

Tab. 3. Additional kinds of personal skills in early farming societies.

potential field in terms of soil conditions and fertility; the observation of flood patterns over time; the growth of previous crops in different places, and a sense of the required duration of the growing season (*Watson, Kennedy 1991*). Small-scale horticulture transferred these locational decisions to the place of settlement, where intensive fertilising and weeding could mitigate any problems of 'natural' fertility. The accumulation of experience and training and observation was not necessarily gendered, although women may well have taken the lead in these tasks.

Hoeing depended on the production of a suitably heavy stone hoe-blade, firmly attached to a wooden handle, and the expenditure of considerable physical energy in breaking the ground for sowing (*Spector 1983.148–153* and Tab. 1). There is no reason to suppose that females and males would not have developed effective hoeing skills.

Ploughing symbolised the integration of herding and farming, with new relations between persons and animals and the potential for cattle to increase their status as never before. Ploughmen required years of training to co-ordinate their actions with their draught animal(s) and the plough itself (*Lewthwaite 1985*), with the castration and training of the draught animal perhaps the most complex task. The making of the plough, using different types of raw materials (*e.g.*, leather, wood and antler / stone / metal), was in itself a specialist task with a complex *chaîne opératoire*: a woodworker working with a stone-worker and a leather-worker, and only then a ploughman. An effective plough-team constituted an important resource that could be shared between households or used in exchange arrangements (for the 'capitalist investment' potential of Bronze Age plough-teams, see *Gilman 1981*). There is a widespread, but not altogether secure assumption that ploughing teams were led by males (*Díaz-Andreu 2005*).

Fence-making required a contrasting range of skills, combining woodland management with carpentry

skills. The coppicing of hazel was a common method of producing the thin, straight rods needed for fencing (*cf.* for Somerset Levels, *Coles, Orme 1977; Rackham 1977; Orme, Coles 1983*). The use of a polished stone axe for reducing the coppiced rods to equivalent lengths, and their insertion into the ground, were less specialised skills. There is no obvious gendering of this task.

Ditch-digging in a range of different soil and subsurface geological conditions (especially abrasive sands and gravels) needed a steady supply of fresh scapula shovels, as well as containers (probably baskets) to remove the loose fill. The year-on-year stockpiling of scapulae tools was therefore essential for this work, unless many head of cattle were butchered as part of related ritual practices. The irregular alignment of ditch segments in British enclosed sites (the so-called 'causewayed camps') has been interpreted as a sign of multiple groups of ditch-diggers, possibly organised at the family level (*Startin, Bradley 1981*). Thus, although the digging of ditches was not necessarily a good way to gain reputation, it required family co-ordination and careful advanced planning (future-orientation) to maintain stocks of tools.

Weeding played an important role in the agricultural cycle; yet the frequent archaeobotanical discoveries of crop-weeds (weeds of cultivation) indicates that they were often only partly successful. The repetitious and physically demanding nature of this task has led (often male) archaeologists to suggest that this work was performed by women and children – often with no real justification (but see *Spector 1983.148–53, Tab. 1; Wright 1991*).

Baking was attested in the majority of, if not all, Neolithic households and was responsible for early and simple forms of bread. Before the so-called 'bread wheats', the Neolithic norm would have been unleavened bread that rose little, if at all, in baking (*Wood 2000*). The significance of invariably carefully constructed ovens in Neolithic houses may have related as much to the heating of the home as it did to the baking of bread and other foods. This role may not have been recognised as anything but one additional household task, with the assumption that it was mostly performed by women.

Brewing depended on the production of cereals for their own task – the creation of alcoholic beverages of widespread use for individual and social pleasure, as well as ritual concoctions and medicinal potions (*Braidwood* et al. *1953; Sherratt 1987*). The key reliance on potters capable of producing large coarse ware containers, as well as small fine ware cups and mugs, shows the close linkage between brewers, farmers and potters. The gender of brewers is not obvious, but was probably linked to household production.

This brief summary of the requirements of a few selected farming practices suffices to show that almost every individual task could be sub-divided into further sub-tasks without whose accomplishment the 'main' task could not be completed. All of these tasks, with the exception of weeding, required the prior production of tools or facilities, each in turn with the implication of raw material procurement from near or far. It is the scale of coordination that puts the growing of crops and their varied usage at the heart of a mixed farming economy.

Animal husbandry was part and parcel of a new kind of relationship with animals – their inclusion within households as something more than hunks of dead meat from the wild wood (*Jones, Richards 2003*). Their herding involved long-term relationships with shepherds, goatherds, cowherds or swineherds. The main element of a herder's life was the devotion of a lot of time to their animals, leaving them free to collect resources, knap flint, grind stone, carve wood, *etc*. If the keeping of animals involved even limited seasonal mobility, the herder would have travelled to a wider range of places than most of the rest of the community. The use of secondary animal products – especially milk – would have increased the significance of the herder, linking them to other members of the community (ploughmen, dairy producers, *etc.*, *Sherratt 1981*). The high-status products that animals yielded were not necessarily correlated with high reputations amongst herders, whose gender was variable.

Dairy production, which included cheese-making as well as the production of milk, yoghurt, curds, *etc.*, (*Sherratt 1981*) constitutes a good example of quite new types of person, performing new daily tasks (milking and dairy production) which depended on the secondary products of potentially three animals – cattle, sheep and goats. The production of high-quality cheese would have been dependent upon regular supplies of salt from near or far (*Chapman, Gaydarska 2003*). While most dairy products would have formed local networks of consumption, there was the potential for the exchange and transportation of cheeses. The gender of dairy producers is hard to determine, but these tasks were linked

to the home and often assumed to have been performed by women.

Cooking was a vital part of Neolithic life styles, which were characterised by the production of a wider range of edible foods and an expanded range of culinary techniques than previously (*Wood 2000*). These changes added to the potential for food-sharing and hospitality in the early farming period, when cooking both outdoors and indoors was often linked to other social strategies (*Halstead 1999*). Each new foodstuff offered the opportunity for new combinations of foodstuffs in a single dish, whether based on cereals, pulses, wild plants, meat or fish. The gender of cooks is not clear, and it may be assumed that both males and females cooked for both domestic meals and feasts (*cf. Spector 1983.148–53, Tab. 1*).

The picture from animal husbandry and the use of animal products reinforces the pattern of multiple, overlapping tasks performed more often than not by groups of related persons. The accomplishment of such tasks was coterminous with the creation of social structure itself through daily interaction.

Pottery-making

At the beginning of the Neolithic, pottery-making was a new craft skill for most regions in Europe. Vitelli (*1995*) has argued that the high status of these new objects connoted high status for the persons who made them. However, the *chaîne opératoire* is bulk-dependent. The production of a few vessels *per annum*, as in the Greek Early Neolithic at Franchthi Cave may required one high-status person (*Vitelli 1995*), while the preparation of many vessels *per annum*, as in the Balkan Early Neolithic (*Chapman 2003*), would have needed the collection of much larger quantities of clay, temper and pigment, as well as the shaping, firing and painting of many more vessels. This *chaîne opératoire* could potentially have benefited from co-operation between different persons of varying status (for a discussion of production stages, see *Wright 1991; Gheorghiu 2008*). The analysis of many Balkan pottery samples has shown that, without exception, local clay sources were used in the Early Neolithic (*Spataro 2007*). Thus, increased production would have led to complex relations of inter-dependency (as with farming), which were interwoven with local consumption links to other social practices (*e.g.*, ritual, farming, *etc.*). There was a high potential in pottery-making for the materialisation of broader exchange networks and links to other worlds.

Figurine making and knapping were almost certainly performed by part-time craftspersons in the early farming period, because of the low incidence of figurines, whether anthropomorphic or zoomorphic (*Nanoglou 2008*). Spataro's (*2007*) results on the use of local clay for pottery were replicated for the sources of clay for figurines. It is possible that household production was the norm, given the combination of little standardization of either major category of image and the small numbers produced. The equivalence of potters and figurine-makers is not necessarily certain, since the shaping of the two types of object is clearly very different. The deliberate breaking of Early Neolithic figurines has been well attested (*Chapman 2000a; Chapman and Gaydarska 2006*) – a task that is not necessarily much easier than their making. Experimental studies showed that the accidental breakage of figurines was rare, since the lightweight nature of the objects meant that the impact from falling was minimal (*Chapman* et al. *n.d.*). The making of some anthropomorphic figurines in three parts – one lump of clay for the body and one for each leg – reinforced the cyclical process of making, using, breaking, reusing and deposition; breaking along the lines of weakness was therefore highlighted. The roles of the makers and breakers of figurines were probably performed at the household level, with household ritual the main context for figurine use and re-use.

Spinning and weaving have now been attested from the Upper Palaeolithic (*Soffer* et al. *2000*), so that their 'appearance' in early farming communities can more accurately be termed a 're-appearance', although there is scant evidence for Mesolithic spinning and weaving. The symbolism of spinning and weaving in Post-Classic Mexico "*defined female identity as one source of control over reproduction and thus as a basis of female power*". Such symbolism "*created a set of meaningful associations that united women as an interest group*". The tools of spinning and weaving (spindles, spindle-whorls and battens) acted as symbols of this female power (*McCafferty, McCafferty 1998.213, 223*). It has been demonstrated for the Iron Age that spectacular amounts of 'free' time were required for spinning enough yarn for household clothing (*Tuohy 2000*), and there is no particular reason to discount this requirement of time in early farming households. Lines of loom-weights within Early Neolithic houses (*e.g.*, Tiszajenő: *Selmeczi 1969*) suggest that many households would have made their own cloth and/or clothing. There is still a debate – embedded in the secondary products issue – over the materials

used for early clothing – whether linen and leather (*Sherratt 1981*) or linen, leather and wool (*Chapman 1982*). Whatever the solution, it is agreed that the more elaborate the clothing, the higher its status. The problems with assessing the quality and ornateness of early clothing make it difficult to assess the date at which the high potential for the exchange of cloth was realised. The ethnographic data favour the gender of spinners and weavers as more probably female, but there is no reason that this should apply to the Balkan Early Neolithic.

Stone ornament-making was effected by persons whose skills were high, but not often employed, suggesting that there is a high probability that they were part-time specialists. Almost by definition, the prestige goods that were made meant that the ornaments created high-status persons in the process of making. The exotic nature of the materials used meant that ornament-makers were heavily dependent on regional, if not inter-regional, exchange networks and, most likely, on long-distance specialists. It is also possible that they were long-distance specialists themselves. Their finely-tuned skills were not found in every household and possibly not even in every community; it seems improbable that there was more than one person in a community (*e.g.*, the Early Neolithic Galabnik community in Western Bulgaria, where exquisite nephrite ornaments were made (*Kostov, Bakamska 2004; Kostov 2008*)). The links between ornament-makers and figurine-makers rarely overlapped; an exceptions include the marble anthropomorphic figurine from Azmashka mogila (*Georgiev 1965; Kalchev 2005.photo on p. 37*) and the marble figurines from Kovachevo (Blagoevgrad Museum). There is no evidence as to the gender of ornament-makers – rather a high level of training, probably in the family of older ornament-makers.

Traditional skills in the Early Neolithic

The quantity and diversity of new roles and potential statuses in the early farming period should not cause us to overlook the traditional skills inherited from the Mesolithic period. At least 15 categories of skills can be identified.

The role of **hunting** was only partly replaced by that of herding. In a recent evaluation of the status of hunting in the Körös culture of Eastern Hungary, Bartosiewicz (*2007a*) observed that those sites with high counts of wild animals in their faunal spectra had the smallest bone assemblages and that, in assemblages comprising over 10 000 bone elements, there was a high proportion of domestic animals – upwards of 90%. Nonetheless, the prey that hunters captured were still valued foods, converting hunters into persons of repute. We should also not forget the significance of specific wild animal parts for some of the most intimate aspects of domestic life: auroch metapodia for spoons in Hungary (*Nandris 1972a*) and wild boar bristles for painting the finest pottery decoration in Bulgaria (*Chapman 2011*). There were probably groups of hunters who were part-time specialists, requiring the integration of one or two members from any given household.

As with hunting, the skills required for **plant-gathering** could have only partly contributed to those necessary for farming, leaving a generalist practice of variable status effected by each household.

Fishing and shellfish-collecting continued to play the same role as in the Mesolithic, as producers of different food for special occasions. The seemingly ubiquitous decline in marine and freshwater protein contributions to the diets of early farming communities (*Bonsall* et al. *2000; Milner* et al. *2004; Honch* et al. *2006; Smits* et al. *2010*) means that fish and shellfish consumption was limited to once per week for the dietary signal to be absent. The status of such fisher(wo)men and shellfish-collectors, which were embedded in household practices, is more difficult to estimate than the gender – probably female for shell-collectors and male for fisher-folk (see above).

Building formed another suite of different embodied skills requiring collective mobilisation and coordination. Although the houses of the Iron Gates Mesolithic demonstrate that building was already a skilled activity among sedentary foragers, with particularly innovative skills in floor-plastering, there is a great expansion in the scale of building, and in the size of buildings, in the Neolithic. Dušan Borić (*2008*) has viewed the Neolithic as a change from dwelling to building. Experimental work studies on Neolithic house building (*e.g., Cotiugă, Cotoi 2004*) shows that the time taken is equivalent to that required to build a small megalith (viz., 800 people/hours for a single-roomed 8 x 6m house: *Startin 1978*; *cf.* 6900 people/hours for the earthen long barrow of Fussell's Lodge: *Startin and Bradley 1981*). This task is a multi-stage process, beginning with the assembling of materials (clay, water, temper, wood), the choice of place, and all the necessary pre-building rituals, and only then proceeding to the actual construction by a team of persons. At a minimum, this includes woodworkers, wattle-makers or reed-

workers, plasterers and painters, and thatchers, as well as *their* helpers.

Woodworking depended upon the collection of both large timbers from ancient trees for main structural members and smaller (? coppiced) posts for internal and external fittings. The range of polished stone tools available for these tasks included axes, adzes, wedges and chisels. However, the almost total absence of large woodworking tools in the Balkan Early Neolithic may have hindered the use of really heavy timbers[1]. This technical issue may relate to the prevalence of low clay wall settings supporting thin posts in Bulgarian Early Neolithic houses (*Nikolov 1996*). The creation of larger tools from the Mature Farming period onward, and in the Linearbandkeramik further to the North-West – notably the *Schuhleistenkeil* (*Burnez-Lanotte 2001*) – facilitated the manipulation of large tree-trunks for house construction.

The construction of exterior walls for early farming houses was effected in one of two ways. For longer-term structures, **wattle-making** was a critical part of the house-building effort, for the infilling of wall area between timber uprights depended on the cutting of thin poles and their vertical and horizontal interweaving (*e.g.*, the illustration of later Neolithic wattle walling from Divostin Phase IIb: *Bogdanović 1988.Fig. 5.25*). The making of these poles on any large scale would have involved the coppicing of such species as hazel (*Corylus* sp.) as one form of woodland management. Both of the rare pollen diagrams with detailed vegetational information for the vegetation of early farming communities – Ecsegfalva – Kiri-tó and Sarló-hat, both in Hungary – indicate that hazel was an increasingly frequent component of the lowland vegetation (*Willis 2007; Magyari 2002*).

Despite the ready availability of hazel at Ecsegfalva 23, the main exterior walls of these light structures were constructed through **reed-working** by the insertion of bunches of reeds into the spaces between small timber uprights (*Carneiro, Mateiciucová 2007*; *cf.* the use of reeds in the houses at Early Neolithic Nea Nikomedia, Northern Greece: *Rodden 1962*).

Plastering made an important contribution to the solidity and impermeability of exterior and interior walls of early houses, as well as their floors. The role of the plasterer was closely related to that of the potter, at least in terms of the early stages of the potting *chaîne opératoire*. The analysis of floor plasters at Ecsegfalva 23 showed the use of dung as well as clay for reed-tempered plaster (*Carneiro, Mateiciucová 2007*). These materials would have been mixed with water to provide the correct consistency. Application proceeded by hand to all of the treatable surfaces. The insulation of the house against rain, snow and wind, as well as the retention of heat generated by cooking, fireplaces and body warmth – whether human or animal – were all important effects of plastering. In addition, the creation of a smooth, regular floor surface was a marked improvement over a stamped mud floor, not least in enabling the cleaning of the house and the removal of elements that contributed to air pollution (*Roberts n.d.*). This role was not a particularly specialist task and could probably have been completed within the household.

House-painting was probably achieved by pot-painters who applied their skills, in particular the collection of the pigment and its mixing with a binder, to the interior and perhaps exterior walls of houses. This may have been a more specialist role than that of plastering, because of the exotic nature of some of the pigments.

Thatching would have completed the in-filling of the roof of the house by the insertion of thatch or reeds between the roof timbers. The work required the construction of light ladders for access to the upper roof space, as well as the collection and bundling of large quantities of thatch or reeds. Once again, this was not a specialist role and could have been performed by members of the household (for an account of Medieval and later thatching, see *Moir and Letts 1999*).

These complex tasks demonstrate that building is, above all, a collective practice involving perhaps all or at least half of the community. This major task required a single co-ordinator – perhaps the builder, per-

1 With only a few exceptions, there is a general lack of large working axes in the Greek, Balkan and Dalmatian Early Neolithic. The excavated material from Early Neolithic settlements displayed in the Town Museum, Vratsa (N. W. Bulgaria) includes the largest collection of working axes longer than 15cm known to us. It is possible that a proportion of the large working axes in the reserve collections in the Regional Museum of Haskovo (S. E. Bulgaria) date to the Early Neolithic, but these axes are almost entirely surface finds. In addition, the large polished stone axes from Early Neolithic Nea Nikomedeia have virtually no wear traces and were likely to have been special deposits (*Rodden 1962*). The implication is that most activities involving breaking ground prior to sowing would have been carried out using wooden digging-sticks or hoes. It is only after the start of the Middle Neolithic in Greece, the Balkans and Dalmatia that large working axes become more common and were clearly used for heavy agricultural and/or woodworking activities.

haps the village leader or household leader – who ensured that the design of the house complied with traditions. Christopher Alexander (*1964*) has shown that designs in vernacular architecture were based on copying previously successful structures. This indicates that the successful builder – coordinator was experienced in construction, having observed and participated in the erection of many other structures.

Flint-knapping continued to play a key role in tool production in early farming communities, although the forms of the tools in this period stood in marked contrast to those of the Mesolithic. The key innovation of the Early Neolithic was macroblade technology, in which raw materials of excellent quality – usually honey-coloured flint from Bulgaria – were used to produce macroblade cores from which long blades were pressure-flaked using a fixed, heavy-duty wooden facility, perhaps as large and complex as a rural olive-press (*Perlès 2001; Gurova 2004; Manolakakis 2005*). Such a facility was restricted to one per village, if not one for a network of villages, indicating a productive specialisation which created high-status persons. Medio- and micro-lithic production was also part and parcel of early farming lithic technology, but was clearly far less specialised. It is unlikely that either category of lithic producer was a full-time specialist in the Early Neolithic.

Resource collecting was, if anything, more important in the Early Neolithic than in the preceding period, by dint of the much wider range of materials needed for tools, ornaments, weapons, clay objects and building materials. It is likely that more people, rather than higher-status persons, were needed to accomplish this vital task.

Long-distance acquisition of resources also increased in significance in the Early Neolithic, given the greater importance of exotic raw materials, especially ornaments (*Chapman 2008*). The context of their travels comprised the inter-regional network of stylistic connections materialised in coarse wares, vessel shapes and technologies, and a wide range of non-ceramic traits such as rod-head figurines, pintaderas, slotted antler sickles, bone spoons and tomato-shaped loom-weights (*Nandris 1972; 1972a*). Such multiple, specific traits indicated a widespread sharing of lifeways (*Chapman 2003*), with kinship links and exchange networks representing the most obvious means of sustaining these stylistic similarities.

Warfare has been less well attested in the Early Neolithic of the Balkans, in general, than in the Mesolithic of the Iron Gates gorge (*Chapman 1999*), with a marked reduction in the frequency and diversity of tool-weapons and weapon-tools. But this category of person was still present, probably related to specialist hunters.

This review of the traditional skills that were found in early farming communities suggests three conclusions: (1) the practices which were materialised in these roles and skills show a considerable degree of continuity in *habitus* between the Balkan Mesolithic and the Balkan Early Neolithic; (2) the formation of individualised personhood in the Neolithic was not inherent in the Neolithic alone, but, rather, an elaboration of Mesolithic forms of individualised personhood; and (3) the combined total of traditional and new skills is a substantial figure. What are the implications for relational personhood, for households and for early farming communities of this striking diversification?

Discussion

The tension between relational personhood and increasing individualisation growing out of a wider range of individual embodied skills is highly relevant to Hernando's general, social evolutionary model for the growth of what she terms 'independent individuality' for persons of either gender (*Hernando n.d.*). Hernando proposes a three-stage model: a first stage, which is dominated by relational personhood; a later, second stage, conventionally dated to the Metal Ages, with the emergence of hierarchical relations and complementary gender roles; and a third, even later stage, not dated by Hernando, in which 'individual personhood' gradually increases for males, while females maintained relational identities for a much longer period. While at pains to emphasise that this is a general social evolutionary model, and not necessarily characteristic of any specific time/space development, Hernando stresses the importance, in male individuality, of datable innovations such as the beginning of writing. She also maintains that each culture has a different blend of degrees of individualisation, on a scale ranging from strongly relational to strongly individualising.

For the present authors, there are two obvious issues for what is an attractive general model with genuine insights into long-term social processes: (1) there is no real attempt to anchor the model in specific time-space processes, developments, and historical contexts; and (2) the shift from relational to individualising personhood is never explained. Neither

of these weaknesses is necessarily fatal for the overall model, since it is possible using the approach outlined in this article to provide some robust chronological pointers for the emergence of individualising tendencies. This emergence does not, indeed, date to the Metal Ages, but can be related to the late foraging period (Mesolithic and probably Upper Palaeolithic), with an elaboration in the early farming period.

In terms of the relationship between personhood and the creation of new skills, it is important to recall that there are approx. 25 new categories of skills in the Early Neolithic – far more than in the Mesolithic – as well as at least 15 traditional skills. This provides an impressive range of close to 40 types of embodied skills and social roles for the creation of a new range of individualised persons. It thus seems obvious to us that an important aspect of each individual's sense of personhood consists of these combinations of embodied skills. We should emphasise that this is not automatically an argument for early forms of specialisation – rather that few persons would have been considered exclusively as a shepherd or as a milkmaid or as a warrior. Here, in this complex world of social and physical skills, personhood should be considered as multifaceted and subject to a wide range of relationships and embodied skills, both of which contributed to an individual's *persona*. We seek to reconcile the *modus operandi* of relational personhood (dividuals) with the encapsulation of new skills and practices in specific human bodies (individualizing results).

The child's development of new skills would have depended upon training by the members of the family and the household, in which gradual increases in body strength, linguistic competence, and hand-eye co-ordination, as well as greater experience of the task in hand, would have led to improved performances (*e.g.*, in making small pots). These improvements would, in turn, have strengthened the relations with other members of the family and household, emphasising the key kinship elements of the child's relational personhood. With time, the family and household would have identified in the child those skills that had further potential for growth (*e.g.*, keen interest in plant-gathering) and those where little could be done (viz., little talent for flint-knapping). Doubtless, households with individual adults with skills in stone figurine-making or bone-working would have led to vertical transmission of similar skills (*Shennan, Steele 1999*). But, at the same time, those children with similar talents would probably have begun to be more closely associated with each other, forming an additional field of peer-based learning (horizontal transmission) with important implications for dividuality. In the teenage years, the increasing spatial range and complexity of the person's social world would have led to greater variations in personal mobility, with a tendency for greater male than female mobility and therefore a tendency for gendered contrasts in the creation of relational personhood through different exposure to types of person both near and far from the home settlement (*Hernando* et al. *2011*).

In the case of cultural norms where the marriage of two young adults led to the setting-up of a new home, this creation formed the starting-point for a new cycle of skills-acquisition. The building of the house and the emergence of a new economy at least partially based on that household, as well as relations with other households, both raised the question of how the young couple could possibly acquire the wide range of requisite skills for the development of a successful household. The cultural transmission of these new, and often highly diverse, skills led to multiple new social relationships, which became increasingly important in the further development of relational personhood. In some cases, the adult members of the household did indeed develop their own embodied skills (*e.g.*, in cooking, dairy production, animal keeping, and flint-knapping), while other persons with skills not acquired within the household were brought into close relations with the family (*e.g.*, figurine-makers and nephrite ornament-makers) and the new couple's own families added their own experience and skills base (*e.g.*, weaving, potting and thatching). The successful recreation of the previous generation's knowledge and skills base may have been a critical factor in the survival of the new household. Both enchained relations with many other persons and the development of embodied skills within the new household had important contributions to make.

The average age of death for Neolithic persons meant that only certain individuals reached the age of biological maturity (*e.g.*, 40 years). Joanna Appleby (*2010*) has discussed the many different life-processes affecting older persons, including the illnesses from which they suffered, the physical changes characterising degeneration, but also, more positively, the earlier relationships and community histories that they embody. However, she does not discuss (at least in this paper) the ways in which degeneration may have hindered or prohibited the continuation of tasks requiring a certain level of bo-

dily skill and/or strength. The survival of individuals to over 60 years (*e.g.*, in Vlasac: *Nemeskéri 1978*) may have required new forms of enchained relations of care and food provision in which the wider families took responsibility for the aged. The physical completion of many tasks may not have been possible, even if discussion of the strategy and tactics of social practices may have been welcomed.

In summary, the most productive time for the acquisition and honing of new embodied skills was the period between 10 and 40 years of age. The acquisition of most skills through either vertical or horizontal transmission co-existed with, and relied upon, a greater development of dividual relations in this age-span, especially for horizontal transmission involving peers.

The settlement context of skills acquisition was a key element in embodied skill-building. At the household and community level, there would be an equal diversity of skills combinations, with some dispersed homesteads operating with an unavoidably narrow range of skills. This restriction on lifeways skills was as vital a reason for dispersed homestead participation in widespread exchange networks as the importance of finding an appropriate mate (*Chapman 1989*). By contrast, the communities living in agglomerated villages would have had at their collective disposal a much wider range of skills combinations – perhaps the larger tell villages of the Early Neolithic period may have boasted the full range of individualised persons.

However, it would have been extremely improbable that each household in a nucleated village would have had access to an identical range of skills. In a community of 20–30 houses, every household may start off attempting all of the new skills mentioned, but there will soon come a realisation that not everyone has the same talents and skills. This differentiation had a temporal component. Training a child in the special skills of the household was likely to lead to higher levels of inter-household skills differentiation after several generations. Thus inter-household contrast in skills was one means of generating enchained relations to ensure access to rare but important skills. The emergence of relations based on accumulation rather than enchainment would have been one route toward which inter-household specialisation led. This is not to claim that specialists were inevitable, but merely that the emergence of different skills in different persons each related to their own social value. Only the *sustained absence* of any special skills in a household would transform a context of potential skills differentiation into low-level social ranking.

We should also recall that the Early Neolithic period in the Balkans and Central Europe covers a long period of time – perhaps as much as 800 years, or 25+ generations, in any single region – and a wide area. We do not envisage the development of the full range of all of the identified types of person over the totality of the time-space distribution of the Early Neolithic. Rather, it is highly probable that particular skills and roles co-emerged with specific social practices in certain places and not in others, or perhaps not for a century or two or more in other places. The recent emphasis on small, flat sites at the start of the Neolithic in Greece and the South Balkans (*Kotsakis 2005; Bailey, Whittle 2005*) has overlooked the narrow range of embodied skills available at these sites in comparison with larger, nucleated tell villages; this narrow range of skills may have selected against the smaller sites which certainly existed in these regions. Moreover, there will have been a particular focus of innovation in the role-linked creation of personhood in nucleated settlements, with later diffusion across networks of dispersed homesteads. As communities developed and embodied skill levels reached higher levels, it is plausible that a wider range of types of individuals developed, with new categories of individualised person co-emerging with new forms of objects and structures.

Thus, the two weaknesses in Hernando's model – dating the stages of the model and explaining the shift from dividual to individualising personhood – can be addressed by proposing that settlement nucleation – whether in the Upper Palaeolithic (*e.g.*, East Gravettian: *Soffer 2003*), the Mesolithic (the Iron Gates Gorge: *Radovanović 1996*) or the tell villages of the Neolithic of Greece or the South Balkans (*Chapman 2008a*) – led to a wider diversity of persons with different skills and a greater likelihood of new skills combinations leading to more individualised identities. The second factor involved the wider range of embodied skills requisite for the major technological changes at the start of the Neolithic and during the long-drawn-out secondary products scenario. These transformations brought a far larger range of completely new skills into existence, providing a range of skills combinations much wider than those of forager groups.

While the development of new skills was an individual matter, generally relying on the creation of an

embodied skill, the acquisition of these skills relied on a vertical (family) or horizontal (peer-based) transmission of skills which enhanced dividual relations at every stage of skill acquisition. A high proportion of the skills that appeared for the first time in the Neolithic were composite skills, single parts of complex *chaînes opératoires*, such as farming or potting, in which it was impossible to complete the making of an object without careful integration of one's own labour with that of others – another sense in which increases in individual skills went hand-in-hand with dividual relations. There would clearly have been social occasions where it was more important to emphasise one's own individual skills (*e.g.*, exchange of prestige goods), while, at other times, the relationship between every person contributing to collective labour would have been highlighted (*e.g.*, a lineage ceremony).

One of the major debates in European prehistory – the balance between 'indigenous' and 'exogenous' contributions to the emergence of farming – may be reformulated in a skill-focused approach. The *chaînes opératoires* of farming and animal-keeping were so complex, involving the successful integration of many persons, that such organisational successes were by no means guaranteed in every community. One reason for variations in the pace of the spread of farming may well have been the greater or lesser ability of groups to learn all of the requisite new skills and then integrate all of the key persons in such complex tasks.

Summary and conclusions

It is far too simplistic to state that farming involved 'much more work' than foraging (*e.g.*, discussion in *Cohen 1977.33–40*). The transition to farming was a process in which the entirety of a community's social relations was transformed into a network of inter-locking tasks – in many ways much more complex a network than in foraging societies. The scale of materialisation of these new social roles and relations was a major factor in the explosion of material culture found in the earliest farming cultures in general and in South East Europe in particular. There is also an emphasis on the categorisation of persons in terms of their skills at certain social roles, as a way of reinforcing a system of values for different social practices through their linkages to material culture.

The core idea of this paper, which seeks to link persons to things, is basically simple: because of the major increase in the number of skills in the Neolithic, there is a concomitant rise in the diversity of personal identities. While some *chaînes opératoires* are relatively self-contained, others require considerable interdependency, and therefore co-ordination, between different persons. The picture that we wish to paint of Neolithic social life is based on a rich and varied palette, with much personal and household differentiation. The period of the emergence of farming provides some background examples of the processes of change involved. During these generations, new types of skills were created, in particular farming and herding skills, but also potting, polished stone tool-making and perhaps brewing skills. A term such as 'potter' does not necessarily imply a full-time occupation or specialisation, nor even the only, or essentialist, identity of a particular person, but emphasises the kind of activities through which persons were recognised through the possession of distinctive embodied skills. These new types of skills co-emerged with new foodstuffs and objects, such as flour, bread, lamb chops, barley beer, pottery and axes – the one could not have occurred without the other. Notions of personhood would have been influenced by the wide range of new relations, not least gendered relations, based on these identities, as well as by their interplay with those with traditional skills – hunting skills, shellfish-collecting skills, flint-knapping skills and leather-working skills. The communal values of the new products went hand in hand with the status of their creators. It is probable that, while those dwelling in dispersed homesteads would have included some of these new classes of skills, meeting persons with other skills seasonally, tell villagers would have included the full range of types of skills, with everyday contacts for most people. The discovery of secondary products would have ushered in new episodes of skill-creation, with the production of milk, cheese and yoghurt; while ploughing involved the harnessing of animal traction, as well as the diversification of traditional skills such as weaving, now making woollen textiles, and carpentry, now shaping wooden wheels, planks and complex joints for carts. The values assigned to the new things transformed the traditional system of communal values, itself confirming new statuses for new types of skills. In Gordon Childe's (*1956*) telling (if gender-biased) phrase, 'man/woman was making himself/herself'. The period of the emergence of farming was a time of particular innovation in this making process.

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In search of past identities

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ABSTRACT – *This paper discuses the conceptualisation of 'partible' and 'permeable' dividual personhood in archaeology. It focuses on flows of substances as media which produce relations with others and are used in altering the composition of the person according to specific doctrines of practice. It presents the manipulation of the dead in funerary and other mortuary practices that may have been correlative with interpretations of identity in the past.*

IZVLEČEK – *V članku analiziramo konceptualizacije '(raz)deljive' in 'prepustne' dividualne osebe v arheoloških zapisih. Osredotočamo se na pretoke substanc, ki vzpostavljajo odnose z drugimi in v različnih doktrinarnih praksah omogočajo spreminjanje individualnosti. Predstavljamo manipulativnost pogrebnih in ritualnih praks pri interpretiranju identitet v preteklosti.*

KEY WORDS – *identity; personhood; (in)dividual; mortuary practices; rituals; Neolithic*

Introduction

In the last four decades, since the introduction of the concept of 'social persona' into archaeology, the debate on the relationship between individuals and the societies of which they form part was a feature of both processual and post-processual archaeology in English-speaking countries and Scandinavia. This debate has had huge implications for the study of identities and individuals in prehistory. It is worth remembering that in processual perception, the individual is recognised as part of a group's passage through a sequence of egalitarian, ranked and stratified societies on the one hand, and passivity and submission to their respective social norms and pressures on the other. In the post-processual model, the focus shifts to agency and the role of social action. Parallel to the Giddens' concepts of 'knowledgeable social actor', Bourdieu's concept of 'habitus' was introduced into archaeology. The first of these postulates an explicit understanding of the agency of an individual social actor capable of manipulating or transforming the rules which govern their behaviour. The latter relates to people's understanding of the world; an understanding that was not based on explicit rules, but on the principles that governed practice. The focus has recently shifted from the notion of the 'bounded individual'[1] to the 'dividual' and 'partible' person as the main paradigm for personhood and agency, not in order to discuss the position of the person in the social system (agency) only, but the position of the person within the cos-

1 Descartes' view of 'person' was discussed by Marcel Mauss (*[1938] 1985.20–21*). The classic Cartesian conceptions of the person as a 'well-defined, stable entity with impermeable boundaries, and a unified and essential core' were regarded as being unique to Western thought. In his classical essay on the notion of person, Mauss considered this as a category of the human mind. The essay reviews various forms of person-related beliefs across societies and through time. The analysis is framed in cultural evolutionary perspective, which describes a progressive transformation from a person's character (personnage) being organized around ascribed roles into that of a person-subject of rights and duties, and into an autonomous self-centered individual. In the Maussian perspective, 'modern' and 'western' societies are considered paradigmatic of egocentric societies, while African and Asian societies are presented as typical examples of sociocentric societies.

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mological universe (personhood) (*e.g.*, *Barrett 2000; Brück 2001a; 2001b; 2004; 2006a; 2006b; 2009; Chapman 2000a; 2000b; Chapman and Gaydarska 2007; Fahlander 2008; Fahlander and Oestigaard 2008; Fowler 2004; 2010; Gillespie 2001; Graham 2009; Guerrero* et al. *2009; Jones 2005; Morris 2000; Meskell and Joyce 2003; Nilsson Stutz 2003; Thomas 1996; 2002*). However, we must be aware of how perceptions of the individual (autonomous) and dividual (social and cosmological relational) aspects of personhood vary across different cultures and in different contexts within the same culture (*e.g.*, the Euro-American capitalist notion of a person as wholly individual, autonomous, self-contained, and self-moving agent versus the complex negotiation of contextual and interpersonal constructions of the self in India's caste system) (*LiPuma 1998; Chaudary 2008*).

Personhood

In its broadest definition, personhood refers to *...the condition or state of being a person, as it is understood in any specific context. Persons are constituted, de-constituted, maintained and altered in social practices through life and after death. This process can be described as the ongoing attainment of personhood. Personhood is frequently understood as a condition that involves constant change, and key transformations to the person occur throughout life and death. People may pass from one state or stage of personhood to another. Personhood is attained and maintained through relationships not only with other human beings but with things, places, animals and the spiritual features of the cosmos. Some of these may also emerge as persons through this engagement. People's own social interpretations of personhood and of the social practices through which personhood is realized shape their interactions in a reflexive way, but personhood remains a mutually constituted condition.* (*Fowler 2004.4*).

The dividual perception of the person stresses that each person is a composite of the substances and actions of others; each person encompasses multiple constituent things and relations received from other people. Not only substances, but also objects, or even animals are incorporated into the person by the agency of ceremonial gift exchange. In a funerary rite, all of these different elements of the person are brought together around the deceased. The rite thus brings the person together. The implication is that, while alive, the person is distributed throughout the social and material world, and only becomes a whole person temporarily during this mortuary rite. All the things that the person embodies are brought together and made explicit for everyone to see. They are then divided again, and these parts are redistributed through mortuary exchanges. Thus personhood is neither fixed nor stable; it is a composite and partible 'artefact' that marks the handling of relationships through the possession and manipulation of things, especially those that conceptualise wealth and exchange.

Using ethnographic data, Chris Fowler identified several 'modes of personhood' that provide the forms that relationships are supposed to take. Contemporary modes of personhood are as follows: (i) individuality and indivisibility, (ii) individuals and, (iii) dividuals and dividuality. The first two refer to the perception of the 'western individual' and to the 'state of being a unitary' in which a constant individuality and a persistent personal identity are stressed over relational identities. The latter is grounded on ethnographic data and relates to perceptions in which 'the person is recognized as composite and multiply-authored'. The dividual person is a composite of the substances and actions of others, which means that each person encompasses multiple constituent things and relations received from other human beings, animals, material objects on the one hand, and ancestors and spirits on the other. In this context, persons are believed to be 'partible' and 'permeable'. The component parts of the 'partible' person are identifiable as objects and can be extracted. The partible perception of a person is recognisable through mortuary and marriage rites and in ceremonial exchanges in many Melanesian contexts. The permeability and permeable person are not, however, identifiable as objects, but as flows of substances. The permeable person is thus constituted in the flow of substances (blood, semen, *etc.*) between members of the group through exchanges, marriage and feasts. The notion is based on Busby's (*1997*) and Marriott's (*1976*) cross-cultural ethnographic studies of permeability in South India and on Strathern's (*1988*) studies of partibility in Melanesia (Fig. 1).

Persons are thus composed of social relations with other human beings, or with others who are objectified as ancestors, animals, objects *etc.*, and therefore owe parts of themselves to others, as revealed in mortuary and marriage rites. Alternatively, persons are constituted in the flow of substances ratified by exchanges, marriage, feasts and so on between members of the group.

Dividual and partible (Melanesia)	*Dividual and permeable (southern India)*
A person is a collection of relations, any of which may be temporarily brought to the fore. Qualities can be added and extracted.	A person is fundamentally a collection of relations, and is a bounded being from whom qualities cannot be fully extracted though ratios may change.
Persons identify relations which are objectified; as animals, objects, body parts, substances, etc. These can be externalised through separation or incorporated through encompassment. As well as being objectified they may be personified.	Substance-codes can permeate the 'fluid boundaries' of the person. Flows of substance extend from persons, they are not objectified as a specific part of the person.
Things fluctuate between being male and female, and singly and multiply gendered, depending on the context of their use.	Substance-codes have fixed properties (*e.g.* hot or cold).
Personhood is highly relational, and identities are performed or presented.	Personhood is relational, but is also strongly substantial.

Fig. 1. Differences between 'partible' and 'permeable' dividual personhood based on Busby's (*1997*) ethnographic studies. The flows of substances are media which produce relations with others and are used in altering the composition of the person according to specific doctrines of practice (from* Fowler 2004.Tab. 2.1*).

It is not that obvious, as it has been widely suggested, that the Asiatic dividual, 'partible' and 'permeable' notions of personhood are very different from Western (*e.g.*, capitalistic) perceptions of the person as a wholly individual, autonomous, self-contained agent. Exploring the conceptual and historical relationship between Western and Melanesian persons, LiPuma (*1998.59–60*) argues that, in the West, both individual and dividual modes of personhood exist: "*For the West the notion of person as wholly individual, as an autonomous, self-contained, self-moving agent is characteristic primarily of capitalism (Bourdieu 1984; Postone 1993). The person in capitalist society has two defining features. (1) the person is composed, historically and culturally, of dividual and individual aspects; and (2) paradoxically, the person appears as the natural and transhistorical individual. The double character of the person is intrinsically bound to, and homologous with, the character of commodity-determined labor. Unlike Melanesia where products are distributed by ties of kinship and community, and over relations of power and domination, in capitalist societies "labor itself replaces these relations by serving as a kind of objective means by which the products of other are acquired [such that] a new form of interdependence comes into being where ... one's own labor or labor products function as the necessary means of obtaining the products of others. In serving as such a mean, labor and its product preempt that function on the part of manifest social relations*" *(Postone 1993.6–7). So it is that commodity-determined labor is mediated by structures such as that of personhood (and also class) that it itself constitutes. The social relations of capitalism are thus based on a quasi-independent structure that stands apart from, and opposed to, persons understood as individuals. Labor, here, as socially mediating activity creates relations among persons which, though social and containing dividual elements, assume a quasi-objective and individualist character.*"

In capitalist society, labour thus replaces the rites, ceremonial exchange and feasts which structure kinship and community by serving as a kind of objective means by which the products of others are acquired. A new form of interdependence comes into being, where one's own labour functions as a necessary means of obtaining the products of others, thereby liberating one from dependence on lineage ties. The person becomes, at least in ideology, materialised as a self-contained and self-shaping independent agent.

Almudena Hernando (*2010*) agrees that individuality is a form of personal identity 'resulting from the gradual historical development of socio-economic conditions of functional division and work specialization'. Thus it is suggested that a subject's attachment to the surrounding world is central in their perception of themselves in egalitarian societies. This perception is embedded in a complex network of relationships comprising humans, animals, plants, and any other significant objects of reality (*i.e.* nature). On the other hand, a subject's detachment from the surrounding world is associated with 'increasing technological mastery over nature' and, the process of 'individualization'. Increasing power over nature leads to a perception of nature as no longer human-like, and therefore, personal relations with it are lost. Norbert Elias (*1991.140*) in his chapter on 'Prob-

lems of Self-consciousness and the Image of Man', states that "*It is probably unusually difficult to realize today that qualities of human beings related to by terms such as "individuality" are not simply given by nature, but are something that has developed from biological raw material in the course of a social process. This is a process of "individualization", which in the great flow of human development is inseparable from other process such as the increasing differentiation of social functions and the growing control of non-human natural forces*."

With the growing specialisation of societies, social positions became increasingly differentiated, and within such a network of separate functions 'more and more people came to live in increasing dependence on each other, while each individual was at the same time growing more different from the others'. Parallel to this, the demand of 'social control' (*i.e.* commands and prohibitions) that a person 'internalizes as his or her conscious and unconscious self-control' increase. Elias (*1991.13*) thus postulated that control of nature, social control, and self-control form a "*kind of 'chain ring'; they form a triangle of interconnected functions which can serve as a basic pattern for the observation of human affairs. One side cannot develop without others; and if one of them collapses, sooner or later the others follow*".

The concept of the individualisation of the self as the cognitive counterpart of a process of increasing technological domination over nature is applied in the studies of indigenous groups in the South American Lowlands (*Hernando 2008; 2010; Hernando* et al. *2011*). The Awá-Guajá, a small indigenous group of around 300 individuals living in a seasonally dry tropical forest area of the state of Maranhão (Brazil) on the eastern flanks of the Brazilian Amazon region, was systematically studied in recent years. They are hunter-gatherers in transition to agriculture. Since the early 1970s, after their first contact with Brazilian society and the deforestation of the forest, when they were removed from their traditional lands and relocated to demarcated reservations, their way of life has changed. Their mobility has been reduced and they have been forced to take up cultivation.

Hernando (*2010.295*) suggests that in this and any other egalitarian group without a division of tasks or specialisation, individualisation does not define the personal identity of anyone, since all (men and women) need to feel bonded to the group to feel safe enough in the middle of a universe which they do not dominate. On the other hand, she hypothesises that gender differences "*may be universal in 'egalitarian' societies at the symbolic level because they result from the social construction of male and female personhood, which in turn is partly determined by the different degrees of mobility involved in male and female tasks*" (*Hernando 2011. 191*). She suggests that the 'slightly higher individualistic component of male personhood' is connected with the greater degree of mobility inherent in men's tasks within the gendered distribution of productive activities, which is in turn mainly aimed at protecting fragile and vulnerable human offspring. Male and female activities in egalitarian societies are complementary; the difference is determined by the need to avoid exposing women to dangerous tasks that might harm their infant children, who are extremely vulnerable and completely dependent on maternal care. Women can work as hard as men, but they take fewer risks, and that small disparity has a huge impact in the construction of personhood, because greater risk and higher mobility stimulate a person's perception of individuality, autonomy, and independence from the social group to which they belong. Male specialisation in affinal relationships[2] could grant men a kind of autonomy related to the power they may exercise, which is not yet material nor economic, but only symbolic. This specialisation is not yet patriarchal, since it does not involve power relations between the sexes, although it creates conditions for the development of male dominance when functional divisions increase within the group.

Hernando's deduction that men's greater mobility results in increasing power, which leads to increasing emotional isolation, which contributes to individualisation, is reminiscent of Elias' conception of the 'subject's detachment from the surrounding world' as a cognitive prerequisite for individuality and the exercise of power and a 'a triangle of interconnected functions' that link the control of nature, social control, and self-control, as we mentioned above. How-

2 Relationships established by women tend to be consanguineal, and those established by males affinal. The consanguine and affine gendering relationships were initially hypothesised for hunter-gatherer societies. Men in these groups seem much more inclined to interact with the 'others', the different, the alien, while women tend stick to well-known things and people. According to Viveiros De Castro (*cf. Hernando 2010.292*), all dealings with the 'outside world', where 'potential affines' dwell, belong to the men's sphere, while the women's domain encompasses the 'inside world' of supporting bonds and familiar, domestic, unremarkable, well-known beings and things.

ever, Hernando *et al.* (*2011.192*) thus agrees "*...with Conklin and Morgan (1996: 659) that personhood cannot be reduced to essentialist categories or reductionist dichotomies such as Western "individualism" versus non-Western "sociocentrism" (or "relationality") (see also Spiro 1993). Personhood is "more an interactive process than a fixed location on a social grid" (Conklin and Morgan 1996: 667). Personhood is as much shaped by social practices as it is expressed in those practices themselves. We believe the key to understanding gender differences along the course of history lies precisely in the fluid interplay between personhood and social practices. In between a "relational" and an "individualistic" sense of personhood lies a whole range of possible combinations – which we believe are not socially constructed in the same way for men and women within the same social group.*"

It is worth remembering that when discussing personhood "*there is no question that relationships among self/person, body, mind, and sociality are universal cultural preoccupations*", but its perception "*should emerge, not from our own Euroamerican philosophical or social science a priori categories, but rather need to be approached as they are in their own right*", and personhood may include "*beliefs and practices concerning some, or all of the following: a soul or spirit; body; mind; emotions, agency; gender or sex; race, ethnicity, caste; relationships with other people, places, or things; relationship with divinity; illness and well-being; power; karma or fate, as ingrained in or written on body or soul in some way*" (*Rassmusen 2008.38*).

The search for past forms of personhood

In the search for past forms of personhood, Chapman and Gaydarska (*2007; 2011*) focused on 'dividuals' as the embodiment of identities based on relations with places, things and other persons, and on individualised persons' as the grounding of individual identities in linguistic, social, creative and task-based skills and capacities. They go beyond Li-Puma's (*1998*) approach in identifying the kinds of embodied skills and associated social roles that created Mesolithic and Neolithic personhoods. They suggest a number of skills and social roles for the creation of types of Mesolithic (14) and Neolithic (25) personhood in the Balkans (*Chapman and Gaydarska 2011*). The types of personhood range from 'hunting' and 'plant-gathering' to 'farming' and 'herding' skills; from 'stone tool-making' to 'ploughing' and 'dairy producing' skills; from 'basket-making and string-bag-making' to 'house-painting' skills, *etc*. The interpretative legitimacy of Chapman's and Gaydarska's approach is based on the concept of 'dynamic nominalism', which holds that "*numerous kinds of human beings and human acts come into being hand in hand with our invention of the ways to name them*" (*Hacking 2002.113*).

According to Ian Hacking, human types have their genesis in the continuous interrelations between social labels and classes. A classificatory label is imposed on a group or class of people, who then begin to act intentionally under the label. The label is used to describe and denote a certain mode of behaviour, and then the label, and its associated appropriate actions, become normative for the members of the group. The forces that objectify the existence of human types are 'vectors from above and below', the social forces "*from above, from a community of experts who create a "reality" that some people make their own. Different from this is the vector of the autonomous behavior of the person so labelled, which presses from below, creating a reality every expert must face*" (*Hacking 1986.234*). While the vector from above is the act of labelling by authority, the vector from below is the intentional actions of individuals. Both vectors combine to create normative forces that constrain people described by different labels to act and behave in the appropriate manner. These vectors are to be understood as social forces that have the power across social times and places to bring some social worlds to an end and to create new ones. In the intersection of these social forces lies a virtual infinity of new 'kinds of people' and associated, new intentional actions and behaviours. In Chapman's and Gaydarska's approach, these vectors are interpreted as a generative power that combines agency, structure and things 'in the formation of identities' and 'the creation of personhood' (*Chapman 2000a.34–37; 2000b; Chapman and Gaydarska 2007.16, 55*). In other words, the acquisition and development of embodied skills and their combinations and competences are key facets of a person's individualisation and participation in social life. The shift from dividual to individualising personhood is associated with settlement nucleation, which leads to a wider diversity of persons with different skills and a greater likelihood of new skills combinations leading to more individualised identities. The increase in the number of skills in the process of the transition to farming, Chapman and Gaydarska suggest, allow us to categorise persons in terms of their skills through their linkages to material culture, and to recognise

the rise in the diversity of personal identities in the Neolithic.

A different approach to the notion of agency and personhood takes agency as a moral category. Sofia Voutsaki (*2010.71*) suggests different modes by means of which people define themselves and their positions in a social system and cosmological universe. Thus "*every action bears, expresses and reflects upon moral beliefs, because people act in pursuit of certain goods that define the purpose and meaning of their life*". She introduces MacIntyre's concept of moral agent by saying that we "*always act, whether consciously or unconsciously, with a certain purpose in mind, a set of goals defined within a moral code, a cultural tradition and a set of historical conditions*".

Alasdair MacIntyre, a moral and political philosopher, through his use of the concept of a practice (*e.g.*, maintaining a household and a family in the pre-modern world), postulates that in heroic society, morality and social structure are conflated. When individuals in heroic society – as described by Homer in the Iliad and Odyssey – first engage in a practice, they have no choice but to agree to accept external standards for the evaluation of their acts and to agree to follow the rules set out for the practice. Practices are important, because it is only within the context of a practice that human beings can practice the virtues.

"*A virtue is an acquired human quality the possession and the exercise of which tends to enable us to achieve those goods which are internal to practices and the lack of which effectively prevents us from achieving any such goods ... we have to accept as necessary components of any practice with internal goods and standards of excellence the virtues of justice, courage, and honesty ... Now the virtues are those goods by reference to which, whether we like it or not, we define our relationships to those other people with whom we share the kind of purposes and standards which inform practices.*" (*MacIntyre 2007.191*). Practices involve moral standards of 'excellence and obedience to rules as well as the achievement of goods'. MacIntyre makes a distinction between external and internal goods. Wealth, fame and power are external goods because they can be achieved by a variety of practices and are typically objects of competition. Internal goods can only be attained by adopting the standards of excellence and obedience definitive of a specific practice, and can only be achieved by those who possess virtues, *i.e.* a disposition to act in the correct manner. In contrast to external goods, those internal to a practice enhance the position of the entire group who participate in the practice.

The main purpose of human agency in heroic societies, where the warrior is the paradigm of human excellence, is to realise the goods internal to practices such as fighting, hunting or feasting. The entire group thus 'celebrates a victorious battle', 'benefits from a successful hunting expedition' or 'enjoys a generous feast' to increase the glory of the kin and social group, and to ensure fidelity and reliability among fighting companions and allies. A moral agent is of necessity a social agent in so far as his perception must match that of the group. Moral standards are always bound up with society as a whole and differ between societies according to each society's respective structure. Each individual has a fixed role resulting from their position in the social network, primarily through their particular ties to kin, and each individual has the specific obligations and privileges attached to that position. "*The self becomes what it is in heroic societies only through its role; it is a social creation, not an individual one*" (*MacIntyre 2007.129*). Each individual in such a society "*... has a given role and status within a well-defined and highly determinate system of roles and statuses... In such a society a man [sic] knows who he is by knowing his role in these structures; and in knowing this he knows also what he owes and what is owed to him by the occupant of every other role and status*" (*MacIntyre 2007.122*). Thus, people do not attempt to determine morality in terms of abstract objective rules which apply equally to all; to place oneself outside of society is to cease to exist, because each person's identity makes sense only in the context of that society. In any particular situation, an individual is able to understand what she or he should do: whatever is appropriate for a person in their position to do which shows the proper regard for someone, meets the particular obligations they have, and accords with what duty requires of them, *etc.* It is also clear what and how actions must be performed in order to accomplish these things. "*If someone kills you, my friend or brother, I owe you their death and when I have paid my debt to you their friend or brother owes them my death. The more extended my system of kinsmen and friends, the more liabilities I shall incur of a kind that may end in my death.*" (*MacIntyre 2007.124*).

The genuine moral codex of rules and standards that developed in the past and is binding in present-

day societies leads Voutsaki to conclude that in heroic societies the self was not detachable from the social structure, or from history and tradition. A moral code, a cultural tradition and a set of historical conditions became central in interpreting past personhood and agency. Personhood, she suggests, is to be understood "*as fluid, but firmly embedded in social relations, moral traditions and historical conditions*", and to be examined first "*by exploring the interfaces of the person*" that correlate to (i) "*the relation between the person and his/her kin, age, sex group and social community*"; (ii) "*the relationship with the 'Other',* i.e. *with neighbouring or distant ethnic and cultural groups*"; (iii) "*the relationship between persons and the 'supernatural' – gods, spirits, or supernatural beings*"; (iv) "*the relationship between persons and (animate or inanimate) objects*"; and (v) "*the relationship between persons and the natural world, specifically humans and animals*" (*Voutsaki 2010.74*).

The perception of the dead in the Homeric world, she suggests, was as a 'relational, embedded, permeable and partible dividual'. Mortuary practice was a deeply moral issue that conveyed proper respect for the dead or piety towards ancestral spirits. Following the classic studies by Hertz and Van Gennep, she suggests that the tripartite structure of the mortuary ritual – in particular the disarticulation of skeletons and partial destruction of offerings during secondary treatment – indicate a belief in the gradual transformation of the dead into a ghost or spirit and ancestor. In this transformation, humans seem to recognise certain animals as equals, possibly as persons in their own right. The relationship between people and objects is deeply permeable. Objects become bound up with human projects/agency, and conversely, people absorb things into their own personal identities. The fusion between subject and object, *e.g.*, the use of valuables in bodily practices, takes place just as persons begin to dissolve into ancestors. The deposition of wealth in graves not only establishes communication across different planes of existence between mourners and ancestors, but it seems that it masks the disintegration of personal identities, as it displays the personal achievement and excellence of the deceased. Mortuary rituals therefore reassemble and manipulate personal identities on one hand, whilst also restricting the mourners by the agency of social obligations and relations, and by moral commitments, cultural traditions, and religious obligations summarised in the notion of proper respect for the dead.

The palimpsest: mortuary practices and the transformation of the person

The evidence for the manipulation of the dead in funerary and other mortuary practices has long been correlative with interpretations of identity in the past. They were central in interpretative trajectories from 'social persona' to 'relational personhood' (see *Budja 2010*). Treatment of the dead has been shown to be important for the realignment of personhood after death. It is believed that the manipulation of corpses was associated with ancestral rites and monuments on the one hand, and was used to reinforce the existing social order through the construction of collective memory on the other. It has recently been demonstrated how human and animal body parts or bones and objects acted as metaphors for the dividual nature of the person, and how they were central to the affirmation of identities and the power of the living (*Berggren and Nilsson Stutz 2010; Brück 2001a; 2001b; 2004; 2006a; 2006b; Chapman 2000b; Fowler 2001; 2004; 2010; Fahlander 2008; Fahlander and Oestigaard 2008; Graham 2009; Guerrero* et al*. 2009; Kuijt 2008; Morris 2000; Nilsson Stutz 2003; 2010; Thomas 2000; Williams 2003*).

Thus Howard Williams (*2003*) suggests that combs, deliberately broken and placed in the cinerary, acted as an extension of the body and were used as a metaphor for the transformation of the deceased 'into a new ancestral material form', the realignment of the personhood of both the living and the dead. Combs and toilet sets were selected, together with burnt human and animal bones, artefacts, and the ceramic urn used to enclose them, and placed with the dead to articulate the building of a new 'body' for the dead. Following ethnographic and historical evidence, Williams (*2003.127*) postulates that as symbols of vitality or regeneration, combs served "*to incorporate the dead into a new state in the post-cremation rites. Their efficacy built on their role as mnemonic devices connecting the living with the deceased and orchestrating the remembering and forgetting of the social person. Bones and material culture were retrieved, transported and buried together to articulate the social, ontological and cosmological transitions through which both the mourners and the dead had passed*."

In a Roman funerary practice known as *os resectum*, the metacarpal bone acted as a metaphor for the dividual body and person of the deceased. Festus remarks that, in order to observe the obsequies after

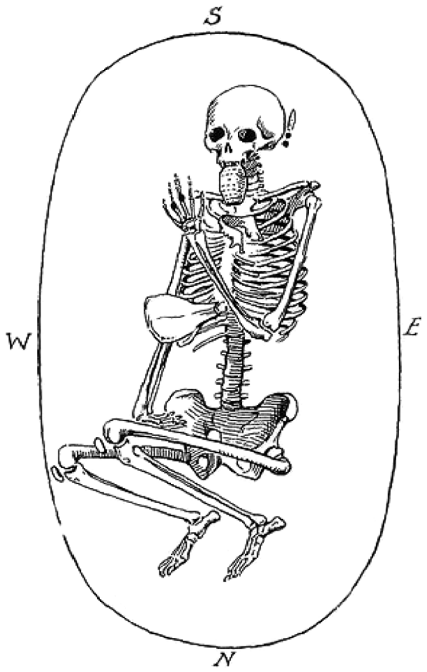


Fig. 2. Bronze Age burial in barrow 40 at Garton Slack. The mandible of the deceased was removed, and a miniature vessel inserted into the mouth (from* Brück 2006a.Fig.4*).

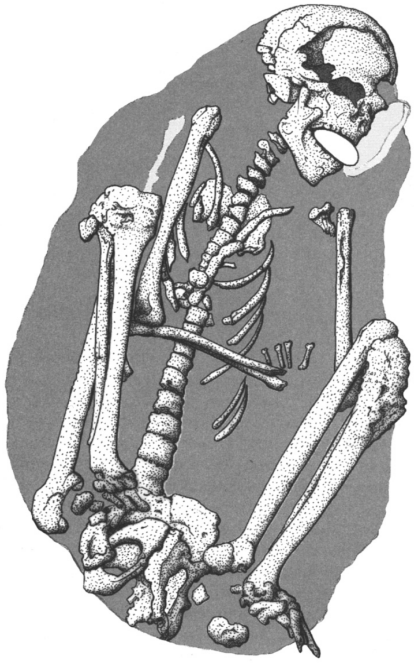


Fig. 3. Early Neolithic male pit burial at Nea Nikomedeia. A pebble had been placed in his mouth (from* Perlès 2001.Fig. 13.2*).

the cremation, a digit must be cut from the corpse and set aside; in his discussion of the end of mourning, Cicero comments that the severed bone should be buried in the earth; meanwhile, Varro states that 'if a bone of the dead man has been kept out for the ceremony of purifying the household, the household remains in mourning' until it is buried (*cf. Graham 2009.55–57*). The *os resectum* was removed from the corpse prior to cremation, kept during the mourning period – when it acted as a metaphor for the dividual body and person of the deceased – and then cleansed alongside the mourners during purification (*suffitio*), when they stepped over a fire while being sprinkled with water, and finally buried. Thus, Emma-Jayne Graham (*2009*) suggests this ritual may have acted as been a metaphor for the dissolution of the social body of the dead and the transformations that all participants experienced. The *os resectum* underwent a visible physical transformation that symbolised the changing status of all the participants. The personhood both of the dead and the living was deconstructed during the nine-day liminal period, when the house was considered impure (*funesta*) and the family and corpse were enclosed in a polluted (and polluting) liminal zone beyond the norms of society. At the end of this period, the new social persona of both parties was created anew and new relationships were created based on mutual dependency. The ancestors would not terrorise the living if regularly honoured and remembered.

It has recently been demonstrated how body parts or bones acted as metaphors for the dividual nature of the person, and how they were central to the affirmation of identities in the British Bronze Age. In the recreation of a new body for the deceased, objects with metaphorical connections to the maintenance of the person were used. Artefacts and human and animal bones acted as extensions of the body and as metaphors for the transformation of the deceased and the realignment of the self of both the



Fig. 4. Early Neolithic (Körös culture) anthropomorphic vessel in which the fragment of a human skull was placed (from* Kalicz 1980.Tab. 2*).

living and the dead, and the reproduction of society through cyclical processes of fragmentation, dispersal and reincorporation. Thus skull fragments are frequently recovered from settlement contexts, where they were deliberately deposited in pits and ditches. Some fragments were carefully shaped in the form of a pierced disc or roundel. In a grave that contained two inhumations, the mandible of a third individual was deposited. Several bones from an adult male were found with the complete inhumation of an adult female. The inhumation of a juvenile was accompanied by a few bones from an adult. This suggests that "*pieces of ancestral bone which had been retained, circulated, and perhaps passed down over the generations were on occasion considered appropriate for inclusion with the burial of a newly deceased member of the community*" (*Brück 2006a.83*).

On the other hand, it has been suggested that a crouched inhumation with a deposit of cremated bone behind its lower back, broken human bones at the knees of a central inhumation, and a child's remains placed at the feet of an inhumation, were placed in positions where one might expect to find pots. These placements perhaps served to underline the metaphorical link between people and objects, in this case pots. Sometimes pots even became part of the human body. In the Bronze Age inhumation burial at Garton Slack in Britain, the mandible of the crouched inhumation had been removed. It was then placed on the deceased's chest and a miniature vessel inserted into the mouth of the deceased (*Brück 2006a.84*) (Fig. 2).

Similarly, the pebble stuck into the jaws of the tightly flexed male adult at Early Neolithic sites at Nea Nikomedeia shows the plurality of substances and metaphorical relations (*Perlès 2001.278*) (Fig. 3). There are also other ways in which substances were directed through human and non-human bodies, not least through consumption practices. For instance, the 'Gorsza Venus' anthropomorphic vessel from



Fig. 5. Lepenski vir Neolithic 'Building 40'. A human mandible was placed upside down with a stone plaque placed between the caudal rami of the mandible. The mandible constitutes the ∀ architectural element in place of limestone plaques (from* Srejović 1969.Fig. 70*).

Early Neolithic Körös culture portrays a headless female body, and contained a fragment of a human skull (*Kalicz 1980.23, Tab. 2*) (Fig. 4). This vessel could be seen as 'mediator in their own right, object as person whose major concern was the regulation of flows of substance' (*Fowler 2004. 63*) or 'as containers, just as the human head is seen in many societies as the repository of the human soul' (*Brück 2006a.84*). We may suggest that the vessel and the skull fragment metaphorically build a new composite body of the deceased. This body can be seen as

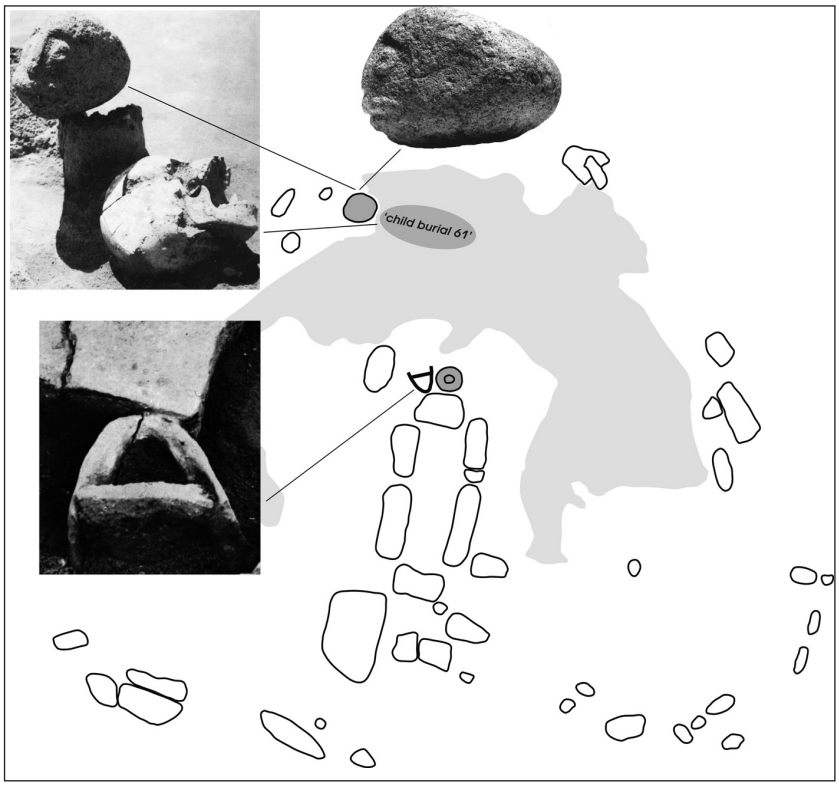


Fig. 6. Lepenski vir 'Building 40' context. A human mandible constitutes an ∀ architectural element. A child burial below the floor in the rear of the building. A sculpted boulder was placed above the child's skull (after* Srejović 1969.Figs. 66, 70; Babović 2006.Figs. 186, 189*).

a vessel through a flow of essences. Fowler (*2008.52*) suggests that in cases 'where flows are usually stressed over partiability the vessel of the body may be fragmented', but only after the death of the person 'in order to allow dispersal of personal essences'.

This link between fragmented human bodies extends further, in that there is evidence for the use of human bones in Mesolithic and Neolithic built environments in the Danube gorge in the Northern Balkans. In a number of buildings at Lepenski vir, limestone plaques were placed as multiple '∀' architectural elements next to the hearth slab. However, in one case in 'Building 40', a human mandible constituted this element instead of limestone plaques. It was placed upside down, with a stone plaque placed between the caudal rami of the mandible (Fig. 5) (*Srejović 1969.Fig.70; Borić 2007. 114; Stefanović, Borić 2008.149*). Two other human mandibles were placed below the hearths of 'Buildings 31' and '54'. The mandibles are contextually associated with the child and neonate burials below the floors in the rear of the buildings. Sculpted boulders are embedded in all contexts, one of them being an architectural part, as the human mandible formed part of the stone hearth of 'Building 43' (*Srejović and Babović 1983.133*).



Fig. 7. Lepenski Vir 'Building 28' context. A child burial below a stone plate in the rear of the building. The skull was removed. A sculpted boulder was placed above the burial (from* Stefanović, Borić 2008.Fig. 18; Babović 2006.Fig. 420*).

In the intentional distribution and redeposition of human skulls within the built environments at Lepenski Vir some distinctive practices are evident:

- a human skull with mandible absent was placed in the rear of the hearth of 'Building 47', where it was contextually associated with two neonate burials and an aniconic boulder;
- skull removal was noted in 'child Burial 92' ('Building 28'), 'articulated Burial 28' ('Building XXXIII'), 'extended Burial 54e' ('Building 65/ XXXV'), and 'extended Burials 15 and 16' ('Building XXVII');
- the skull in 'adult Burial 26' ('Building 34') was detached from the body and turned to face east, to the Danube River, while the mandible was slumped as if left in the anatomical position;
- the skull in 'contracted Burial 19' ('Building 54/ XLIV') was removed and placed on the stone slab that covered the burial (*Stefanović, Borić 2008. 20–21*).

It is worth noting that in some cases sculpted boulders were placed on the floor immediately above the head of the deceased buried within buildings. A sculpted boulder in the form of a human head was placed above the head of an approximately seven-year-old child in 'Burial 61' in 'Building 40' (Fig. 6). It is noted that the boulder represents a human face with a schematic representation of its mouth and nose and 'opened eyes' (*Stefanović, Borić 2008.26, 34*). In contrast, in 'Burial 92' ('Building 28') a boulder with a schematic representation of mouth, nose, and 'closed eyes' was placed above a two- to three-year-old child. The skeleton was placed in the extended anatomical position, absent its skull, with only the mandible being present. This may indicate that the skull was removed (*Stefanović, Borić 2008.25*) (Fig. 7).

A decorated boulder was placed above a man's skull in 'Burial 7/I' in 'Building 21'. The burial was embedded next to the hearth, behind its rear. A detached human skull which was heavily worn, possibly from handling, was placed on his left shoulder, next to the head of the deceased. An auroch skull

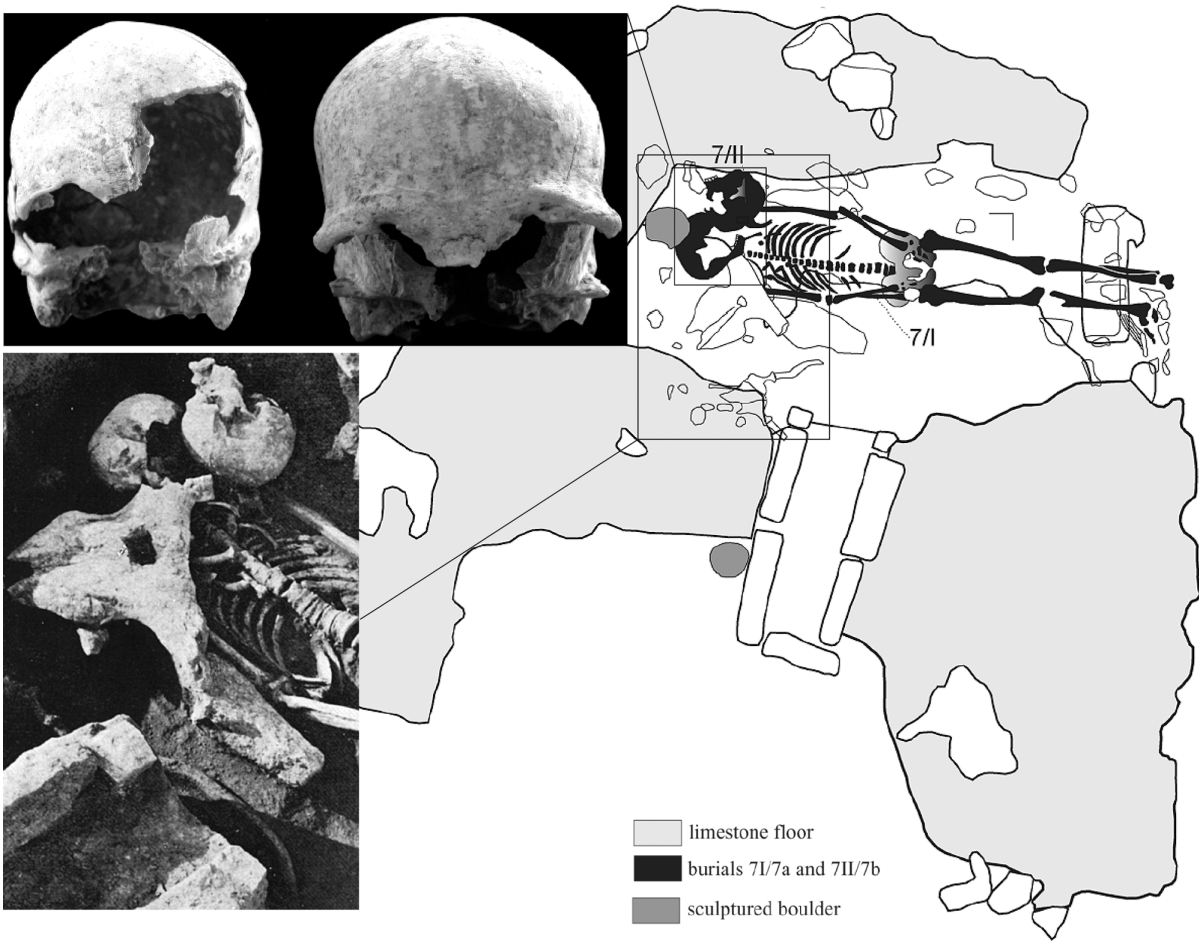


Fig. 8. Lepenski Vir 'Building 21' context. Flow of substances of (i) an adult man buried in a burial pit cut through the floor of the building; (ii) the disarticulated human skull that was placed on his left shoulder; (iii) the auroch skull placed on his right shoulder, and a deer skull with antlers next to it; and (iv) the sculpted boulder placed above his head (from* Srejović 1969.Fig. 69; Borić 2005.Fig. 3.3; Babović 2006. Figs. 260, 312, 314*).

was placed above his right shoulder, and a deer skull with antlers next to it (*Srejović 1969.Fig. 69; Radovanović 1996.Fig. 4.3; Borić 2005.Fig. 3.3; Stefanović, Borić 2008*) (Figs. 8 and 9).

The deposition of human jaws in built contexts associated with objects and animal skulls can be traced across Europe. Thus, in a settlement context of the Pitted Ware culture at Korsnäs in Södermanland in Sweden, the mandible of an adult human was found beside a small collection of fire cracked stones. Beneath the jaw was a hollow edged stone chisel. A dog skull, with lower jaw missing, lay beside it. A clay 'pearl', tightly packed inside a bundle of fish bones, had been placed in one of the dog's eye sockets. The assemblage was deposited in a two-metre-long dug feature, with a filling containing a large quantity of fish bones (*Larsson 2009.118*). The second deposition, which has been attributed to Early Neolithic Vlaška culture, was found in 1894 in the Pejca v Lascu rock shelter on the Karst plateau in the Northern Adriatic. Below a stone plate, which was covered by a thick layer of ash, the fragments of a 'human frontal bone' and 'young girl's maxilla' were found. A dog mandible, mussel shells, sheep ribs, a deer antler hammer and two bone points were placed beside the bone remains (*Moser 1899.62–63*).

In the mortuary practices and relational palimpsest at Lepenski Vir we can recognise metaphorical links between (i) buried human bodies and buildings; (ii) secondary buried human skulls and mandibles and building parts; (iii) neonate and child dead bodies, secondary buried human mandibles, and sculpted boulders; and (iv) adult dead bodies, animal bodies, secondary buried human skulls, and sculptured boulders.

These may all indicate rites of passage and a trajectory from the corpse to bones, and to a new identity negotiated within the community as well as with the deceased. The context of human and animal bodies and secondary buried human skulls in indivi-

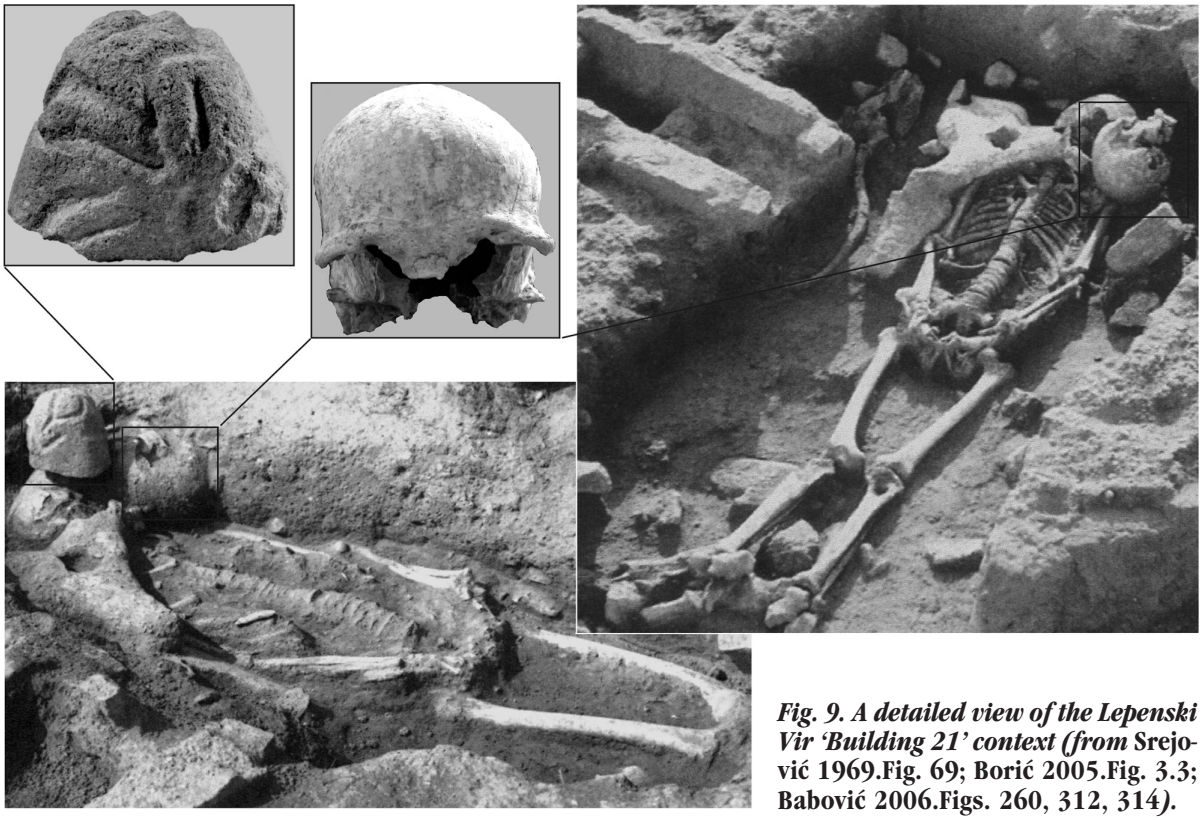


Fig. 9. A detailed view of the Lepenski Vir 'Building 21' context (from* Srejović 1969.Fig. 69; Borić 2005.Fig. 3.3; Babović 2006.Figs. 260, 312, 314*).

dual burials may indicate a fusion of the various substances that make possible the transformation of the deceased into ancestor, spirit or ghost. Thus the sculpted boulders placed above the burials may have to be seen as animate objects indicating the transformed identity of the deceased, and that some of them were selected to be archetypically representative of the whole community, or even the cosmos, in mortuary practices. We may hypothesise, therefore, that personhood was attained and maintained through the agency of active relationality. When death interrupted it, mortuary rites functioned to resolve the imbalance by the removal of one identity from society and the creation of another, and by reintegrating both the living and the dead into another state of existence. Burial contexts and rites of passage thus "*[m]ay not be aimed at removing them from society, as we might expect, but at reintegrating them into society as different kinds of entities, different orders of person. The mortuary sphere is focal in the movement of personal substance, the renegotiation of value, and transformation of personal identity among survivors as well as the deceased. Mortuary practices therefore have multiple roles, including the deconstitution of the person, and their reclassification as spirits, ghosts, ancestors, and other subsets of the community. While the dead are transformed persons, they are often present among the community either as identifiable forces, or through the recycling of their elements.*" (*Fowler 2004.45*).

Instead of conclusions

The recognised mortuary practices and fragmented ritual palimpsest in Lepenski Vir lead us to the notion of ritualisation as a strategic way of acting within 'complex traditions and systems' for the construction of certain types of power relationships effective within particular social organisations. Catherine Bell discusses (*1992.109–110, 197, 218, 221*) them as a codified and constructed social medium in which "*complex and multifarious details of ritual, most of which must be done just so, are seen as appropriate demands or legitimate tradition*", the collective body seemingly "*sees itself as responding to a place, event, force, problem, or tradition*". In this context, she suggests, some gradually come to dominate others by the prestigious and privileged status that ritualised activities claim. The flow of substances and manipulation of objects on the one hand, and gathering and following a fixed agenda and repeating this activity, are thus not necessarily associated either with social solidarity and conflict resolution, or with the transmission of shared beliefs and a dominant ideology as an internal subjectivity, but the production of ritualised agents and power relations within a society.

The flow of substances, the fusion of subject and object, and the perception of the individual as a relational, embedded, permeable and partible dividual lead us to naturalism, animism, totemism and perspectivism, all which conceptualise non-humans as persons, as well as humans as non-human. They postulate subjective and social continuity between humans and animals, and between the living and the ancestors. Shamanism – in which the capacity evinced by some individuals to cross ontological boundaries and adopt the perspective of non-human subjectivities in order to mediate relations between humans and non-humans – is embedded in these contexts (*Bird-David 1999; Descola 1996; Groleau 2009; Ingold 2000; Pedersen 2001; Sillar 2009; Viveiros de Castro 1998; 2004*).

The embodiment of dead human and animal bodies in built environments, and the incorporation of fragments of human bodies into built structures may lead us to hypothesise that the flow of substances was symbolically embedded within a house, a "*[m]oral person, keeper of a domain composed altogether of material and immaterial property, which perpetuates itself by the transmission of its name, of its fortune [destiny, chance] and of its titles in a real or fictive line held as legitimate on the sole condition that this continuity can express itself in the language of kinship [descent] or of affinity [alliance], and, most often, of both together*" (*Lévi-Strauss 1987.152*). Thus, dividual, partible and permeable persons constitute a 'house society'. The house as a social institution, on the other hand, symbolically and metaphorically mediates between humans and non-humans and the landscape.

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Burial practices at the Mesolithic-Neolithic transition in Britain: change or continuity?

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ABSTRACT – *There is no doubt that the Mesolithic-Neolithic transition was a time of great change. It has been suggested that at this time people began to disarticulate their dead and use caves and monuments as ways of interacting with the ancestors. This paper looks at the transition from a Mesolithic perspective in order to identify evidence for change and continuity. It is suggested that certain practices such as disarticulation and the use of caves are much earlier in date and thus provide some continuity. Practices such as the use of shell middens for the deposition of human remains and the construction of monuments stand out as innovations, but are not necessarily the result of a new ideology.*

IZVLEČEK – *Prehod iz mezolitika v neolitik nedvomno predstavlja čas, v katerem je prišlo do velikih sprememb. Predlagano je bilo, da so v tem obdobju ljudje pričeli raztelešati svoje umrle in začeli uporabljati jame in spomenike za interakcije s predniki. V članku se ukvarjamo s prehodom iz mezolitske perspektive, da bi lahko prepoznali dokaze o spremembi in kontinuiteti. Predlagamo, da so se določeni običaji, kot je raztelešenje in uporaba jam, pojavili bolj zgodaj in tako nudijo kontinuiteto. Običaji, kot je uporaba školjčnih kupov za odlaganje človeških ostankov in izdelava spomenikov, pa predstavljajo inovacije, ki niso nujno posledica nove ideologije.*

KEY WORDS – *burial; caves; disarticulation; Mesolithic-Neolithic transition; Britain*

Introduction

The transition to the Neolithic is often seen as a time of great change: domesticated animals and grain, pottery, monuments, and polished stone tools are all introduced. In Britain, this transition is usually said to occur at 4000 BC, but in recent years, research has moved towards disentangling this 'package' through the use of multi-scalar approaches, and some researchers have begun to think about change in terms of human time frames in order to identify variety, messiness, and localness (*Cooney 2007.543; Whittle 2003*). These approaches are coupled with scientific methods with a particular emphasis on the creation of fine-grained chronologies. The use of strict sampling methods and Bayesian statistical frameworks has enabled a better understanding of the introduction of innovations, and in the case of monument building in Southern Britain, the establishment of a gradualist model. For instance, five important long barrows appear to have been constructed about 3800/3750 calBC up to a century or so *before* causewayed enclosures (*Bayliss and Whittle 2007; Whittle 2007.382*).

Other innovations such as domesticated sheep and cattle appear in the 4th millennium BC. One of the earliest dates on sheep appears to be from the site of Ascott-under-Wychwood, where sheep teeth date to 3990–3780 calBC (*Bayliss* et al. *2007*). The most compelling evidence for early cereals come from charred cereal grain, and it has been recently argued that the introduction of grain appears at about 3800 calBC (*Milner 2010*), although with ongoing dating programmes, a clearer picture may emerge. Pottery seems to appear about 4000–3700 calBC,

although it has been suggested that some pottery introductions may be earlier than this at about 4200–3800 BC for certain parts of Scotland and Ireland (*Sheridan 2000; 2003; 2004; 2007*).

When all this evidence is brought together, it is not particularly apparent whether the different aspects of the Neolithic came together or whether introductions were slightly staggered, and how this varies from region to region. However, it is very clear that in the 300–400 years at the beginning of the 4th millennium BC, great change was occurring in Britain, in many different ways. What is still very uncertain is the process of change and what was happening to the people at this time. There are two main views. The first is that the transition was very rapid with a dramatic change in subsistence practices to agriculture (*Rowley-Conwy 2004*). Stable isotope data has also been used to argue for a rapid dietary shift from marine dominated foods in the Mesolithic to terrestrial foods at the start of the Neolithic, again indicating a rapid introduction of farming (for further debate see *Milner* et al. *2004; 2006; Richards, Schulting 2003; 2006*). In addition, it has been argued that pottery and other aspects of the Neolithic were being brought to Britain with the arrival of small farming groups from the Continent (*Sheridan 2007. 442*).

The alternative view is presented by Julian Thomas (*1999; 2004*), who takes the acculturationist, gradualist position. He suggests that communities in the earlier Neolithic would still have been mobile, still relying heavily on wild resources, and that domesticated animals and grain would have been bound up in symbolic and ritual aspects of society rather than playing a key role in the subsistence economy. The evidence he uses for this is that cereals and domesticated animals are usually deposited at monuments, such as causewayed enclosures.

Another way of considering the effect on people is to look at burial practices and the degree to which we see change or continuity at this time. Traditionally, burial practices and ritual practice are deemed to have changed significantly in the transition, but this paper will look at both the ways in which dead bodies were treated, and the contexts in which they are found, in order to test this assumption.

Treatment of the body

During the Early Neolithic, secondary rites appear to have been a major part of the funerary practices with disarticulated bone found in tombs and caves (*Parker Pearson 1999.50*). Far from being interpreted as the results of disturbance or cannibalism, these are seen as funerary acts to honour ancestors (*Parker Pearson 1993; 1999; 2000; Whitley 2002*). In addition, it is believed that certain parts of the skeleton were moved from one context to another. For example, skulls are under-represented in the chambered tomb at West Kennet, but are found in profusion in the nearby ceremonial causewayed enclosure of Windmill Hill (*Parker Pearson 1999.52*).

But is this actually an innovation, or did disarticulation and secondary rites occur earlier? In fact, disarticulation is also the way in which most Mesolithic bodies seem to have been treated. The *only* articulated remains that currently exist are from the very early part of the Mesolithic in the 9th millennium BC at Aveline's Hole and Gough's Cave (the famous 'Cheddar Man'). All other human bone which has been found in Britain appears to have been disarticulated (*Conneller 2006*). In both the Mesolithic and Neolithic periods there is evidence that the bones are being treated like animal bones, and we cannot discern a significant difference in the ways in which the human remains are being treated in the Mesolithic compared to the Neolithic.

Van Gennep (*1960.146*) introduced the idea of liminality and rites of passage in death when he showed that a dominant part of death rituals was a transitional phase where the dead were no longer a part of the living community, but they had not yet passed to the next world. It is during this liminal stage that the dead are transformed physically from a body into bones, and metaphorically from relative into ancestor (*Metcalf and Huntington 1991.34*). Disarticulation of the body is one way that this process of transition can occur so that it is accepted by the society as an ancestor. For the body to become disarticulated it has to have decomposed sufficiently for the bones to be detached from the body and the decomposition process can be seen as a physical example of the transition taking place. The idea of secondary burial treatment is central to the concept of transitional states, as it entails the body, or parts of it, being moved from a temporary place of treatment where the bones are de-fleshed to its present resting place where the bones are deposited (*Andrews, Bello 2006.17*).

Secondary treatment of the dead can occur in several ways. Some practices use natural decay and defleshing by birds and animals to decompose the body

so that dry bones remain. For example, the Iroquis Indians in the United States and Canada lay out their dead on a raised platform (*Henderson 1987.50*) and the Ashanti place the body in a coffin rested on stilts for eighty days to allow decomposition (*Rattray 1959.115*). Archaeological evidence of the exposure of corpses can be seen in many monumental structures where the remains are found in a disarticulated state, such as Ascott-under-Wychwood where bones are severely weathered and bleached (*Chesterman 1977*) or at Parc Le Breos where bones showed signs of weathering and scavenging marks (*Whittle, Wysocki 1998*).

In ethnographic examples there is often little time taken to ensure all of the bones are collected after exposure of the body. In Balinese burial practices, remains are roughly buried and later collected for cremation; here, the focus is on the process rather than the actual remains themselves (*Metcalf and Huntington 1991.101*). The Ashanti only make a cursory attempt to re-articulate long bones before reburial (*Rattrey 1959.115*). The collections of bones in Neolithic tombs suggest that selection did occur, such as at Wayland's Smithy and Fussell's Lodge, where there is a general lack of small hand and foot bones (*Whittle 1991; Mays 1998*). Many small bones, however, survive on sites such as the shell middens on Oronsay (*Meiklejohn* et al. *2005*) and the causewayed enclosure at Hambledon Hill (*Mercer 1980*). Here, the interpretation is that they could have functioned as areas where the bodies were exposed.

It is not doubted that disarticulation can be the result of deliberate human treatment of the dead as part of the liminal transition phases outlined by Van Gennep (*1960*), but disarticulation as a treatment for the dead has received differential treatment in the literature. It is a widely accepted treatment in Neolithic studies, where sorted and manipulated human bones are interpreted as evidence for ancestral worship (*Whitley 2002*). However, in the Mesolithic there is little acknowledgement that disarticulated remains represent anything more than disturbed burials. This is beginning to change as new evidence from Europe demonstrates the potential of an understanding of disarticulation in the Mesolithic (*Green 2006*).

Context for burial

There is no doubt that the monuments such as long barrows and causewayed enclosures which appear during the 4th millennium BC, at the start of the Neolithic period, are an innovation. But it was not just monuments which were used to house the dead; caves were also used. Some studies give the impression that the use of caves is possibly reserved for 'deviant' burials. For instance, recent dating from sites in the Yorkshire Dales has highlighted 'diverse treatment' and a range of activities with regard to the deposition of human remains (*Leach 2008*). Prior to this reanalysis, the human remains from these caves were generally considered to be Late Neolithic or Early Bronze Age in date and derived from articulated burials. However, dating showed a group of five cave and rock shelters are actually Early Neolithic; the earliest known deposition of human remains in this upland region relating to Neolithic mortuary activity.

Andrew Chamberlain (*1996*) argued that there was an absence of cave use in the Mesolithic in the last 2000 years prior to the Neolithic. There thus tends to be a perception that the use of caves in the 4th millennium BC is an innovation related to an abrupt cultural transition. There is very little evidence for human remains in the Mesolithic, but most of what there is comes from a number of cave sites, Table 1 (see *Conneller 2006; Chamberlain 2001; Meiklejohn* et al. *2011*). There is a very well known grouping of caves in the Mendip Hills and Southwest England. There are six sites here which have produced radiocarbon dates on human bone that date to the Early Mesolithic: Aveline's Hole, Badger Hole, Gough's New Cave, Kent's Cavern, Oreston Cave and Totty Pot. Another set of sites occurs in South Wales on the Gower Peninsula (Foxhole Cave, Paviland Cave, Worm's Head) and on Caldey Island (Daylight Rock, Ogof-yr-Ychen, Potter's Cave) and these on the whole tend to date more to the 7th and 6th millennia. There is also the site of Pontnewydd in North Wales, with a human bone dating to the 7th millennium. There are a couple of caves in England which also appear to have Mesolithic dates: Bower Farm in Staffordshire, with a cranium dating to the 8th millennium, and Foxhole Cave, Derbyshire, with a 5th–4th millennia date (see below). Finally, Killuragh Cave in Ireland has also been dated to the 5th millennium.

Fox Hole cave in Derbyshire is slightly contentious in that it has been interpreted as possibly having Early Neolithic remains (*Chamberlain 2001; Meiklejohn* et al. *2011*). The cave was discovered and partly explored in 1928, with further controlled excavations by the Peakland Archaeological Society between 1961 and 1981 (*Chamberlain 2001*). These last ex-

cavations concentrated on archaeological deposits in the floor of the Entrance Chamber, the Main Passage and the First Chamber, and a sequence of deposits up to 2 metres deep was recorded. The human bones which have been dated were found in a layer which also contained wild and domestic fauna, charcoal, a Group IV polished axe, worked animal bone and teeth and some Peterborough ware pottery. Although the human bones are associated with Neolithic artefacts, the calibrated dates themselves are 5th millennium, with the date from the humerus spanning into the early part of the 4th millennium (Tab. 2).

With the transition dated to somewhere in the period of 4000–3800 BC, the dates from Fox Hole Cave, Derbyshire are arguably of Mesolithic date. There is also the example of Killuragh Cave in Ireland, which dates to the 5th millennium BC (*Conneller 2006*). Overall, there are very few dates for Mesolithic human bone within cave sites. However, what there is does suggest that cave sites are being used from the 10th to the 4th millennium BC. What is significant about the Early Neolithic is that in the 4th millennium BC, there is an increase in use, as noted by Chamberlain (*1996*), and further Early Neolithic human bones from caves have more recently come to light: *e.g.* in the Yorkshire Dales (*Leach 2008*).

Shell middens are another interesting context when analysing human bone deposition. Although shell middens are usually associated with the Mesolithic period, the deposition of human bone within the shell middens occurs only from about 4000 BC in Britain. The most well-known example is Oronsay, where human bones were found at Cnoc Coig. The midden itself is attributed to the Mesolithic period, with radiocarbon dates spanning from the 7th to the end of 5th millennium BC. There are also four dates on human remains from this site, which have recently been recalibrated to take account of the reservoir correction (*Milner, Craig 2009*). Two of the dates now appear to span the 4000 BC marker, while the other two date to the first centuries of the 4th millennium BC, so these appear to be very late additions to the midden (see *Milner, Craig 2009* for a full discussion). Similarly, at the shell midden site of An Corran, Scotland, the midden is very definitely Mesolithic in origin, with dates that span the 7th millennium to the end of the 5th millennium, but the human disarticulated remains found at the site are 4th millennium in date.

10th millennium	Worm's Head
9th millennium	Aveline's Hole
	Badger Hole
	Gough's Cave
	Worm's Head
8th millennium	Kent's Cavern
	Oreston Cave
	Totty Pot
	Daylight Rock
	Ogof-yr-Ychen
	Potter's Cave
	Bower Farm
7th millennium	Ogof-yr-Ychen
	Potter's Cave
	Pontnewydd
6th millennium	Ogof-yr-Ychen
	Paviland
	Foxhole Cave (Glamorgan)
5th millennium	Fox Hole Cave (Derbyshire)
	Killuragh Cave (Ireland)

Tab. 1. Mesolithic cave sites that have radiocarbon dated human bone sorted according to millennia.

Discussion

The question of whether new burial practices occur in the Mesolithic-Neolithic transition is a very difficult one to answer. On the one hand, the practice of disarticulation occurs in the Mesolithic and appears to continue into the Neolithic. In addition, caves seem to be used as places to deposit human bones from the 10th millennium right through into the 4th millennium, the Neolithic. Both the disarticulation of human bones and the deposition of bones in caves are also known on the Continent for the Mesolithic, and so these appear to be long-standing traditions and ones that are not new to the Neolithic period. However, there are also innovations at this time in the form of the building of new monuments and, in Scotland, the deposition of human bones in shell middens.

The Neolithic has been interpreted in terms of new ideas, motivations and changes in beliefs which accompany the new practices such as monument construction. It has been argued that monumental structures containing human remains delineated the land and marked out territory, as competition for land increased with the adoption of farming (*Parker Pearson 1993; Renfrew 1976; Sherratt 1995; Tilley 1996*). Another suggestion is that monuments were built to make a visual impact on the land (*Tilley 1996.73*) and link a community with the land by showing a long history of occupation (*Parker Pearson 1993.41*). It has also been posited that with the

Specimen	Material	Date (uncalibrated)	Date (calibrated 95%)	$\delta^{13}C$	Lab Number
Humerus	Human bone	5185 ± 60 BP	4230 BC to 3800 BC	–20.6%	OxA–9805
Tibia	Human bone	5485 ± 75 BP	4500 BC to 4050 BC	–21.4%	OxA–9929

Tab. 2. Radiocarbon dates from the site of Fox Hole Cave, Derbyshire (*Chamberlain 2001*).

development of farming there was an increased reliance on the work of previous generations (*Bradley 1984; Meillassoux 1972*) and with this increased reliance came a need to worship and appease the dead in order to ensure the economic success of the community (*Barrett 1988; Cooney 2000; Parker Pearson 1993.42; Whittle 1996*).

Disarticulation in the Neolithic is very much perceived to be tied into ideas of ancestor worship and monuments, which were not simply places to dispose of the dead, but places where the ancestors resided, giving their sanction to the use of that land by descendants (*Parker Pearson 1993.41*). Although monuments seem to be an innovation at this time, both caves and monuments alike have been argued to offer entry into the earth, into confined and dark spaces (*Barnatt, Edmonds 2002.124*). Caves form constant and fixed elements of the landscape and as such have characteristics that are predictable over time; these include the fact that there is restricted space in these "*naturally confined locations*" (*Pasda 2004.9*). The confined space and restricted light in caves has been argued to be a contributing factor in their nature as ritual locales, which mean that they may be seen as mysterious places (*Barnatt, Edmonds 2002.121; Conneller 2006.154–157; Tolan-Smith, Bonsall 1997.217*). They have been seen as entrances into the earth, liminal places between light and dark, where only small numbers of people could enter the unfamiliar worlds (*Barnatt, Edmonds 2002.126*) and they are less suitable for general residential activities which require space and light (*Tolan-Smith, Bonsall 1997.217*). These interpretations of the nature of caves are supported by ethnographic examples, such as the Saami in Northern Scandinavia, who believed in a three-tier world (*Bradley 2000.11–12*). They believed the world was split into three horizontal levels – the sky, earth, and underworld – and that there were entrances to this underworld at specific points in the landscape. The similarity between the restricted space in caves and chambered tombs has been suggested by Barnatt and Edmonds (*2002*) to show that they could have been used as interchangeable and equally appropriate places for burial, and reflect the playing out of similar beliefs about life, death, and rebirth.

The fact that Mesolithic shell middens contain human bones which date to no earlier than the 4th millennium BC has been used to argue that these places may have played a role in allowing people to hark back to older identities as a way of negotiating change at this time (*Warren 2007.323*). Perhaps these are also seen as territorial markers and an ancestral link with these places, as suggested by some for the monuments (see above).

Whether one decides to agree with these interpretations or not, the fact that there is some continuity in both disarticulation and cave use suggests that in the Mesolithic, people may have had similar types of beliefs to those posited for the Neolithic people. They may also have seen caves as entrances to unfamiliar worlds and may have disarticulated the dead and performed secondary rites because they too needed to maintain links with the ancestors. The new innovations of monument building and placing human bones in shell middens may have been a reaffirmation of those ideas. Our problem for Mesolithic studies is that there are fewer remains, and so they have tended to be ignored and un-theorised (but see *Conneller 2006*) which has helped to perpetuate a bias towards the Neolithic viewpoint in the study of the Mesolithic-Neolithic transition (*Warren 2007*).

The evidence that we have does not tell us any more about whether these were hunter-gatherers or incoming bands of farmers. That is more likely to be answered through a DNA studies (*e.g. Malmström* et al. *2009*). What is clear is that the situation is likely to be very variable, regional, and 'messy' as discussed at the start of this paper. What we also have to take into account is the time frame being analysed. In the 'grand narrative' the transition appears to be rapid, but if we consider it in terms of human experience and change over generations, it becomes more comparable to the Roman period in Britain, which took a similar length of time, about 400 years, and which witnessed similar major innovation and change, as well as indigenous acculturation. It is also important to consider why change occurs. Changes in burial practice are not always related to a change in belief or religion: over the last 100 years or so in Britain the number of people who are cremated has risen from 0% to over 70%. This

is due to a number of factors but does not represent a change in religion. There is a temptation to see something new, like the introduction of monuments, as the material representation of a change in ideology or religion; however, we have to also consider the possibility that these innovations are related to older customs.

Conclusion

In sum, the greatest change in terms of burial practice at the Mesolithic-Neolithic transition is the introduction of monuments, but as we have already seen, Barnatt and Edmonds (*2002*) suggest that chambered tombs and caves could have been used interchangeably. The fact that disarticulation also occurs in the Mesolithic, and caves are the main place where we find the bones, suggests that there is some continuity rather than change in practice during the Early Neolithic. Finally, the idea that there is a new ideology or a new form of ancestor worship does not fully consider the Mesolithic evidence prior to 4000 BC. It is important that false divisions are not created through the use of binary oppositions such as Mesolithic:Neolithic, hunter-gatherer:farmer, indigenous:incomer which can obscure the variability and complexity of the transition (*Warren 2007*).

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Water and fire as transformation elements in ritual deposits of the Scandinavian Neolithic

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ABSTRACT – *Flint axes are the most common Neolithic (4000–1800 calBC) artefacts found in southern Scandinavia. The vast majority of the tens of thousands that we know of have been recovered from former wetlands. In fact, detailed work in southern Sweden suggests that flint or stone axes were deposited in almost every single bog. There is also evidence that many axe blades underwent forms of treatment that involved transformation by fire, deliberate destruction and purposive deposition. These details of context, form and treatment suggest that axe blades were often of great symbolic significance to Neolithic communities, and implicated in the reproduction of the social world.*

IZVLEČEK – *Kremenove sekire so najbolj pogoste neolitske (4000–1800 calBC) najdbe v južni Skandinaviji. Velika večina od več deset tisočih znanih sekir je bila najdena na nekdanjih mokriščih. Natančno delo v južni Skandinaviji je pokazalo, da so bile kremenove ali kamnite sekire odložene v skoraj vsakem močvirju. Obstajajo tudi dokazi, da so bila številna rezila sekir izpostavljena obdelavi, ki je vključevala preoblikovanje z ognjem, namerno uničenje in namensko odlaganje. Ti podatki o kontekstu, obliki in obdelavi kažejo, da so imele sekire velik simbolni pomen v neolitskih skupnostih in so bile vpletene v reprodukcijo socialnega sveta.*

KEY WORDS – *South Scandinavia; Neolithic; axes; ritual deposits; wetland; heat treatment; fire*

Introduction

Studies of the creation of material culture and technology are well represented in research. But in contextual research, the ways artefacts went out of use should be as interesting and important an aspect as how they were made. There is a need to study the causes of destruction, both intentional and unintentional: worn out and discarded, deposited in graves, caches or ritual deposits *etc*. These make up an important part of the life cycle of an artefact, and this aspect is often perceived as a self-evident event. There are many possible reasons of social importance why an object was taken out of service. Many of the flint objects that have been discovered appear to be fully serviceable, yet they were incorporated into an occupation layer. They can also be tools that were taken out of service in accordance with special rules and norms, because they had been polluted when used on some occasion and were therefore separated from one social context, to be integrated into another. In many cases, socially related processes of deposition constituted a precondition for increased demand for new raw material and the need for new tools. From the point of view of the market economy, this demand may have been decisive for the existence of societies in which this specialisation had become an important economic factor. Demand is also of great significance from a broader societal perspective for maintaining contacts and a high level of craft competence, since the demand for new tools meant that flint distribution and skills in flint knapping could be maintained.

The study of ritual deposits has played an important role in research on the prehistory of southern Scandinavia. A large number of deposits, including different types of tools, have been identified as Neolithic (*Jensen 2001*). Deposits have been found at monuments such as megalithic tombs and cause-

wayed enclosures – associated with the entrance in the former case – and in ditches or specific pits within the enclosure at the latter type of monument. However, most of the deposits have not been found in direct relationship to a monument, even if several originate in areas with a high number of megalithic tombs (*Ebbesen 1985*). Some of these have been found in mineral soil, but most were placed in wetlands.

The most important tool in deposits is the flint axe. Some types are represented by thousands or even tens of thousands of finds. Almost every farm collection includes one or more axes, frequent among which are pieces from the Early Neolithic and the later part of the Middle Neolithic. The axe is also the most common tool in graves. Details of context, form and treatment suggest that axe blades were often of great symbolic significance to Neolithic communities, and implicated in the reproduction of the social world.

In the final part of the Neolithic, the axe seems to be replaced by the dagger as the most important flint tool in graves (*Jensen 2001*). Pottery is also of importance in deposits – if the megalithic tombs are included. Other find materials include amber artefacts, and copper tools which constute a very small category (*Jensen 2001*).

Wetland deposits

Wetland finds play a very important role in prehistoric research in southern Scandinavia in general, and during the Neolithic in particular (*Larsson 2001*). Wetlands have been an important source of information due to the large number of water basins, from large lakes to small kettle holes, formed during the deglaciation in southern Scandinavia.

A considerable number of lakes were substantially filled with organic litter and became bogs during the Atlantic period. In the Subboreal period, which corresponds to the beginning of the Neolithic at 4000 calBC, many bogs dried out. However, this description of wetland transformation is obviously very general, and wetland development was dependent upon a range of local factors, such as topography, hydrology and catchment size, so that even in the same land block, wetlands will have the potential to exhibit diverging developmental histories.

Population aggregation and early forest clearance caused fuel shortages, and from the late 18th century, peat cutting was introduced on a large scale (*Kristiansen 1974*). In order to gain more arable land, many wetlands were also drained, a process that began in the second half of the 19th century and is still taking place today. This process has consequently caused a radical change in the total area of the wetland landscape.

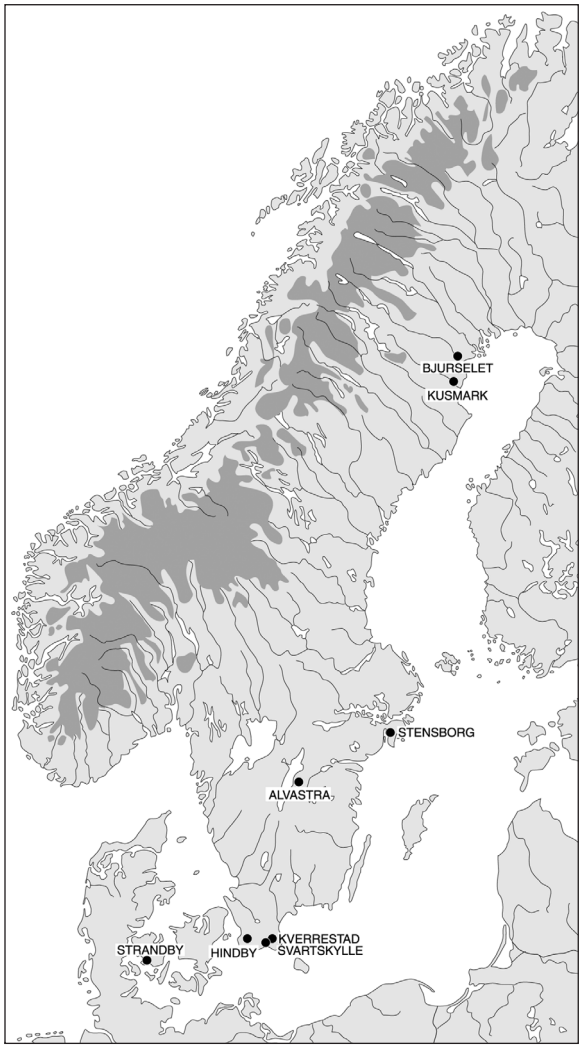


Fig. 1. Scandinavia with the location of the sites mentioned in the text.

Since Swedish cartographic sources are extremely rich by international standards, we can gain a good idea of the extent of wetlands during the period immediately preceding the large-scale drainage endeavours of the last century and a half. If we compare the situation in the 18th century, for which we have particularly numerous and detailed map sources, very few wetlands have survived in today's landscape. A study of the drainage system of a small river in the western part of Scania, the southernmost part of Sweden, shows that in the early 19th century, wetlands covered 29% of the drainage system (*Wolf*

1956). By the 1950s, the wetland area had been reduced to about 3%,, and today the figure is even lower (Fig. 2).

Deposits of artefacts in bogs were recognised during peat digging in the 18th and 19th centuries (*Nielsen 1985*). In the late 19th and early 20th century, a large number of artefacts were retrieved in southern Sweden. During the two World Wars and shortly afterwards, peat cutting was intensive. Until the late 1940s, most of the cutting as well as drainage work was carried out manually, which meant that artefacts and sites were easily recognised. Today, peat cutting is of minor extent and completely mechanised.

The role of the wetland as a place of contact with the spiritual world was clearly much accentuated during the Neolithic. A study of the find contexts of more than 600 Neolithic hoards in Denmark has shown that at least 80% have been found in former wetlands (*Nielsen 1977; 1985*) (Fig. 3). The Danish study is based on deposits that included two or more flint or stone objects, but a large number of single finds have also been found in wetland contexts (*Karsten 1994*). Additionally, in a study of depositional contexts in Scania, some 370 hoards have been identified, and the proportion found in wetlands is similar to the figure for Denmark (*Karsten 1994*). However, in Scania as well, in addition to the hoards, there are more than 900 recorded single finds.

In some instances, a number of artefacts were deposited within a limited area over a period of time, often amounting to hundreds of years. Intact tools constitute the most common kind of find, but in some instances these objects might simply represent the most visible element of deposits that may have included a range of additional artefact types of less durable or obvious nature.

A case study

In order to generate a more detailed and holistic understanding of the impact of votive deposition for Neolithic society, an area in the southernmost part of Sweden was chosen, including the neighbourhood of the author's residence in southern Scania (*Larsson 2007*). A complex range of landscape features, the understanding of which is fundamental to the analysis of wetland deposits, defines the research area. The landscape is mainly undulating in character, consisting of clay with a high proportion of lime. The landscape extends almost to the coast, and is delimited on both sides by sandy plains (Fig. 4). Due to the nature of the topography of this area, wetlands are plentiful and, consequently, the land suitable for settlement is somewhat limited. The number of Neolithic artefacts from the area of study in museum collections is low (*Karsten 1994*).

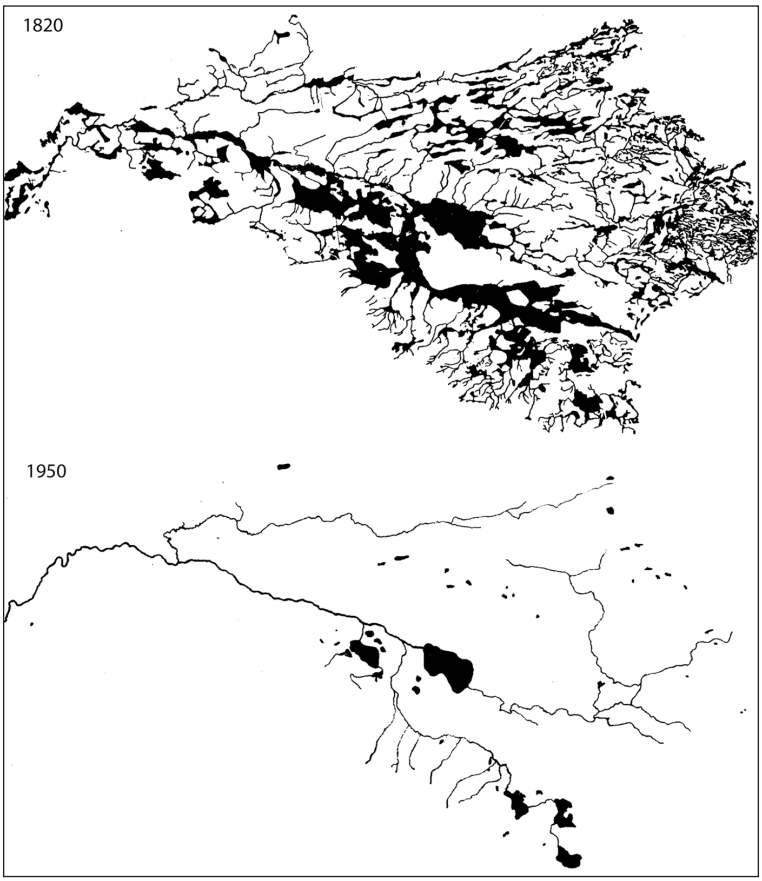


Fig. 2. The drainage of wetlands between 1820 (29% of all land) and 1950 (3% of all land) within a river drainage system of southernmost Sweden (after* Wolf 1956*).

The wetlands have been considerably reduced in both area and number in recent decades. However, an important data set is preserved in a military reconnaissance map from around 1815, prior to the implementation of large-scale drainage endeavours. The map gives a unique insight into the size and distribution of wetlands, several of which have been totally drained today. In most of these cases, the former wetland

area can still be monitored, as these areas are distinguished by darker soil, which remains visible today as a result of the high humus content of the ploughzone.

Because of the undulating topography, the view of the landscape varies considerably, with excellent views from hilltops and a restricted field of vision in the areas between the hills. This change can take place within less than a hundred metres, and can significantly affect a person's perception of the landscape. These changes in the landscape imbue it with a kind of monumentality in itself, and in this regard it contrasts markedly with the surrounding plains. In this topographic setting the wetlands are usually rather small, or else long and narrow, and they occupy discrete areas between the hills (Fig. 5).



Fig. 3. A deposit of thin-butted flint axes (after* Jensen 2001*).

The settlement remains of the Neolithic are situated on small hills, more especially on those that are made up of well-drained material (Fig. 4). Unfortunately, ploughing has heavily damaged all of these sites, but most are of limited extent, usually covering an area of less than 1000m^2.

Field surveys, along with information gained from several farm collections, means that a considerable number of archaeological deposits have been identified as located in wetlands (Fig. 4). Judging by the yellow to red patination of artefacts in the farm collections, an even larger number of artefacts were found in wetlands, although it should be noted that no information on the circumstances of discovery is available.

Most of the finds from museums as well as farm collections are intact tools (Fig. 6). However, during surveys, several fragments of axes and also daggers have been found. While some of these might have been intentionally split, some axe fragments have a pattern of breakage consistent with their having been broken during use (*Olausson 1983.Fig. 26*).

The simplicity of the deposits makes it difficult for the layman to identify some of the objects as belonging to intentional votive deposits. It is possible that similar votive deposits in other bogs have not been noted except when they occur in more easily recognised votive forms, as is the case with the more characteristic deposits of flint axes or daggers.

The excavation of a small bog, Hindby mosse in south-western Scania, presents the remains of votive practices running through the Late Mesolithic, most of the Neolithic and into the Bronze Age (5000–1500 calBC) (*Berggren 2007*). There are examples of axes deposited in pairs in the bog, but it is more common to find combinations of tools, some of which had been broken before deposition. In addition, the bones of animals or humans have been recovered, such as a deposit of a burnt fragment of an axe, a human bone, and three canine teeth of pig (*Berggren 2007.241*). These remains show that in some cases sorting of the ritual deposits was carried out, as well as deliberate fragmentation by cracking and burning before deposition. While these deposits are the most difficult to recognise, the possibility exists that they may well have constituted one of the most common kinds of deposit, and that failure to identify them has severely distorted the record.

From the perspective of the Neolithic period, the case study shows that almost every wetland was used for some form of ritual deposition. Compared to Continental Europe, where deposits in rivers and lakes are rather well known, the equivalent number

in southern Scandinavia contexts is small, with only two instances reported within the research area, where artefacts have been found in small brooks.

Most of the wetlands considered here contain either one or a couple of artefacts, and in the larger wetlands on the plain a considerable number of artefacts have been found.

In view of the fact that we are dealing with wetland deposits, it is conceivable that people stood on the shore and threw the objects out into the water. However, in many of those cases where a more detailed account is given of the precise context of axes that were found close together, the finder has observed that they were carefully placed in a special arrangement within the wetland. Axes have been found close to, and sometimes on top of each other, with the edges directed downwards or in a circle (*Rech 1979.Abb.2*). This substantiates the observation that such artefacts were carefully placed in the water, rather than being thrown out into the basin.

Landscape and society

In certain respects the cosmology relating to wetland deposits was active throughout most of the Neolithic, and in later periods as well. Some wetlands appear to have been imbued with ideas of a sacred character over many centuries, and in some cases millennia (*Stjernquist 1997*). Artefacts were often deposited within a delimited area of the bog, even though individual finds may comprise artefacts covering a considerable time-span (*Karsten 1994*).

Depositing artefacts within a delimited area of a wetland during intervals of several centuries means that knowledge of the ritual importance of the site survived for generations. Knowledge of the physical as well as the metaphysical components of the landscape was passed on over long time scales with no visible manifestation in the material culture. Clearly, a detailed knowledge of the landscape included legends, tales and stories passed on from one generation to the next. During certain periods, this relation to the wider worldview is marked by acts of ritual practice involving the material culture. However, it is apparent that for long intervals the knowledge was passed on with no visible reaction by the Neolithic societies in question, in terms of active votive deposition, and this factor perhaps best reinforces the observation that these locations held a significance that was not only spiritual.

In this context, changes might have been happening in society, when people had a need to disrupt as well as establish links with much earlier societies. Bringing the old offering sites back into use during the later part of the Middle Neolithic might have been a way to re-establish contacts with earlier generations. The sites represent a connection with societies of the past based on legends, and could function as a means of legitimisation, as well as a means of emphasising a different value system from that of the society that had just been replaced.

As repeated deposition of artefacts took place within a limited area of the wetland, which was shallow and in some cases seasonally dry, there would have been some residual knowledge of the excellent condition of the tools that had been placed as offerings

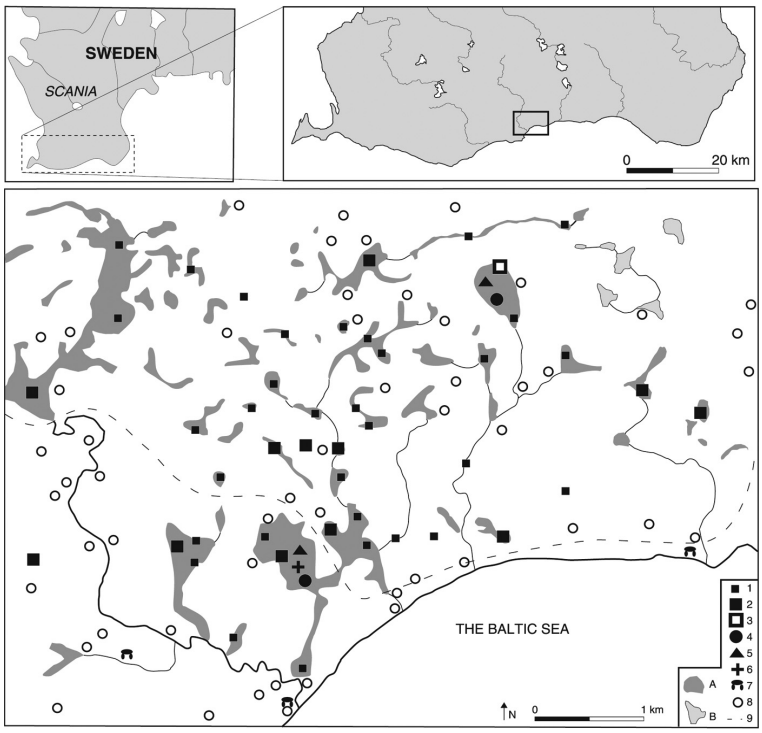


Fig. 4. Wetland deposits within the research area in the southernmost part of Sweden. See legend. 1 deposit of a single artefact. 2 deposit of at least two artefacts. 3 deposit of several artefacts. 4 deposit of artefacts made of antler and bone. 5 deposit from the Bronze Age. 6 deposit from the Iron Age. 7 megalithic tomb. 8 Neolithic settlement. 9 extent of the hummocky area. A wetlands and B lake.

several generations earlier. The deposition or transformation of artefacts in water would presumably invoke a subtle quality and confer special value on the artefact. This must have been the primary intention behind wetland offerings. Wetland deposits could have been visible during dry summers, when the harvest might have been severely affected, and the appearance of earlier deposits during times of drought might well have been an important stimulus to reinforce connections with the metaphysical world.



Fig. 5. Wetland in between the hills within a south Swedish hummocky landscape.

In the cosmology of certain societies the cosmos consists of three worlds: the underworld, the earth and the sky (*Helskog 1988*). The underworld is usually connected to water, so the wetland might have been regarded as a liminal zone between the underworld and the physical world. Water is life-giving for all organisms, and wetland deposits might be related to underground spirits connected with fertility, where the wetland was regarded as a point of bodily access to the hidden soul, *i.e.* to the underworld. Ritual deposition in wetlands might have been a regular practice, where the desired effects were long-lasting, but not immediately noticeable. We can envision a situation where change is not visible, unless the offerings cease. Several of the wetland offerings may be viewed as unfinished projects, especially where the deposition period extends over several generations.

According to palaeoecological studies, most Neolithic wetlands were partially covered or encircled by small trees and bushes (*Larsson 2000b*). The depositional context of a small wetland, with a dense vegetation of bushes and trees surrounded by steep hills, focusing on a small part of the sky, produces a location tailor-made for secret deposits made by individuals or a small group. The situation is quite different from that of larger wetlands on a plain, where deposition could be watched by a large group of people. The first example is a ritual act in which the most important part is to create contact with members of the underworld or upper world. In the larger wetlands, it should be anticipated that at least some of the deposits were made in order to let several people take part in an act of ritual deposition, which was initiated and performed by particular members of society. The latter form of offering ceremony might be related to activities taking place in relation to burials in megalithic tombs, or offerings in connection to these monuments. Such ceremonies are well attested by the large quantity of pottery and flint tools found outside the entrances to such tombs (*Strömberg 1968; 1971; Tilley 1996*).

Ritual deposits within the hummocky landscape are usually rather small-scale, the more substantial deposits being found in the larger wetlands on the plain, but in a context that exhibits a close connection to the adjacent hummocky landscape. This might indicate that wetlands in different kinds of landscapes could have had special importance in the metaphysical world, and the fact that they are still used during later parts of the prehistoric period could also attest to their continued ritual and symbolic importance.

The hummocky landscape, with numerous small wetlands, had a limiting effect in terms of population size and the potential for communities to expand their resource exploitation areas. This might mean that conflicts between any new settlers and the people already inhabiting different farms were minimised, thereby reducing the potential for stress in the society. Therefore, it was not necessary to mark relations between people by means of monuments in the more marginal landscape, but this does not mean that ceremonies of different kinds did not take place. These ceremonies were performed as both more individual or personal ritual deposition in small wetlands, or as larger societal expressions of ritual behaviour on the plains. They clearly functioned with the landscape, acting as natural monuments in regions where monumental architecture

was either an impractical or unnecessary form of societal ritual expression and legitimisation.

Transformation by fire

A special form of fragmentation is the effect of fire. Finds from settlement sites indicate that the ritual burning of flint artefacts was well known throughout the Neolithic. Fire alteration of tools is relatively frequent at sites throughout the Neolithic (*Karsten 1994; Malmer 2003.41, 74*). The burning of flint axes could be accidental, but at several sites the percentage is too high, often higher than 20%, to be viewed in such mundane terms (*Karsten 1994.159*). Most sites show marked differences in terms of the tool types affected by fire. There is also evidence that the burning of axe blades was its self highly structured (*Larsson 2000a; 2000b; 2002*). The alteration of flint by direct exposure to fire provides different products of fragmentation from those seen on many sites. Simple exposure to high temperatures usually results in the fragmentation of flint artefacts into very small pieces. This is not what we find with many burnt axes, which are often recovered as larger-than-expected fragments. This suggests that axes were often heat-treated before they were placed on the fire (*Larsson 2000b*). The intention was not to destroy the axes entirely, but keep them in parts as large as possible, even after their transformation by fire. At almost every site, axes are more affected than any other type. This phenomenon is independent of chronology, occurring from the earliest Early Neolithic to the latest Late Neolithic. Alteration by fire, however, seems to be most common during the Middle Neolithic, including the late Funnel Beaker Culture and the Single Grave Culture.

Creating and constructing requires profound practical knowledge. Destruction, or should we say, different means of transformation, does not require the same physical competence, but rather a feeling, sometimes a profound sensitivity, for the manipulation of emotions and impressions among the members of society, in order to turn an act of destruction into an act of reproduction. There are several aspects that may be considered within the processes of deposition and destruction.

One aspect relates to tools affected by intense fire. Intentional destruction of tools is rarely observed among the wetland deposits. In a few cases, flint axes, which make up the predominant group of deposited tools, have traces of fire (*Stjernquist 1965; Knutsson 1988*).

Fire-damaged flint axes are found in connection with megalithic tombs (*Jørgensen 1977*), as well as in pits and trenches associated with causewayed enclosures. The fragmentation of flint axes has been regarded as the result of ritual acts in which fire played an important role (*Andersen 1997*).

It is of special interest to identify a relationship between the fabrication of axes and destruction of the same kind of tool. At some causewayed enclosures of the late Early Neolithic and early Middle Neolithic (about 3400–3200 calBC) (*Andersen 1997*) as well as palisades of the 'second generation' (*Svensson 2002; Brink 2009*) from the late Middle Neolithic (MNA–MNB at about 2900–2600 calBC) waste from flint axe fabrication as well as fire destruction has been documented (*Runcis 2008*). There seems to be a direct link between the birth and death of axes (*Strassburg 1998*) related to monumental enclosures.

Mass destruction of axes by fire

A special and so far rare type of site with examples of fire-altered flints has been found on a plateau within an area of approximately 70x70m at Kverrestad, south-eastern Scania (*Larsson 2000b; 2002*). Excavation revealed a number of pits varying in size and depth, in which flint and stone artefacts affected by fire had been deposited together with a considerable amount of fragmentary pottery. The largest pit was about 4m long, the shortest measuring less than 0.5m. Finds were made throughout the fill, which shows that the artefacts had been deposited during the entire process of filling in the pits. Frag-



Fig. 6. An Early Neolithic battle axe and a Late Neolithic flint axe from a small bog.

ments of about a hundred thick-butted concave-edged axes and chisels were found, as well as arrowheads and other flint and stone tools (*Larsson 2000b*) (Fig. 7). A small number of burnt human bones, intentionally cracked into small pieces, were also found, providing another example of the combination of humans and axes. The finds are dated to the late part of the Battle Axe Culture, at about 2300 calBC. As an interesting aspect of the 'life cycle' of axes, the axes at Kverrestad included rough, unpolished examples, only shaped into form, as well as examples with very well executed polish over the entire body.

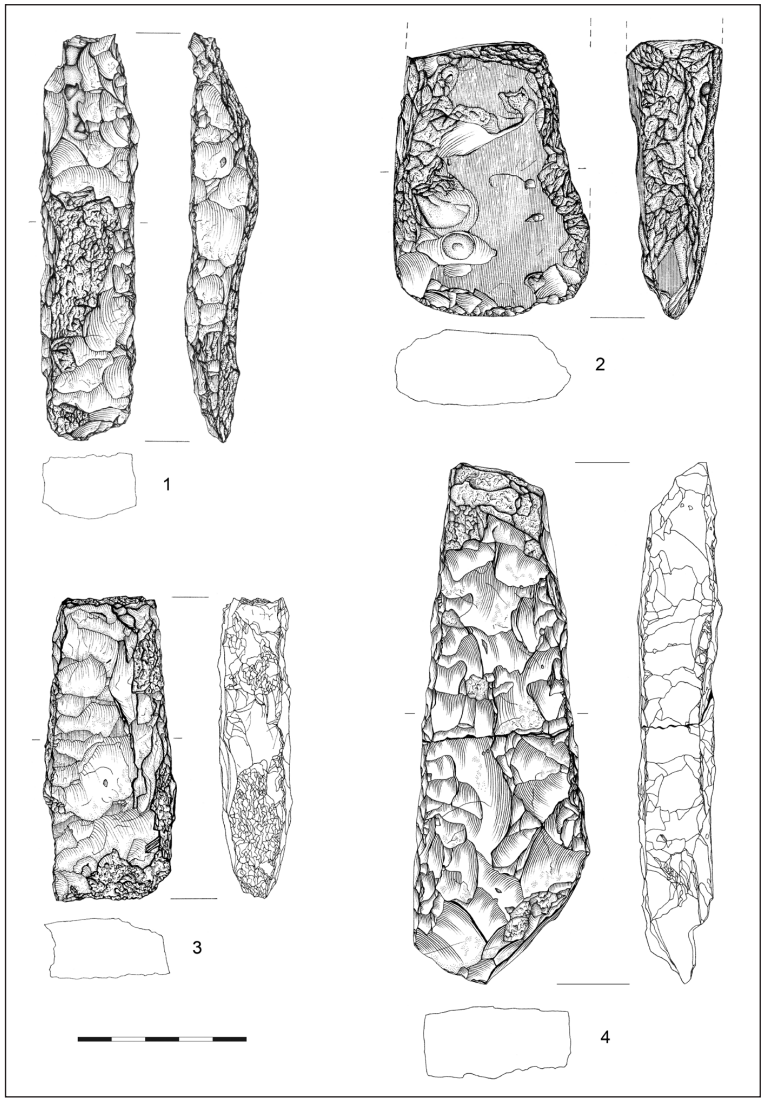


Fig. 7. Flint axes (2–4) and flint chisel (1) with traces of heat from Kverrestad, southernmost part of Sweden. Drawing by Björn Nilsson.

The choice of axes for burning, as recorded at settlement sites, is also obvious among the finds at Kverrestad. While more than 90% of the axe finds display changes by fire, approximately 65% of the scrapers, approximately 50% of the tanged arrowheads, and approximately 30% of the arrowheads made by pressure-flaking show the same alteration by fire. These marked differences indicate intentional selection – some tools required treatment by burning more than others. Similar evidence has also been found at Svartskylle, some 17km west of Kverrestad (*Larsson 1989*), and at Strandby, southern Funen (*Andersen 2000.34*). These two sites are dated to the Early Neolithic/Middle Neolithic transition and the earliest Middle Neolithic. On both sites, preforms as well as polished flint axes were found.

But why was burning of flint used in activities of ritual significance? There is a very marked difference in the attitude towards burning, compared with deposition in water. In the former case, the destruction of the artefact is easily visible at the point when the practical function of the tool ceases to exist. Fire is the destroyer, but also the creator. Slash-and-burn clearance of the forest creates arable land. Destruction by fire could have had a direct visual as well as an auditory impact.

That flint axes are linked to fire could be explained by a special relationship between fire and flint. A common way of making fire was to use flint and iron pyrites. The sparks seem to originate from the flint, and the view that fire was incorporated within the material might have led to the acceptance of this relationship as part of the worldview.

The intention was not to destroy the axes entirely, but to keep them in parts as large as possible, even after their transformation by fire. At almost every site, axes are more affected than any other type.

Ritual burning has a public, direct, evocative and even magical appearance (Fig. 8). Experiments have been conducted by exposing newly-made flint axes to different forms of fire, including direct as well as indirect heat in large and small fires, in order to learn what happens to flint at different temperatures. In order to obtain large pieces of burnt flint,

such as are found at the sites, it must be treated it in two evocative, but less public stages. First, the flint has to be heat-treated. In the second stage, the flint could be directly placed on a fire. The flint undergoes a colour transformation from natural black or grey to white. This shows that the majority of flint tools were handled carefully in order to obtain a colour change with a minimum of destruction. The artefact undergoes remarkable change during the process. The changes are similar to the cremation of a human body.

Fire as transformation in the northernmost part of the Funnel Beaker Culture

In Scandinavia, mass destruction by fire has been identified at a small number of sites. One site in particular provides a lens through which to study the ritual significance of Neolithic axes. Stensborg, on the northern border of the Funnel Beaker Culture in the Mälardalen region, lies some 30km south of Stockholm and has been the focus of field collection over the past twenty years (*Broström 1996*). During the early part of the fourth millennium BC, the site was situated on an island in a large archipelago. At 35m above the present sea level, the settlement was located close to a deep and narrow inlet. A large number of tools were found on a field sloping towards what is now a valley. This collection, the largest from central Sweden, includes several hundred cracked stone axes and a considerable number of fragments of flint axes damaged by fire (*Broström 1996.69*) (Figs. 9–10). The collection also includes slate objects from northern Sweden. The range of raw materials and forms of treatment represented at the site is unparalleled.

Stensborg is located at least 600km north of the southernmost part of Sweden or eastern Denmark, where flint of suitable size and quality for making thin-butted axes was available. Here at least, the distances involved may have conferred a particular importance on the thin-butted flint axes recovered from the site, an importance reflected in their subsequent treatment. All the thin-butted stone axes were found as fragments, a few also showing marks of exposure to intense fire. They were intentionally cracked into pieces and the edges of some are heavily damaged, as if repeatedly hit against a rock. Wear and repair traces on a number of these suggest that, whatever else they may have meant, they nonetheless saw practical use. The flint axes from the site, none of which have been recovered intact, all showed traces of exposure to fire. It is difficult to arrive

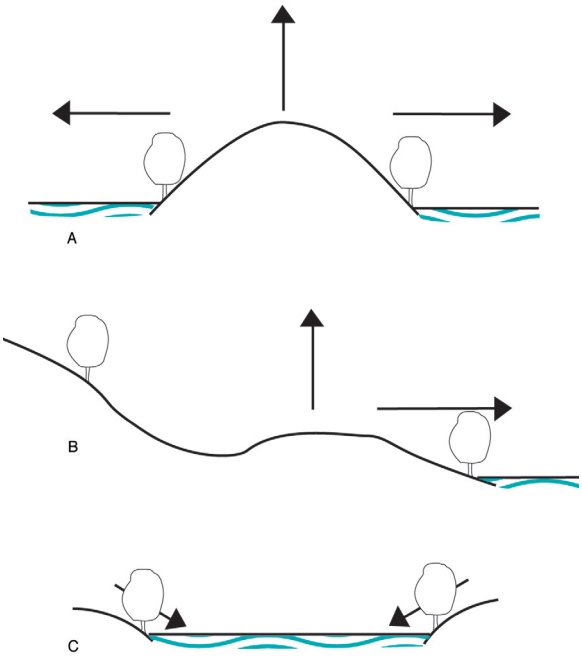


Fig. 8. The topography of the site with mass destruction of axes by fire (A–B) in relation to a bog in a hummocky landscape with wetland offerings (C).

at an estimate of the size of axes based on more than five hundred fragments, although at least some were of a size comparable to the larger examples in southern Scandinavia. Numbers are also difficult to calculate, although there might have been as many as twenty. From the shape of the fragments, it is estimated that about 70% were thin-butted, while the remainder were point-butted. In southern Sweden, the point-butted axe is rarely found damaged by fire.

In the course of excavation at the site, several small pits were discovered. They included parts of flint axes damaged by fire and broken parts of stone axes. The pits had been dug into clay, filled and finally covered with clay, which made them hard to detect. Large quantities of grain had been burned and placed in the pits.

The slope might have functioned as an assembly area where certain rituals were performed. It had a specific setting, with a considerable depth of water just beyond the shoreline, meaning that vessels could easily approach. On the opposite side of the slope, a ridge marked the limit of the site. On both sides, to the south and north, the site was delimited by steep-sided ravines eroded by small brooks. The field was thereby well enclosed by natural obstacles.

In southern Scandinavia, causewayed enclosures are situated in locations partly surrounded by natural

obstacles. However, artificial obstacles are added, such as palisades and pit systems. One can envisage other kinds of enclosure within smaller social systems that might be surrounded only by natural obstacles, and Stensborg might be one such example.

The finds from this site show a marked difference from finds at ordinary settlement sites. The large number of axes might instead indicate a relationship to other kinds of sites in southern Scandinavia, where axes played an important role in activities that have for a long time been regarded as ritual deposits.

The phenomenon of burning is also evident in other parts of Sweden. For example, the pile dwelling from the Middle Neolithic at Alvastra, western Östergötland, includes remains of ritual activities (Fig. 11). The site is dated to about 3100 calBC and includes artefacts characteristic of the Pitted Ware Culture, as well as the Funnel Beaker Culture (*Malmer 2003.103*). Among the entire flint axes and large pieces of axes, several examples show effects of fire alteration (*Browall 1991*). A large number of hearths as well as strike-a-lights have also been found (*Browall 1986*). In the dwelling, carbonised grains as well as apples and hazelnut shells are frequent. Burning was of special significance at the site. At sites in northern Sweden, such as Kusmark, evidence of flint alteration by fire has also been found. In this area, flint was a very exotic raw material, because it had to be transported more than 1000km from the south. The fragments from Kusmark are remains of axes or chisels affected by fire (*Knutsson 1988.86*). The largest find of axes, at Bjurselet, contains about two hundred blades of the same type as at Kverrestad. The finds have been identified as ritual deposits, as the axes had been placed in special arrangements (*Knutsson 1988.Fig. 40*). Some of the Bjurselet axes had been deliberately affected by fire (*Christiansson 1989.21*).

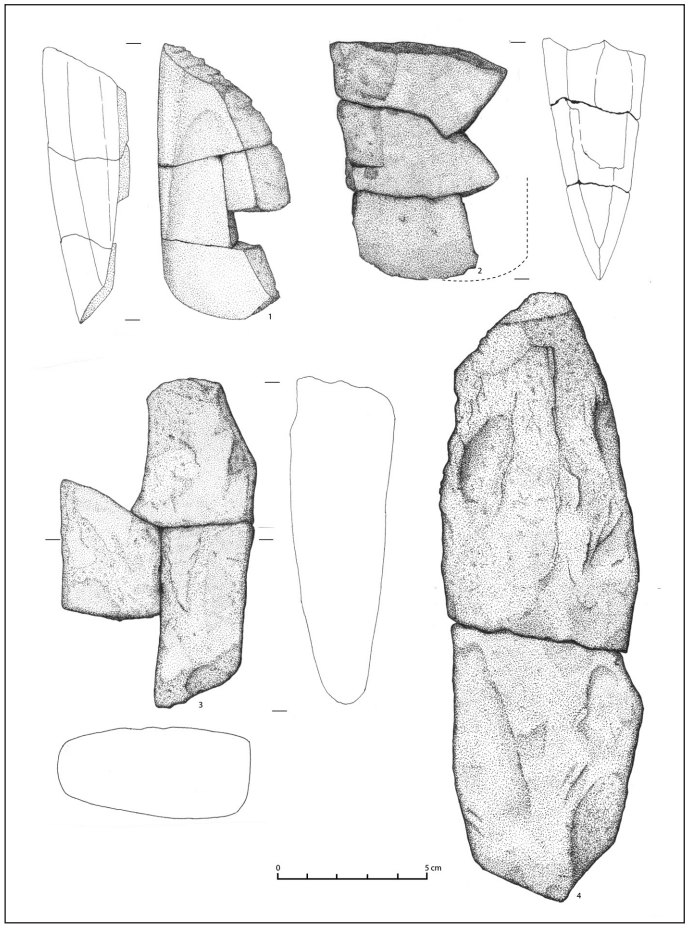


Fig. 9. Stone axes from the settlement site Stensborg, middle Sweden. 1 fragments of stone axe with hollowed edges, 2–3 fragments of thin-butted stone axes and 4 preform of a stone axe. All stone axes are intentionally damaged, and the edge of no. 3 is blunt. Drawing by Krister Kam Tayanin.

The societope of fire

What is being expressed at Svartskylle, Kverrestad and Stensborg differs from the destruction of single artefact or a number of artefacts by fire evidenced at settlement sites and megalithic tombs. This type of deposit is found throughout the entire Neolithic, but on certain occasions the act achieves an imposing effect.

Tools destroyed by fire that lie outside the megalithic tombs can be regarded as offerings to the ancestors or deposits through which the ancestors act as agents for further contacts. Deposits that included the element of fire, as at Kverrestad, Svartskylle and Stensborg, place the actors in direct contact with the metaphysical world without a detour via ancestors.

The cosmology that dictated burning, just like that relating to wetland offerings, was active throughout most of the Neolithic. The fact that the offerings at Svartskylle and Kverrestad are the result of short-term activities indicates that they should be regarded as completed deposits of mass material. These seem to have been of exceptional size and intended to impress humans as well as metaphysical beings. The contact that people intended to be established between the physical and metaphysical worlds was

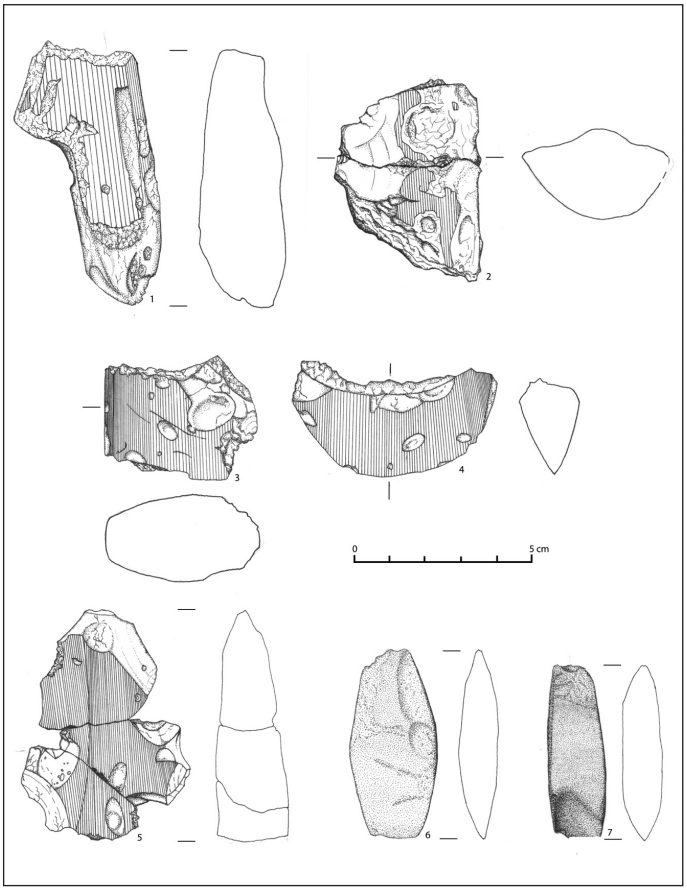


Fig. 10. Flint axes (1–5) and stone chisels (6–7) from the settlement site Stensborg, middle Sweden. Drawing by Krister Kam Tayanin.

to a great extent impressive and imposing. The transformation by fire of material culture must have been very obvious and the wealth represented by the number of tools and exotics included must have been considerable.

In view of the high quality and great number of axes, there must have been knappers who spent a considerable amount of time producing axes, *i.e.* true flint-knapping experts. Blacksmiths were regarded in late prehistory as possessing the knowledge not only to master iron, but also to master forces of the immaterial world (*Østigård 2007*). A similar status was accorded to the knowledge and action of the bronze smelter (*Goldhahn 2007*). The flint-knapping specialist who made the axes might have acquired the same position. The knapper, like the axes, became positioned in a zone between the living society and another world, that of spirits and deities. Those involved in the birth of particular axes may also have been involved in their death, transforming blades as part of the transformation of the deceased, effecting their transfer to the world of the forefathers.

These arguments bring us back to Stensborg. The stone knapper(s) at the site might have taken the lead when certain axes were to be transformed, most probably during assemblies of people from farms across the island of Södertörn. These assemblies may have been held for many reasons, but they most likely included mortuary rituals that involved the cremation of bodies, this being the common rite across Mälardalen at the time (*Hallgren 2008*). The evidence from the site suggests that, among other things, the process of transforming the body also involved transforming key items of material culture and, in the case of flint axe blades, this also involved prior heat treatment. This prior treatment was in most cases not a public, pyrotechnical event with a huge fire, the cracking of heated flints and splinters flying out of the fire. Rather, it was a slow and largely silent process. It might even have been conducted away from the public gaze. The subsequent result, a slow colour change without intense cracking, may thus have been all the more remarkable for those attending the more open and public moments of particular cremation ceremonies. The distribution of axe fragments over most of the slope at Stensborg indicates that after their transformation by fire, a number were deposited in shallow pits, some of which were later destroyed by ploughing.

The patterning at Stensborg reflects the operation of cultural choice according to a very particular logic. The process of heat treatment does not seem to have been applied to other materials on the site or at earlier sites in the region. The large number of simple chisels found on site were not fragmented or heated (Fig. 10.6–7). These could have been used in the building and decorating of wooden structures that were provided for the public events. They were easy to make and were probably deposited after use without the kinds of treatment accorded to many of the flint axes. Because of their associations, the flint axe blades required a different kind of treatment, one that involved a very specific technique. This knowledge of what heat treatment involved was one element in a body of ideas that was brought to the north as part of the knowledge involved in know-how (*Pelegrin 1990*) – the manufacturing of the thin-butted flint axes. Another idea would have been how the axe was generally used in deposition, or rather the transformation of an important part of the

material culture to an immaterial world. The handling of the objects undoubtedly involved special acts, perhaps combined with songs and dances. The specialist flint knapper was the possessor of that information, transmitted from generation to generation, providing him or her with a special status.

Conclusion

Many more examples could be presented to confirm that the ritual use of flint axes in Scandinavia was structured by norms and conventions. What is interesting here is that these conventions cut across other boundaries of cultural diversity and are sustained despite changes in the form of axe blades themselves and over a period of about two millennia. Stability seems to have been more important than innovation. The meaning of ceremonies, or at least the knowledge of how ceremonies involving axes should be performed, was transferred from generation to generation without much change. During the Neolithic, the intensity of axe deposition changes considerably. Rather few axes were deposited during the early part of the Early Neolithic (EN I, 4000–3500 calBC). A considerable intensity of axe deposition in wetlands is evident in the late Early Neolithic and earliest Middle Neolithic (EN II–MNI, 3500–3100 calBC). This is when megaliths and causewayed enclosures are built, probably indicating extensive internal stress within and between societies. Far fewer depositions in wetlands take place in the middle part of the early Middle Neolithic (MNA II–IV, 3100–2800 calBC). However, that is a period when axes are deposited within and outside megaliths, emphasising the deposition with the dead or outside the tomb of the ancestors. Quite a number of wetland depositions occur during the later part of the Middle Neolithic (MNB, 2500–2200 calBC). There seems to be a desire to link society to a specific period several centuries earlier. During the Late Neolithic (LN, 2200–1800 calBC) axes are still deposited, but they are replaced in their role as the most important object for individuals by daggers.



Fig. 11. The wooden platform from Alvastra, dated* c. *3100 calBC (after* Browall 1986*).

In certain cases, as many as fifteen axes might be deposited in one instance in wetlands. However, the largest depositions of axes take place in combination with the use of fire. This type of sacrifice of a large number of axes, including rare objects, may have been practised on special occasions, probably in combination with external or internal threats. It could have been an act which was meant primarily to legitimate power by impressing representatives of another community.

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A glimpse of human life from the Neolithic cemetery at Tell el-Kerkh, Northwest Syria

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ABSTRACT – *The excavations at Tell el-Kerkh, Northwest Syria, have uncovered the presence of a large Neolithic settlement that had a long cultural sequence. The settlement covers a vast area of at least 16ha and shows signs that it was a complex society. Excavations recently revealed a Neolithic cemetery with the remains of over 240 individuals that is one of the earliest outdoor communal cemeteries in West Asia. The discovery of the cemetery has provided a great deal of information about Neolithic life, and forms the basis of this paper, which discusses causes of death, division of labour, and ownership in Kerkh Neolithic society.*

IZVLEČEK – *Izkopavanja na najdišču Tell el-Kerkh v severozahodni Siriji so pokazala prisotnost velikega neolitskega naselja z dolgim kulturnim zaporedjem. Naselje pokriva območje, veliko najmanj 16ha, in kaže znake o tem, da gre za kompleksno družbo. Nedavna izkopavanja so odkrila neolitsko grobišče z ostanki več kot 240 posameznikov, kar pomeni, da gre za eno prvih skupnih grobišč na prostem v zahodni Aziji. Z odkritjem grobišča smo dobili veliko informacij o neolitskem življenju in podlago za ta članek, v katerem se ukvarjamo z vzroki smrti, delitvi dela in lastništvom v neolitski družbi v Kerkhu.*

KEY WORDS – *Tell el-Kerkh; Neolithic cemetery; causes of death; division of labour; proprietorship*

Introduction

Since 1997, experts from the University of Tsukuba and the Directorate-General of Antiquities and Museums of Syria have been excavating a large Neolithic settlement called Tell el-Kerkh. This site is located in the south of the Rouj Basin in Northwest Syria (Fig. 1). The site consists of three contiguous artificial mounds: Tell el-Kerkh 1 and 2, and Tell Ain el-Kerkh (Fig. 2). Although we collected Neolithic material from all three mounds, Tell el-Kerkh 1 is densely covered with later cultural deposits, while Tell el-Kerkh 2 and most of Tell Ain el-Kerkh contain pure Neolithic mounds. Therefore, we concentrated our activities at Tell Ain el-Kerkh.

The purpose of the excavations is to reveal the formation and management of such mega-sites, particularly during the Late Pre-Pottery Neolithic B (PPNB) and Early Pottery Neolithic (PN) periods. More than ten seasons of excavations revealed that the Neolithic settlements at Tell el-Kerkh not only cover a vast area of around 16ha, but also show signs of being a complex society, which included communal storage, craft specialisation, advanced technology, long-distance trade, concepts of ownership, ritual practices, and personal property (*Tsuneki* et al. *2007*).

A recent focus of the excavations has been the discovery of a Pottery Neolithic cemetery in the central area of Tell Ain el-Kerkh in 2007; its excavation has continued since then (*Tsuneki 2010; Tsuneki* et al. *2011*). The cemetery is located next to a habitation zone of the Rouj 2c settlement, dating to between 6600 to 6000 calBC. Up to and including the 2010 season, the remains of over 240 individuals have been discovered within an area measuring about 200m^2 (Fig. 3). The skeletons were laid overlapping each other in a layer about 1m thick, and two ^{14}C datings directly from human bone samples dates

them to 6474–6266 and 6415–6252 calBC (1σ) respectively. The cemetery seems to have been used for several centuries.

In the previous Pre-Pottery Neolithic (PPN) periods, the dead were commonly buried within of living spaces, such as under the floor, in a courtyard, or near a wall foundation. Clusters of human bones were sometimes discovered in special houses, called skull buildings (*Bienert 1995*), charnel houses (*Moore* et al. *2000*), maison des morts (*Coqueugniot 1999*), and tower burials (*Cornwell 1981*). The long and complicated funeral practices, including skull decapitation and skull caches, were repeatedly undertaken in PPN societies (*e.g. Kenyon 1981; Bar-Yosef* et al. *1991; Kuijit 1996; 2000; 2008; Goring-Morris and Horwitz 2007; Bienert 1995*). The characteristics of graves at Kerkh Pottery Neolithic cemetery were quite different from PPN graves, and the funeral practices executed there must also have been quite different. The Kerkh Pottery Neolithic cemetery shows drastic changes in funeral practices and views of the next world. It is one of the earliest outdoor communal cemeteries in West Asia. Considering the information that the excavation of this cemetery has revealed, I would like to provide a glimpse of the life of Pottery Neolithic people.

General information about the Neolithic cemetery

Burials in the cemetery can be divided into three main types: primary inhumation, secondary burial, and cremation burial. Structured burials and urn burials were also identified within the cemetery, but their number was quite limited.

Primary inhumation was the main burial type. Without exception, all the burials were in a flexed position (Fig. 4). They were usually buried on their side, although some people were buried in a supine or prone position. Adult males and females, in addition to children, were buried in any position, and no remarkable differences were observed between age and sex. There were various burial orientations; however, we cannot point to any strict rules for burial orientation in this Neolithic cemetery.

Human skeletons, especially skulls and long bones, were sometimes removed from the primary burial context and reburied in a shallow pit. There are two sub-types of such secondary burials: single and collective. However, the majority of secondarily deposited skeletons were buried in a collective burial ground



Fig. 1. Location of Tell el-Kerkh.

(Fig. 5). Most of these individuals were adults; however, sub-adults, juveniles, and infants were also included in the secondary pits. Both sexes were identified from the adult bones.

The third burial type is cremation. Thus far, at least 37 cremated individuals have been discovered, mainly in four cremation pits (crematoriums) (Fig. 6). Over half of the cremated individuals were adults of both sexes; however, sub-adults, juveniles, and infants were also cremated. The age and sex distributions of those cremated were similar to those of the secondarily deposited individuals. Considering the size of the pits, the number of individuals, and their disarticulation, it seems that the Kerkh people did not cremate dead bodies, but rather, skeletons that had been disinterred from primary burials.

In the earlier stages of the Kerkh Pottery Neolithic cemetery, cremation practices, including the use of crematoriums, were common in association with primary and secondary pit burials. In the later stages, however, cremation declined. Primary inhumation gradually became the most popular burial type. Elsewhere, I have discussed the transition of these funeral practices and placed them within a long tradition of funerals from the PPNB period. I concluded that the term and complexity of the funeral process lessened with the passage of time, and this funeral transition must have reflected a social transition from the PPNB to the PN society (*Tsuneki n.d.*).

Causes of death

As I have already mentioned, over 240 human skeletons have been discovered in the cemetery. As of now, approximately 200 individuals have been stu-

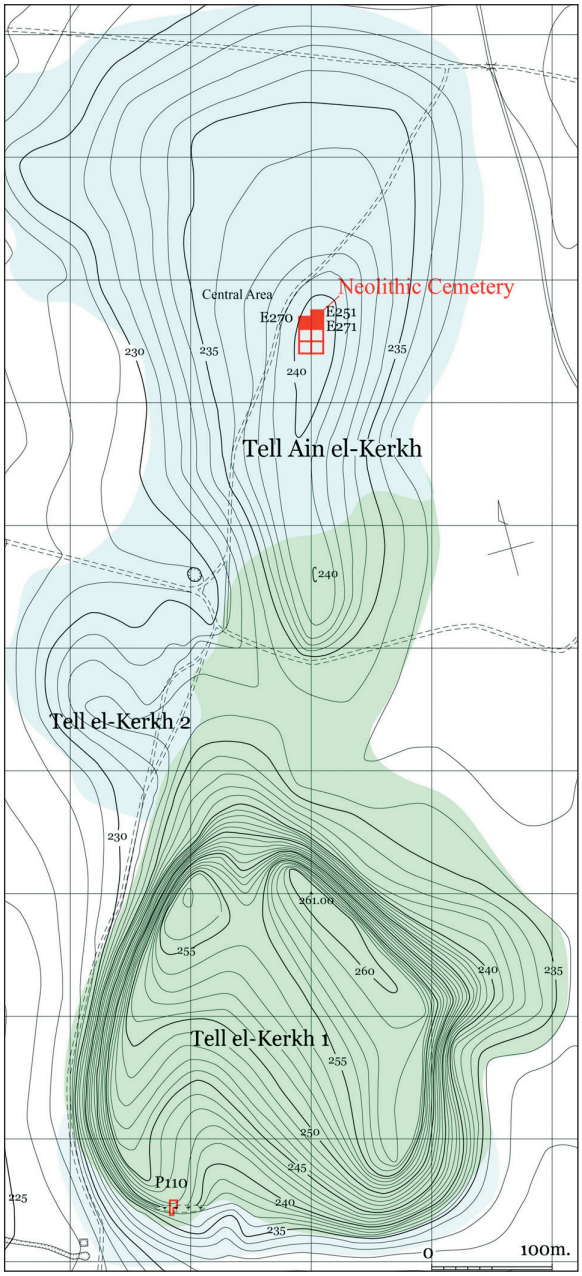


Fig. 2. Map of Tell el-Kerkh.

died by Sean Dougherty, a physical anthropologist, who developed the following basic data (*Dougherty 2011*).

Individuals younger than 20 years old account for 47% of the total sample. Of these, 27% died within the first year of life, and 86% died before they were 12 years old. Such a high infant and child mortality rate is notable, as is the fact that most of these deaths were among perinates, infants, and juveniles less than 3 years old, which is highly suggestive of a crisis in parturition, and during and after breast-feeding periods. A large number of young female burials also indicate the presence of poor maternal health.

The lack of adults over 50 years old is also notable. Almost all the adults died in their 20s and 30s, and very few individuals lived beyond 45 years of age; this leads to the conclusion that the average lifespan of Neolithic people was comparatively short.

Evidently, such a brief life expectancy was caused partly by poor pediatric and maternal health. About 20% of the skeletons at Tell el-Kerkh had at least one hypoplastic enamel defect, which indicates that many individuals experienced repeated incidents of chronic, physiological stress or illness during adolescence. Dougherty also suggested that acute infection, malnutrition, and parasitic infection were likely contributors to the decreased longevity of the frailest members of the Kerkh Neolithic community (*Dougherty 2011.28–29*).

Although we have some concrete evidence of nutritional deficiency, the frequency of pathology of bones does not adequately explain the comparatively short life expectancy at Tell el-Kerkh. Are there any other causes? To determine the answer, we must pay close attention to the traces of injury on some skeletons.

A good example is Structure 1054 (Fig. 7). When uncovered through excavation, this young adult male seemed to have been buried in a very strange position. Although his right leg was folded in a normal position, his left big toe was placed unnaturally near his right shoulder. After removing his right leg, we understood the reason for this unnatural position: his left femur was broken in half and bent conversely. This femur fracture had happened due to a fall from a high place; the femur had pierced the skin of his leg, and was the cause of death. An attempt had been made to bury him in a normal flexed position; however, his left leg could not be folded.

A middle-aged adult male (35–40 years) burial, Structure 807 provided the next example. His upper body was covered with lime plaster, and a large limestone was placed at his knees. His upper body lay in a supine position, but his flexed legs lay to the left side. A small hole had been bored through his left temple, and another through his mandible (Fig. 8). It is quite certain that he had catastrophic perimortem fractures of the cranium and mandible, which would have caused his death.

We also observed fractures on the bones of Structure 921, although these did not seem to have been fatal. This young adult male (probably 30–35 years)

had several healed fractures, on the left radius, clavicle, and right metacarpals. In addition, he was covered with wounds, but curing traces were observed on the fractures. At any rate, he seemed to have fought with someone.

All these injured skeletons were of adult males; however, some female skeletons also showed traces of fracture. For example, Structure 803 is an adult female buried in a tightly flexed position on her right side (Fig. 9). She had several traces of fractures on her bones: one on the clavicle and two on the left ulna.

Structure 909 is another adult female who had profuse traces of bone fractures. She was buried in a tight position, on her left side (Fig. 10). She had fractures on the left distal ulna, the left distal second metatarsal, and at least six rib fractures; consequently, it seems these two females had suffered some violence.

These injured skeletons may indicate a certain level of interpersonal violence at the settlement. Especially in the case of adult males, some might have been killed by violence. It is not easy to guess the cause and degree of such violence; however, we cannot imagine a peaceful and idyllic society here. Consequently, causes of death at the Neolithic society of Tell el-Kerkh must have included injury and illness associated with malnutrition.

Division of labour

Let us review the pragmatic aspects of the social life of PN people. Over one-third of the primary burials contained grave goods, the majority being personal ornaments such as beads and pendants and pottery vessels. Furthermore, stamp seals and bone tools were not uncommon grave goods. Although adult males tend to have more grave goods than adult females and children, grave goods accompanied both sexes and all ages except infants and perinates; however, some grave goods were more typical of one sex.

Structure 1058 is a burial of a large middle-aged adult male (Fig. 11). He was buried in a tightly flexed position, on his right side. It is noticeable that many objects were dedicated to this male. A small dark-faced burnished ware (DFBW) bowl (Fig. 12.1) was placed at the back of his head. Near his lower back, a cluster of objects was discovered: a flat clay stamp (Fig. 12.2), three bone awls (Fig. 12.3–5), five deer horns (probably fallow deer) (Fig. 12.6–8), three flint axes (Fig. 12.9–11), two grind-stones (Fig. 12.12–13), two hammer-shaped pumice stones (Fig. 12.14–15), a small hand-held whetstone (Fig. 12.16), an Amuq-type flint point (Fig. 13.17), five long flint blades (Fig. 13.17–21), two burins (Fig.13.23–24), and eighteen flint flakes (Fig. 13.25–42). The number and variety of these offering objects, especially the deer horns and flint objects, are conspicuous when compared with other grave goods. These objects seemed to have been packed in an organic bag and placed in the grave. It is very probable that they were tools and products which had been used and dedicated to him when he died. If these grave goods were his property, their presence and inventory suggest that the tomb owner was engaged in flint knapping.

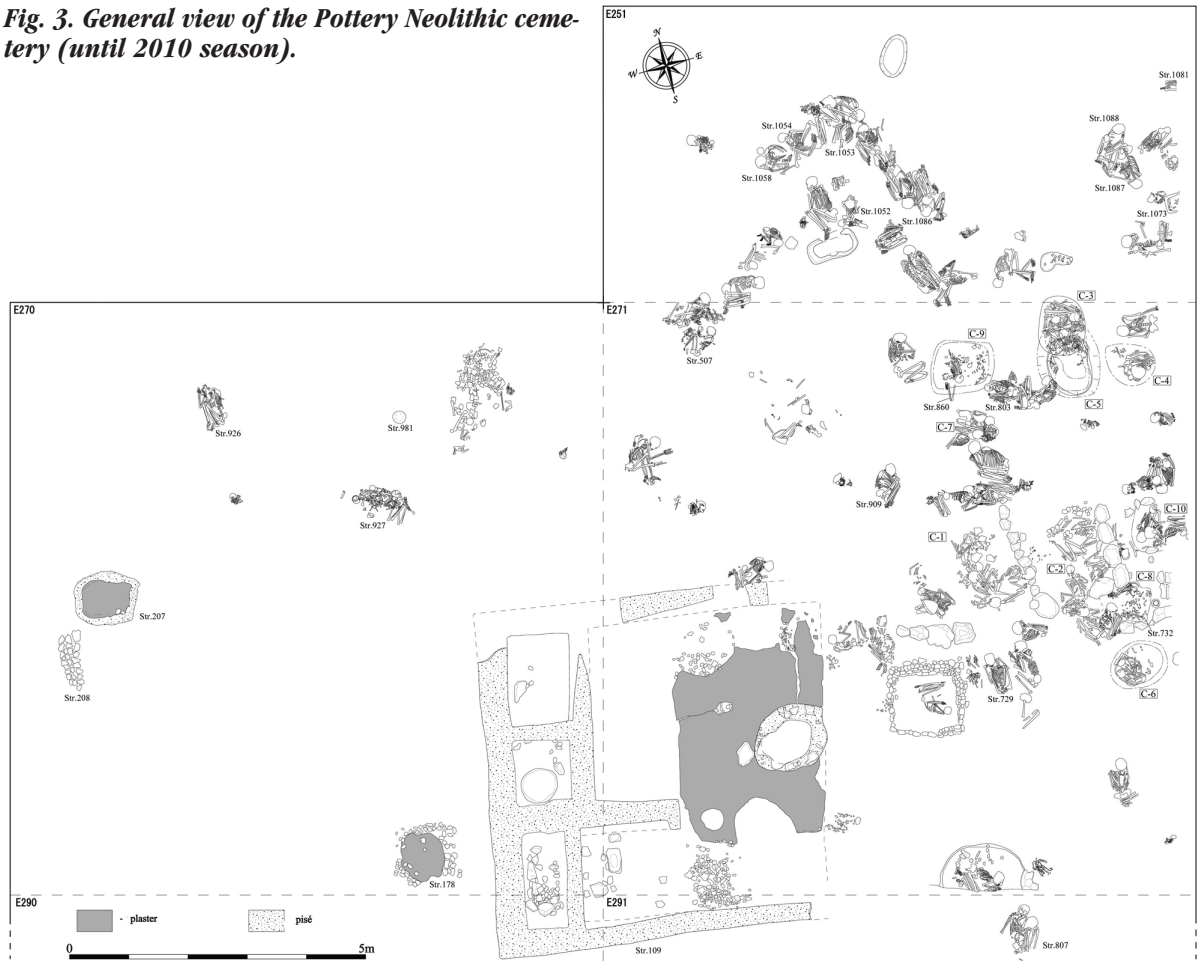
On the other hand, some adult females were buried with characteristic bone implements, specifically cattle metacarpals. For example, Structure 1081 is an adult female buried in a flexed position on her right side (Fig. 14). A large cattle metacarpal (Fig. 15.1) and seven bone awls (Fig. 15.2–8) with three stone beads (Fig. 15.9–11) were discovered near her hipbone. Structure 732 is another female, around 20 years old, who was buried in a prone position; she held a large wild cattle metacarpal with her right hand and chin (Fig. 16). In ethnographical documents from Syria, animal metacarpals are often recorded on weaving looms to tighten cords for treadles (*Saito 2007*). Therefore, we may presume that these characteristic metacarpal bones were used in weaving. The bone awls discovered with a metacarpal at Structure 1081 seem to have also been very suitable for weaving purposes. If these objects were the property of the tomb occupants, adult females tended to engage in weaving activities.

In other words, on the basis of some grave goods found at Tell el-Kerkh, we can assert that there was a division of labour to some degree based on gender. For example, as mentioned above, males tended to engage in flint knapping, and females tended to engage in weaving.

Ownership

Among the most notable grave goods from the Kerkh Pottery Neolithic cemetery are stamp seals made of various materials; as of now, 15 stamp seals have been discovered in 11 burials. The seals have usually been found near the individual's hipbone (Fig. 17) or in one hand (Fig. 18). We suggest that the stamp seal was strapped to the belt during the person's lifetime and buried as it was, or placed in the hand during the funeral ceremony.

Fig. 3. General view of the Pottery Neolithic cemetery (until 2010 season).



Some stamp seals were found in unusual positions. One stone stamp seal was found near the neck (Structure 1053) along with four beads (Fig. 19), and must have been one piece of a necklace. Another stamp seal was found from a DFBW pot which was dedicated to one of the cremation pits, *i.e.* 'concentration 5' (Fig. 20).

Most Neolithic stamp seals have been found in fills and among debris at many archaeological sites in West Asia, and the context in which they have been found has been unclear. The situation was similar at Tell el-Kerkh until the discovery of the PN cemetery. Over 150 stamp seals were revealed from Neolithic layers, but only four, discovered in store-rooms below a plaster floor, had a clear context (*Tsuneki* et al. *1999.17*). However, we now have concrete evidence on the context of the stamp seals; the evidence that they were grave goods indicates that they were personal property in that society. Although most of those buried with stamp seals were adults of both sexes, two juveniles also had them (Structure 751 and 1093). Therefore, we can understand that people of all ages and each sex, including even a small child, carried stamp seals in the PN community at Tell el-Kerkh.

As mentioned above, as of now, over 150 stamp seals and six clay sealings have been discovered in the excavations at Tell el-Kerkh (Figs. 21 and 22). These findings indicate that the clay sealing system already played a role in the sealing and record keeping of goods. The background of the sealing system is the rise and retention of the concept of ownership, as well as of the complex human relationships associated with the development of agricultural society[1]. The discovery of stamp seals in the PN cemetery strongly suggests that this system was used not only by elite groups, but by all members of the community.

1 Peter Akkermans and Kim Duistermaat discuss the idea that the Late Neolithic sealing system was used not by a full agricultural society, but by a mobile society practicing pastoralism or hunting, on the basis of the archaeological evidence from Tell Sabi Abyad and ethnographic evidence from North Africa (*Akkermans, Duistermaat 1997; Duistermaat 2010*). I agree with their opinion that the Neolithic sealing system was accessible to most members of society. However, I think that the sealing system could also have been used by a fully agriculturally settled society with no mobility, such as societies in later periods in West Asia.

Conclusion

I have touched on life as revealed by the remains at the PN cemetery of Tell el-Kerkh. PN people confronted problems of high infant mortality rates and poor maternal health and were comparatively short-lived. Interpersonal violence, especially among males, and poor pre-natal conditions for pregnant females might be among the reasons for such a short life expectancy. At the same time, however, they held funeral services even for small children and badly injured people, taking great care with the funeral arrangements, indicating a deep feeling of affection for their families and colleagues.

From the grave goods, we may argue that there was some degree of a division of labour based on gender. The discovery of stamp seals as personal property indicates that the concept of proprietorship had become a fundamental principle among Neolithic people; this principle was not reserved to a small elite, but shared by all members of the community.

We are continuing our analysis of the skeletons and archaeological material. For example, studying the ratio between carbon and nitrogen isotopes extracted from human bone collagen has already yielded information about the diet of the Kerkh Neolithic people (*Itahashi 2011*). We expect that the results of the strontium isotope analysis will provide information with which to consider the kinship system of Kerkh Pottery Neolithic societies. These analyses will shed further light on life in Neolithic societies.

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Fig. 4. Primary burial (Structure 1085).

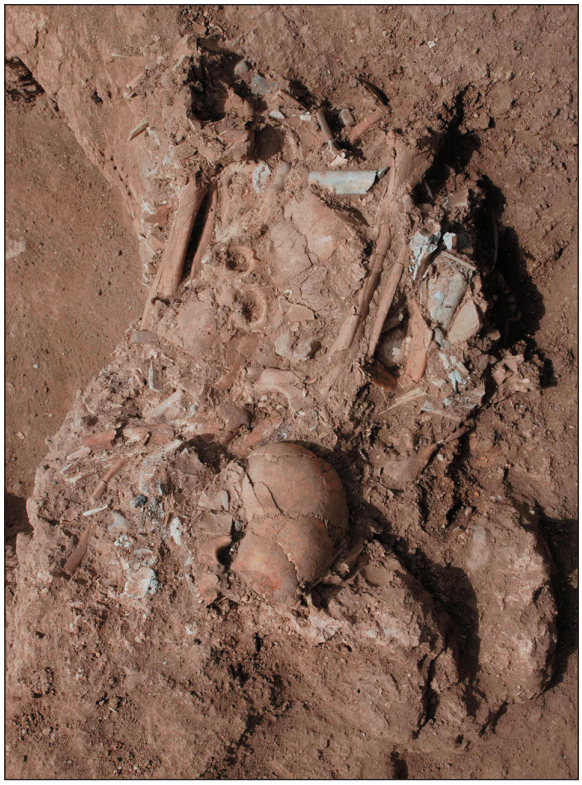


Fig. 5. Collective secondary burial (C–3).



Fig. 6. Cremation burial (C–6).

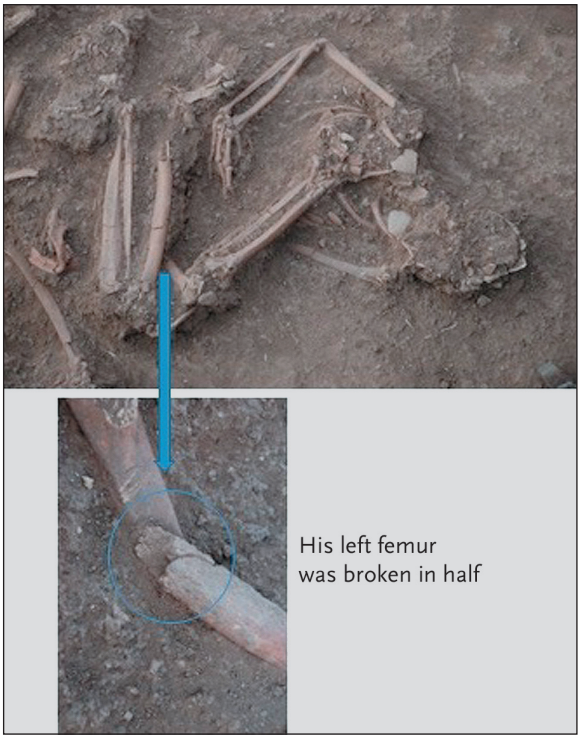


Fig. 7. A young-adult male burial, Structure 1054.



Fig. 8. A middle-adult male burial, Structure 807.



Fig. 9. An adult female burial, Structure 803.

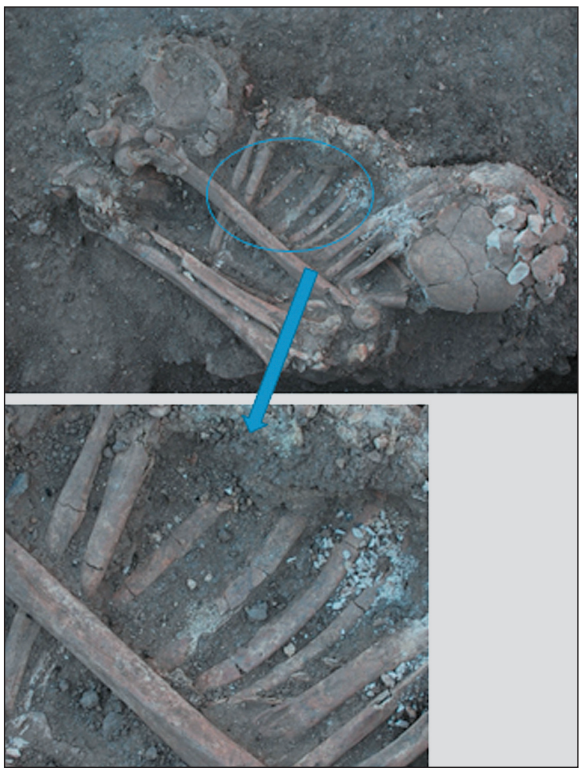


Fig. 10. An adult female burial, Structure 909.



Fig. 11. A middle-adult male burial, Structure 1058.

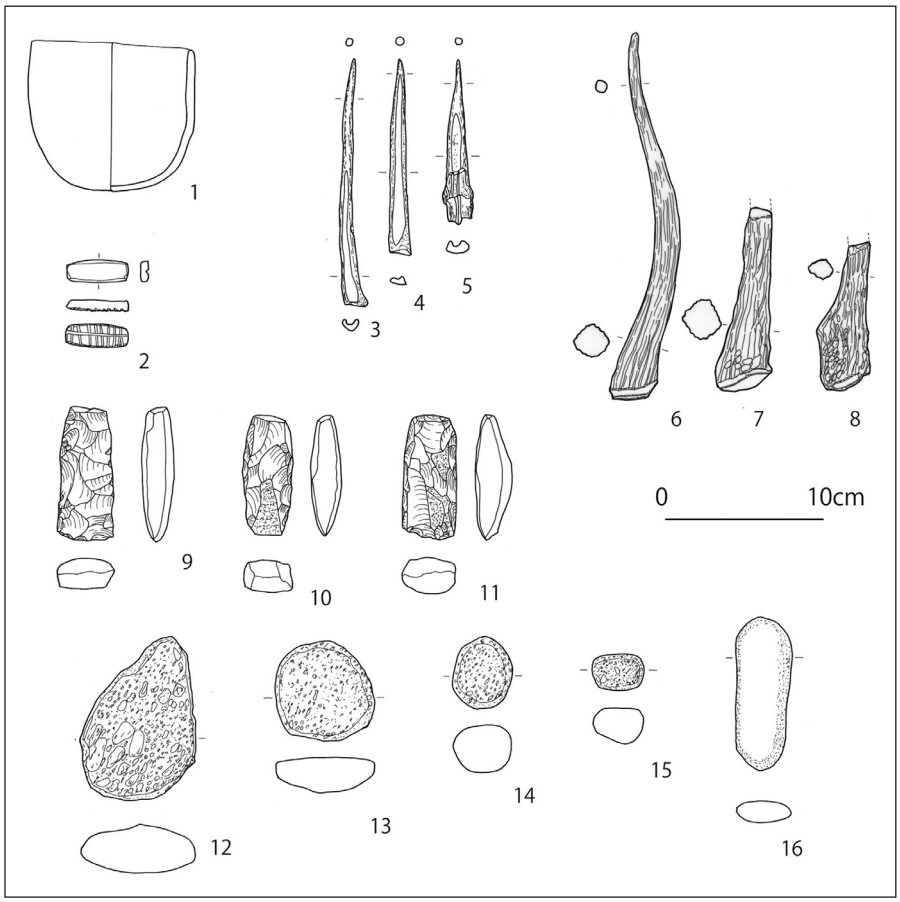


Fig. 12. Grave goods from the Structure 1058.

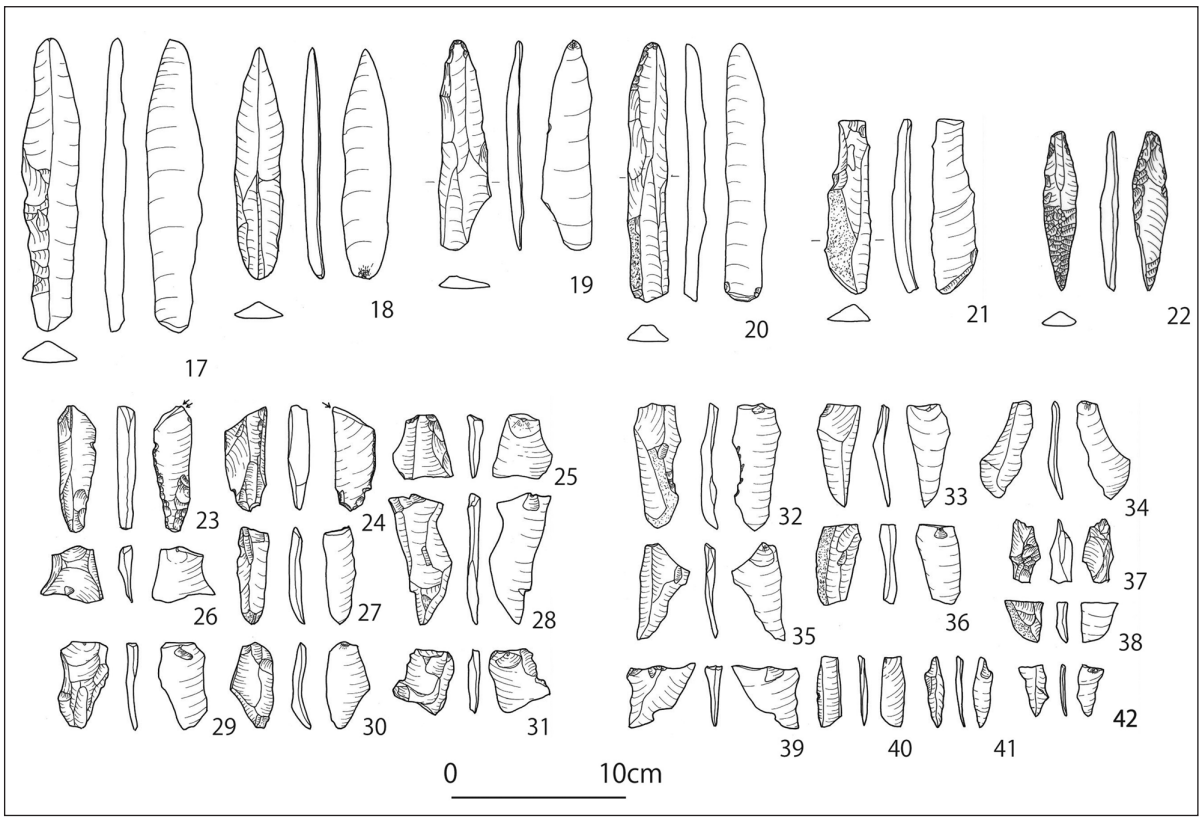


Fig. 13. Grave goods from the Structure 1058.



Fig. 14 (left). An adult female burial, Structure 1081.



Fig. 15 (right). Grave goods from the Structure 1081.



Fig. 16. A young-adult female burial, Structure 732.



Fig. 17. An adult male burial, Structure 1086.



Fig. 18. A juvenile burial, Structure 1083.



Fig. 19. Stamp seal found with four beads near the neck of Structure 1053.

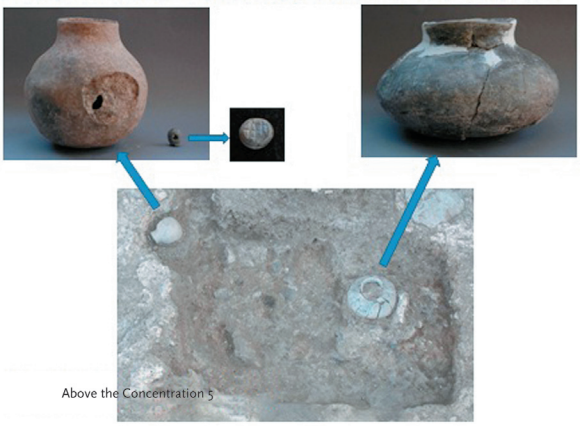


Fig. 20. Stamp seal discovered in a pot (C–5).

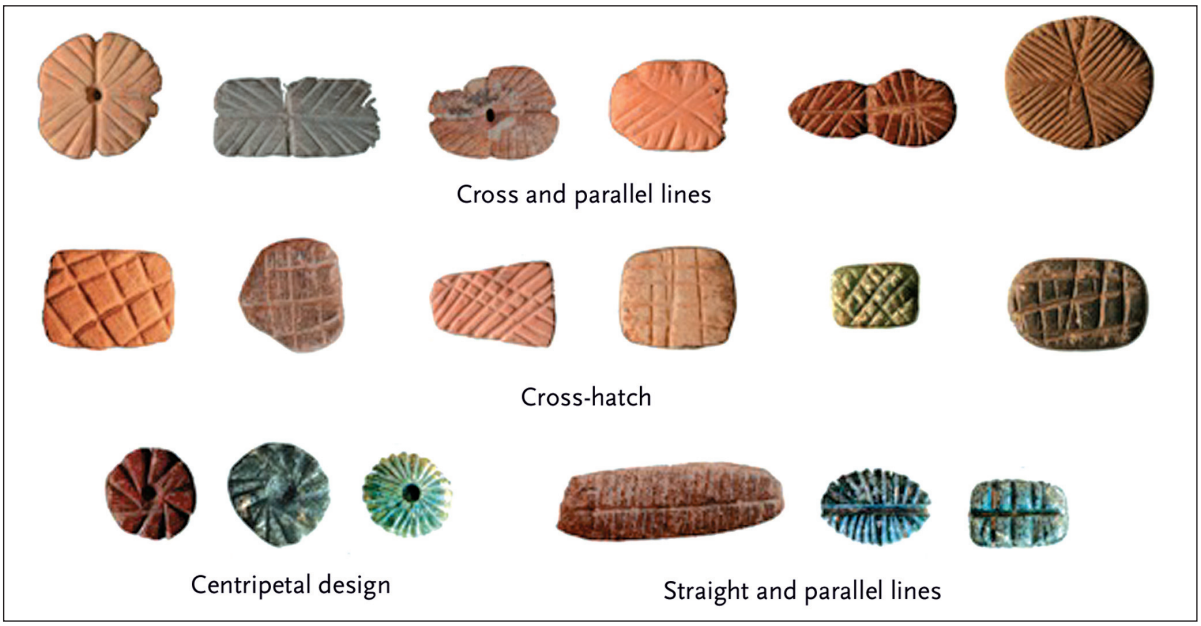


Fig. 21. Stone stamp seals.



Fig. 22. Clay sealings.

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What can bodies do? Bodies and caves in the Karst Neolithic

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ABSTRACT – *This paper discuses ways in which bodies – human and animal – were produced in the Neolithic of the Karst. Bodies are seen as cumulative processes shaped by forces of encounters with the material world, rather than as biological givens. Thus, the paper focuses on the process of embodiment mediated with other bodies and landscape, especially important places such as caves. It explores the unique ways in which caves affect bodies, and how these affected bodies created new societies. In the Neolithic Karst, everyday contacts and interactions between humans, animals, the landscape and caves and rock shelters profoundly changed all the participants. A new hybrid society emerged, consisting of human and non-human bodies.*

IZVLEČEK – *V članku raziskujemo, kako so skozi neolitik na Krasu nastajala telesa ljudi in živali. Telesa ne razumemo zgolj kot biološke danosti, temveč kot kumulativen proces, ki ga izoblikujejo sile soočanja z materialnim svetom. Tako se ukvarjamo s procesom nastajanja telesa skozi interakcije z drugimi telesi in pokrajino, predvsem pomembnimi kraji v pokrajini, kot so jame. Preučujemo, kako jame afektirajo telesa in kako ta afektirana telesa ustvarjajo nove skupnosti. V kraškem neolitiku so vsakodnevna srečanja in interakcije med ljudmi in ostalimi živalmi, pokrajino in jamami preoblikovala vse udeležence. Nastale so nove hibridne skupnosti, ki jih sestavljajo tako človeška kot živalska telesa.*

KEY WORDS – *body; affect; human animal relations; caves; Neolithic; Karst*

Introduction

How did Neolithic bodies, not only human, but also non-human animal, 'domesticated' bodies come about? How did their bodies emerge through interweaving with the material world? How did the use of caves change the bodies involved?

I will explore these themes through examples from the archaeological record of the Karst in northeast Italy and western Slovenia. The paper tackles the emergence of a historically specific assembly of non-human animal and human bodies and objects that appeared in the Karst Neolithic by following the process of embodiment through interactions with other objects, bodies, and landscapes.

The body is a reservoir of biological impulses and cultural-neurological habits, rather than a stable, biologically fixed entity (*Connely 2002; Macpherson 2010*), and the process of embodiment is dependent on how the body is put to use. The Neolithic of the Karst plateau is marked by the appearance of 'domesticated' animals, predominately sheep in the archaeological context. To live with animals is always already a material practice which includes material culture, bodies, gestures, actions, habits, and physical skills. It requires that new practices and skills of flocking, herding, closing, observing, separating, amassing, forming queues *etc.* be learnt and employed by the participants. Bodies can be seen as cumulative processes shaped by interactions with the material world, rather than as biological givens. This would mean that actions and conscious thoughts and representations are the result of preconscious brain activity shaped by available technologies and objects,

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and that humans, animals, and caves therefore mutually constitute each other.

Context: Karst

The Karst plateau (Kras in Slovenian, Karst in German, and Carso in Italian) is a limestone landscape rising above the Bay of Trieste (in the Adriatic Sea). It comprises the north-westernmost tip of the Dinaric Mountains, which extend along the East Adriatic coast. The area is covered by large dissolution dolines and other classic karst features in a landscape of broken rocks, patchy grass cover, and stands of woodland. Although there is heavy rainfall in the region, there is a general lack of surface water; the porous limestone quickly absorbing water through cracks and fissures, draining the surface. Except in depressions, soils are thin and leached (terra rossa), and as a result of millennia of overuse, some areas are virtually barren. The area is pockmarked with caves and rock shelters (Fig. 1).

The Mesolithic and Neolithic archaeological record of the Karst consists almost exclusively of cave and rock shelter sites (Fig. 1). They are usually 'deep', with thick Holocene sedimentational sequences and long occupational histories, often extending back into the Early Mesolithic. For the Mesolithic (broadly between 9500–6000 BC), they are conventionally interpreted as temporary hunting camps for mobile hunter-gatherers, although we know little about open-air sites and other special places (*Cremonesi 1981; Biagi 1994*). In the Neolithic (approximately 5500–3500 BC), pottery of the so-called Vlaška group and animal bones, the majority of which are ovicaprine, appear in the caves. This marks a new use of caves. Archaeological, geoarchaeological, and archaeozoological data suggest that they were used as sheep pens for large flocks of ovicaprines (*Boschian, Montagnari Kokelj 2000; Mlekuž 2005; Boschian 2006*). In the Neolithic, there is evidence of short, seasonal visits to caves. The complementary seasonal patterns may suggest that cave sites in the Neolithic were not merely out-stations of a larger pastoral system, with central sites elsewhere, but comprised a full annual cycle of seasonal mobility. Thus we might see the Karst pastoralists as nomads moving from cave to cave (*Mlekuž 2005*). These practices – with minor changes in intensity and scale – continued into the Bronze Age.

Caves and bodies

What is a cave? We can see caves as affordances of a landscape. Caves provide affordances that other places in the landscape do not. The concept of affordances was developed by James Gibson (*Gibson 1986*; see also *Ingold 2000*) as part of his theory of 'direct perception'; direct here means that perception is not a computational activity of a mind within a body, but an exploratory activity of an mobile organism within its environment. From this perspective, the environment is not a set of latent resources awaiting human exploitation, but part of the practice of dwelling in the world.

Affordances can thus be defined as "*properties of the real environment as directly perceived by an agent in the context of practical action*" (*Ingold 2000.64*). An encounter with an affordance will lead to decisions about immediate and future actions. For example, to a group of hunters, an encounter with a cave can provide an affordance of shelter against rain or wind. To sheep, it can offer shelter from the

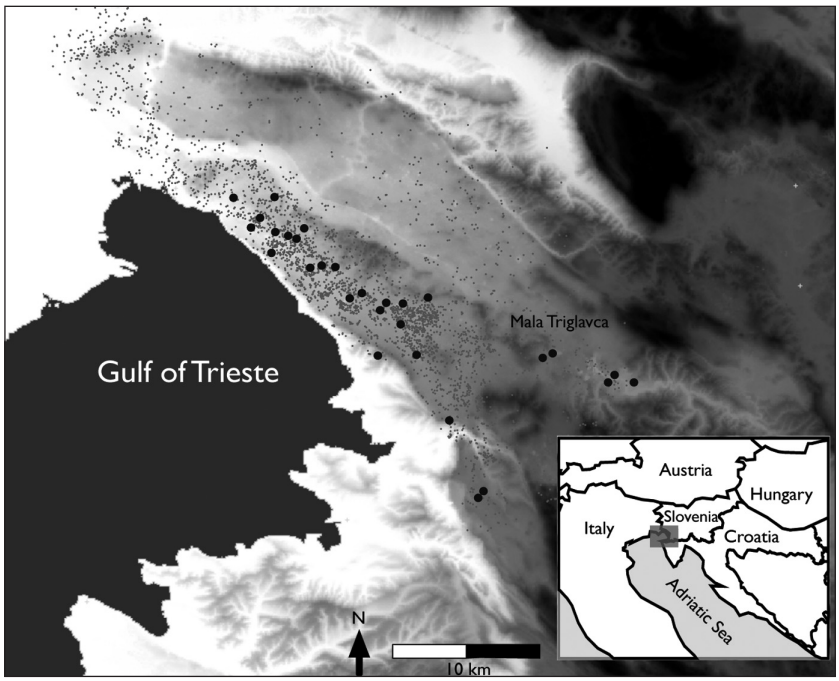


Fig. 1. Map of Karst with the position of caves (small dots) and Neolithic cave sites (large dots).

scorching midday sun, and allow the shepherd to take a nap in its shade. At night, it can provide the affordance of enclosing the herd and protecting sheep from predators. Affordances are therefore contextual, and relationally specific to individuals, rather than generic properties of the environment.

But there is always more to the world than can be apprehended by a perceiver at any particular time. The world is more than just affordances; it is a 'continuous variation', material flux, perpetually unfinished, virtual in a sense that is real, but not yet actualised. It can be described as continuously differentiating relations between forces prior to any actualisation (*Deleuze 2004*).

Perception is only a 'searchlight' governed by our ongoing needs, which isolates stable islands of reality by identifying possible relationships that might serve as footholds in a mobile, constantly changing reality. It is a situated perspective extracted from overarching movement or change.

Encounters produce more than mere affordances, stable islands in a permanent material flux of continuous variation. Recent developments in neuroscience demonstrate that brain activity occurs a half-second before reactions are consciously registered. There is some autonomy in what the body can do before action is taken.

Gilles Deleuze calls pre-cognitive bodily response to encounter 'affect' (*cf. Deleuze 2004; Deleuze and Guattari 2004.256*). This half-second gap is a place of vibratory or felt movement that may or may not result in action. Prior to action, there are changes in the body – anxiety, tensing of muscles, alertness *etc*. Brian Massumi defines affect in terms of autonomic physical responses in excess of conscious states of perception, and points instead to 'visceral perception', or receding perception (*Massumi 1995; Massumi 2002*).

Consciousness is subtractive, as it reduces complexity; and it is limitative, a derived function in a virtual field where any actualisation becomes, at the same moment of actualisation, the limit of that field, which otherwise has no pre-given empirical limit. Affect is found in intensities that pass from body to body (human, non-human), in resonances that circulate around and between them, and sometimes become attached to them and the world, and in the very passages or variations between these intensities and resonances themselves.

Thus, affect can be described as the force of encounter. Affect should be seen in terms of the virtual, as the realm of potential, as tendencies or incipient acts, indeterminate and emergent. Affect is independent of conscious perception and language, as well as emotion. Conscious perception is a narration of affect. In many cases, an action is never actualised and affect remains virtual (*Massumi 2002*).

The tasks that people perform and that involve affordances of caves are part of everyday life, which goes on elsewhere. Activities in a cave are always implicitly or explicitly connected with activities elsewhere, outside, at other locations, in other caves and in the landscape. Caves are elements of landscapes because their affordances are part of people's social life in the landscape. These tasks, movements of bodies and flows of substances become habitual, part of the bulk of everyday social life, which in the process of stopping regularly at special places in the landscape such as caves, become incorporated into them, and caves become embodied in the people inhabiting them.

How does this happen? Instead of viewing the body as a fixed property, a biological given, a noun, we can view the body as a process, a verb, a process of embodiment (*Macpherson 2010*). Embodiment is a process that always occurs in conjunction with the material world around us, other bodies, things, landscape *etc.* As Tim Ingold (*2000.193*) says, "*... body and landscape are complementary terms: each implies the other, alternately as figure and ground*". This emphasises how we are constituted at the interface with objects and environments, rather than existing in separation, and complicates understandings of the body as a separate entity that acts out life on the surface of the earth. An affected body is as much exterior, in a web of relations, as interior, within itself.

This is where affect as a force of encounter is so important. Affect is the potential of a body's capacity to change, to become something else, and to change things around it. A body marked over time by these various encounters comes to shift its affections (its being affected) into actions. Thus, affect works far beyond a single encounter. Affect is integral to a body's perpetually becoming, however subtly, something else.

Bruno Latour (*2005.206*) says, "*if the opposite of being a body is dead [and] there is no life apart from the body... [then] to have a body is to learn to*

be affected, meaning 'effectuated' moved, put in motion by other entities, human or nonhuman. If you are not engaged in this learning, you become insensitive, dumb, you drop dead".

Through the almost inconspicuous affect of daily encounters with such minutiae as gradients of odour or luminosity in a cave, the body becomes like "*... an interface that becomes more and more describable when it learns to be affected by many more elements*" (*Latour 2005.206*).

The idea of the body as constantly becoming, in process or formation, has important implications for how we might think about and categorise different bodies. Instead of thinking about bodies as relatively static or stable entities, it is possible to think of them as performances that occur in conjunction with particular objects or contexts. Bodies are performed and emerge in conjunction with other bodies. The body of a herder, as well as of a sheep, arise through regular performances of particular embodied roles, which results in their becoming habitual and neurologically sedimented phenomena (*Macpherson 2010*).

Bodies are affected through these close encounters with other bodies, their presence, heat and odours, the sheer physical nature of the cave, with its gradients of luminosity, temperature, and wall textures (Figs. 2 and 3).

The pioneering work of Edward Hall (*1966*) in the field of 'proxemics' emphasised the role of 'interpersonal distance' in the quality of peoples' social relations.

Interpersonal distance is not only a reflection of on-going relations between persons, but can play an active role; by negotiating and adjusting the distance, people can maintain or change the quality of their interpersonal relations. Hall, as a cultural anthropologist, was interested in cultural frameworks that define and organise space; and, from a cross-cultural study of space-maintaining strategies, he outlined a typology of 'zones or spaces of interpersonal distance'.

Conceived as nested bubbles that surround persons, Hall defined several informal spaces on the basis of the types of sensory information available to the persons involved, like speech volume, olfactory cues, and body heat. The most intimate and closest is intimate space, where the involvement of the other person is unmistakable and characterised by strong and intense sensory inputs. The voice is usually held low or even to a whisper. Personal space is characterised by normal speech and minimally perceived olfactory inputs, and extends to approximately arm's length around the person. Entry into this space is restricted to close friends and acquaintances. Social and consultative spaces are spaces in which people feel comfortable conducting routine social interactions with acquaintances as well as strangers, whereas public space is defined as the distance beyond, in which people perceive interactions as impersonal and relatively anonymous. However, this typology is a rather static approach to interpersonal distance, and it might be more useful to conceptualise Hall's spaces as a continuum, as proposed by several authors (*e.g., Aiello, Thompson 1980*).

Studies in environmental psychology suggest some interesting physical determinants of interpersonal spacing. People maintain more distance between themselves when indoors than when outdoors, and personal space increases with reductions in room size (*Cochran* et al. *1984*). Personal distance increases in darkness (*Adams, Zuckerman 1991*). Males have more need for personal space when ceiling height is low (*Cochran, Urbanczyk 1982*). People desire more space in a narrow room, and persons exhibit more personal space in corners than in the



Fig. 2. Changes of gradients of light and temperature and requisite body postures on entering the cave. Jazbina pri Kačičah, Neolithic site on the Karst.

centre of a room, and maintain a closer distance when standing than while seated (*Evans* et al. *1996*).

Because interpersonal distance is tacit or habitual, people usually become aware of the boundaries only when they are violated. Several studies have shown that, when an environmental setting forces people to interact in an inappropriate spatial zone, changes appear in vital signs, such as heart and pulse rates, and provoke feelings of discomfort, stress, threat, aggressiveness, or fear. On the other hand, proximity can also provoke a desire for closer contact and intimacy. People tend to touch more in the dark (*Andersen, Sull 1985*).

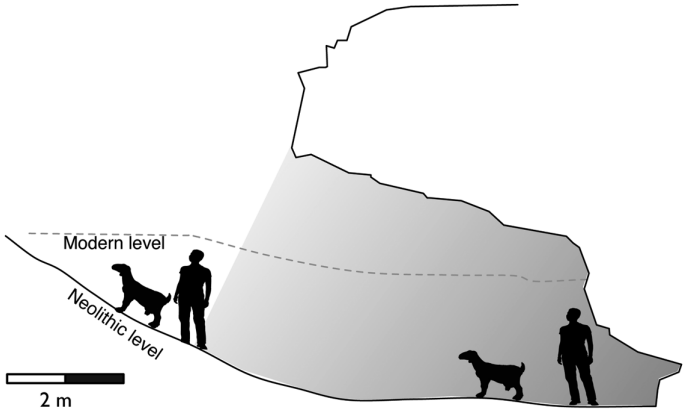


Fig. 3. Gradients of light (and temperature) and changes in gradient of cave floor and height of cave roof inside Mala Triglavca.

When people invade our personal space, the body might respond by thinking 'what are they doing', 'who are they', 'they are invading my personal space'. But it is also possible that the body does not act or respond, but merely feels the affect of anxiety, loathing, fear. These visceral forces beneath, alongside, or generally other than conscious awareness, emerge from virtual, intermediate reality or change, an excess of potential relatedness. Before bodies act, if they act at all, bodies are affected by encounters.

Intimate and impersonal at the same time, affect accumulates across both relatedness and interruptions in relatedness, becoming a palimpsest of force encounters traversing the rise and fall of intensities that pass between bodies, as defined by their potential to reciprocate and co-participate in passages of affect.

Enforced close interpersonal distance can lead to stronger responses than interaction at an appropriate distance. Caves with confined spaces, narrow passages, low ceilings, and darkness can be places of intense sociality. In this way, they have an agency and act on people, they produce bodies.

Containers for animals, people and substances: Neolithic uses of Karst caves

'Places gather' (*Casey 1996.24*), but caves also hold, amass, contain and store. Caves and rock shelters provide the affordance of containment. They provide a physical envelope for a setting, separate the outside from the inside, and excluded from the rest of the landscape. They can crowd people, animals, things and substances together, mix them, and hide them from view (*cf. Warnier 2006*).

There is plenty of evidence that Neolithic caves and rock shelters became containers for people, animals, things and substances (*Boschian, Montagnari Kokelj 2000; Miracle, Forenbaher 2005; Mlekuž 2005*). Caves became seasonal camps and pens for mobile herders and their flocks. However, caves were used not only as sheep pens, but also for habitation. The relative frequency of different body parts shows that ovicaprines were culled, processed and eaten on site. The deposition rates of bones are generally low and can be compared, for example, to the deposition rate of a single Navaho cohabitation group, suggesting that group size was small (*Mlekuž 2005*). Caves were regularly used both for penning animals and by camping pastoralists.

People and animals, each with their specific smells, sounds, food, and personal space, were kept in the same envelope or container of a cave. Thus the sociality between animals and humans in a cave was much denser than outside, in the open landscape (Fig. 4).

Containment is a technology of power; power rests on an agency to act directly upon subjects or make subjects act upon themselves (*Warnier 2006*). All these actions rest upon technology, and include material culture such as fences, barriers and blockades. Containers in the form of corrals, fences and pens are the principal elements of material culture used by herders to control animals (*Ingold 1980; Cribb 1991*). Caves can be seen as a form of material culture associated with containment, often improved with fences or dry-stone walls that control and guide the actions of entering and exiting the en-

closure of the cave. In this way, the material culture of containment, caves themselves, become embodied in persons through sensory motor behaviours associated with containment, such as entering, exiting, maintaining limits, forming queues, and preventing the transit of substances (*Warnier 2006*).



Fig. 4. Cave as container of bodies. Cramped setting where materiality of other bodies cannot be avoided. Cave used as sheep-pen on the Adriatic island of Pag.

There is evidence from the Karst that caves were modified to be more effective containers. Numerous stone walls can be encountered in front of the caves, and in at least one case (Grotta dell'Orso/Pečina pod Muzarji) it can be confirmed that the wall was built in prehistory (*Guacci 1959*). Karl Moser encountered the remains of a wattle fence in Grotta Moser/Pejca na Doleh (*Moser 1903; Barfield 1972.201*). In the Mala Triglavca cave, located at the edge of a minor doline, a dry-stone wall was built in front of the cave during the Neolithic (as its stratigraphic position suggests).

Containers have volumes, and the volume of caves can be measured in terms of the number of sheep and people that can be enclosed. For example, a flock of 60 sheep can fit inside Mala Triglavca, with enough remaining space for several people to sleep or perform daily activities. However, this would make for a rather cramped setting (Fig. 5).

Thus in the Karst caves (as well as in the eastern Adriatic hinterland), humans and sheep lived in very close proximity, sharing living spaces, smells and sounds. The smell of smoke and cooking mixed with the smell of dung and sheep, people and animals, attended people and animals in their mundane tasks. There is evidence of both human and sheep milk teeth shed on the sites (*Štamfelj* et al. *2004*), and we can imagine children and lambs playing together, or human children sucking milk directly from a ewe's udder.

Sheep are often seen as rather stupid animals, but we should grant sheep more social intelligence. The social organisation of sheep is believed to be shaped by anti-predator and grazing strategies and relies upon learned traditions (*Festa-Bianchet 1991*). Sheep are social animals which construct and maintain their society. The basic social tools of human and non-human primates enable them to discriminate between other social agents, remember them, and think about them when they are not present. Sheep posses similar specialised neural systems in the temporal and front lobes to recognise individual sheep and humans by their faces. The specialised neural circuits involved maintain selective encoding of individual sheep and human faces even after long periods of separation. Individual sheep can remember up to fifty other different faces for over two years (*Kendrick* et al. *2001*). When living in close proximity to other species for prolonged periods, they tend to bond – a feature that modern herders exploit when they socialise sheep dogs into herds. (*Fisher, Matthews 2001; Estevez* et al. *2007*). Sheep communicate mainly through sight. When grazing, they maintain visual contact with each other and constantly monitor other sheep. In this way, they move and stay together as a flock. A striking effect of this is flocking behaviour, a mesmerising movement of a flock of sheep moving across a field, changing shape, but always remaining a single unit. It shows how a complex effect can emerge from simple local interactions. Complex social behaviour emerges from simple local interaction and rules. Thus sheep are not only single individuals, but always a multitude, a flock, a phenomenon that emerges from simple face-to-face social interactions (*cf. Armstrong, Simmons 2007*).

Within the flock, sheep form strong social subgroups. However, the flock stays together as a social entity because membership of sub-groups is con-

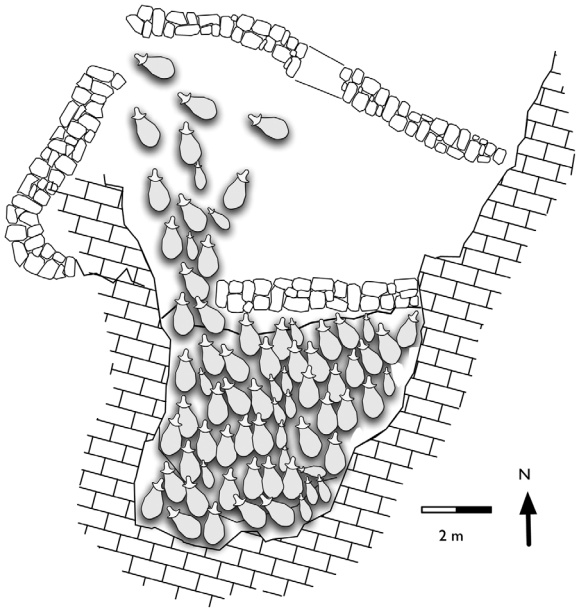


Fig. 5. Mala Triglavca as a container of sheep bodies. Up to 60 sheep can fit under the cave roof.

stantly changing (*Winfield* et al. *1981*). Thus, other social skills include negotiating, testing, assessing and manipulating. Social hierarchies are formed among some breeds, and are maintained, challenged, and negotiated through pushing and shoving in competitive feeding situations, mating, or ritualised fighting (*Shackelton, Shank 1984*). Therefore, social hierarchies are not fixed, but actively performed and negotiated.

Like baboons (*Sturm, Latour 1987*) and other non-human primates, sheep are constantly re-creating or re-assembling their society through monitoring, testing and negotiating. They do not enter a stable, ready-made social structure, but constantly negotiate what the structure will be. The society is literally socially constructed out of face-to-face interactions. Sheep are skilled social players, actively negotiating and renegotiating their society and their positions within it.

How is this different from human societies? Strum and Latour (*1987*) distinguish between complex and complicated societies. Complexity in this context means that it is difficult for participants to decide who is a member of the group and what the nature of an interaction is. Sheep have only their bodies, skills, intelligence, and history of interactions at their disposal to maintain social relations. They perform their society only through their bodies, their social skills, and social strategies, which makes it difficult to establish a stable society. Society is performed *ex nihilo* at every social encounter, in every face-to-face interaction. The society could disappear if not performed; nothing fixes or stabilises it. Of course, age, kinship, and hierarchical rank can be mobilised to make social relations more stable, but even these might – and are – constantly challenged. Thus sheep acquire the skills to create society and hold it together only by using 'soft' tools. But their society is also 'soft'. Sheep live in complex societies, with complex sociality.

A stable society can emerge only when additional resources besides bodies and social skills are mobilised. Material resources or symbols can be used to reinforce a particular form of society, permitting a shift of social life away from complexity to what Shirley S. Strum and Bruno Latour (*1987; Latour 1994*) call 'complication', *i.e.* social life comprised of successions of simple operations. Language, symbols, and material objects are used to simplify the task of ascertaining and negotiating the nature of social order. Individuals continue to perform society, but on a much more durable and less complex scale. The nature of social interaction is stabilised by the use of durable material resources, things, material culture, but also language and symbols. Individuals can influence and have more power over others, and extend their presence even when they are not physically present in a social interaction.

Thus the difference between humans and sheep or other animals is not in the social order, but in the ways the social order is made durable. Living in a complicated society means that individuals inhabit a world shaped by their predecessors. However, this does not mean that society is fixed, and can not be changed. Material resources can be employed and modified to enforce a different view of society.

Living with companion animals is always already a material practice. It includes material culture, bodies, gestures, actions, habits, body skills. It requires new practices and skills of flocking, herding, closing, observing, separating, amassing, forming a queue ... to be learnt and employed by all participants. However, numerous resistances and translations are encountered and employed along the way, changing everyone in the process. In this way, new bodies – human and non-human – are created, ultimately leading to the 'herd', a new mode of association of animals, people, and things.

Caves and rock shelters used for habitation can be seen as material resources which structured and strengthened the social bond between people and

animals, making it durable. They provided the context for social interactions, making them complicated, but also less complex. Caves provided the material world into which people and animals were born; they fixed the way people and animals interacted, and reduced the number of possible outcomes of face-to-face interactions. The material objects, including caves and rock shelters, employed in the process of social complication enabled more durable social relations between humans and animals to emerge. These resources played a crucial role in the construction of stable societies. In fact, those societies were made durable enough to survive the attrition of time and enabled us to observe them archaeologically.

People and the material world are always conjoined in actions, and there is a mutual constitution between people, things, and places (*Miller 1987; Knappett 2005; Latour 2005*). Things, places and bodies are changed through the performance of tasks, and through this mutual constitution, people are also changed. Tasks leave traces on matter, tools, places, and bodies. Through repetition, these traces accrete or layer one upon another. Through layering – a process of creating sediments, assemblages of traces that accrue over time, repair, adapt, modify or curate – life histories become sedimented and layered, and biographies of objects, bodies, and places are created (*Gosden 1994; Knappett 2006*). Things and places change, people become more skilled and older after each task, each day, and through each change of season. Their bodies accumulate traces, skills, and knowledge of how to perform the body movements, gestures and postures that in turn constitute human beings.

But caves are also places of embodiment, where the bodies of both herders and sheep emerge through the regular performance of particular embodied roles, resulting in their becoming a habitual and neurologically sedimented phenomenon.

Thus habits formed in conjunction with particular materials (other people, sheep, material culture, and landscape) become part of an embodied reality for participants through participating in certain activities using certain material resources. Equally, the cave itself can be incorporated into this habitual process or performance of embodiment.

The adoption of flocks of sheep in human households and their penning in caves and rock shelters thus marks different relations between humans and animals, relations which Tim Ingold (*2000.61–76*) describe as "*domination*". Animals in the pastoral mode of production become a means of reproducing the social relations of pastoral production. The slaughter of domestic animals frees people from the obligations of sharing that apply to game animals only. Reproduction and the multiplication of domestic animals make possible the accumulation of wealth. Thus the effect of drawing on domestic herds leads to the social fragmentation of human groups into autonomous, self-sufficient domestic units, where animals are simultaneously members of the household and food resources (*cf. Ingold 1980.79–89*). However, the incorporation of animals into the human household is not merely a tyrannical act of domination over hapless animals. The changes emerging from the incorporation of animals into the household are considerably more complex and contradictory, and include mastery, domination, and objectification, as well as care and nurture (*Cambpbell 2005*). Domestication practices brought humans and animals closer together in relationships of not only control, but also affinity, proximity, and companionship.

By focusing on the systemic power relations of humans over non-human animals, we lose a more nuanced view of how power structures are performed and emerge as stable entities. Animals are not simply thrown into relations of domination. Power can only be understood if we start with the local, and observe patterns and practices and discourses and their interrelation and how they became fixed.

Michel Foucault views power as exercised through a 'net-like organisation' where individuals 'circulate between its threads'. Thus, "*[p]ower is everywhere not because it embraces everything, but because it comes from everywhere*" (*Foucault 1979.92–93*). Therefore, power resides not in a single individual or group dominating others. Individuals are always in a position of simultaneously being subjected to power and exercising it. For Foucault, power is omnipresent; it 'pervades the entire social body'. But where there is a power, there is always also resistance, and this allows the possibility of change (*Foucault 1979.95*) This also holds for power relations between humans and non-human animals. For example, herding manuals suggest that the first thing a herder must learn is that "*[y]ou aren't going to get to do it the way you want*" (*Cote 2004.9*). Animals always react, and resist power relations. All attempts to force them are met with resistance, which can range from open aggression, unruly or uncontrol-

lable behaviour, or flight to passive resistance in the form of stress, loss of weight, sickness, and ultimately death (*Cote 2004*). The image of power as a network thus carries implications of equality and agency, rather than the systemic domination of one group over another. And power can manifest itself positively by producing knowledge and certain discourses that are internalised by individuals and guide the behaviour of populations.

Thus, instead of focusing on the systemic domination of one group over another, it might be more productive to observe how power relations become fixed in a specific historical context and which resources are mobilised to make them more durable. Which technologies and resources are employed to fix power relations between human and non-human animals?

Material culture is a crucial resource in this respect. It fixes the way individuals interact and move, and dictates new skills, habits, and actions, and imposes new body techniques. In this way, it trains and disciplines individuals. As Foucault says, "*stones can make people docile and knowable*" (*Foucault 1977. 172*). Thus, ultimately, it produces a new kind of practiced, docile, knowable body, human and non-human alike.

Conclusions

In the Neolithic Karst, everyday contacts and interactions between humans, non-human animals, landscape, and caves and rock shelters profoundly changed all the participants. The close everyday contact mediated by the materiality of the caves and the wider landscape provided an opportunity for intimate and close contact between humans and animals. Sheep are gregarious animals: during socialisation, they establish a social order; they can recognise individual ovine faces – even human faces – and remember them for years. Through bonding with people (and other species), humans became incorporated within animal social organisation, and animals became part of the power and social relations of human households. A new hybrid society emerged, consisting of humans and non-humans alike. This new set of relations between people and animals brought about a different use of caves, which in turn influenced relations between people and animals. Caves as material culture and as special places in a landscape thus played an active role in changing relationships between people and animals during the Neolithic.

We may call these bodies 'Neolithic' and 'domesticated', but they were not static or stable entities that can be easily fixed with simple adjectives.

Through material encounters, companions from other species became mutually 'incorporated' and reached deep into the psyche of the subjects, not through abstract knowledge, but through sensory-motor experience and engagement. The forces of encounters, affects, created new bodies – human and non-human alike. Bodies, as interfaces, that became more and more describable as they learned to be affected by other bodies and material arrangements.

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Burial practices and social complexity: Jomon examples

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ABSTRACT – *Many archaeologists investigated the burial practices of the Jomon in order to clarify emerging social complexity, especially in the 1950s. Recently, since the social complexity of the Jomon became an important issue, burial practice has been recognised as an indicator of a hereditary ranking system. As I have noted elsewhere, there is no clear evidence that a hereditary ranking system existed in Jomon society. However, instead of searching for hereditary ranking in the Jomon, burial practices could be analysed from another aspect. The temporal and regional distribution of Jomon burial practices has been clarified. In the Kanto district, communal graves appeared in the early Late Jomon. This type of burial has been discovered only in this area. In the same period, some burial practices also appeared in other areas of Eastern Japan. Although this change from Middle to Late Jomon has been recognised, it has not been investigated from the perspective of social complexity. In this paper, I will try to examine the change in burial practices from the Middle to the Late Jomon in terms of social complexity.*

IZVLEČEK – *Številni arheologi so preiskovali pogrebne običaje v kulturi Jomon z namenom, da bi razjasnili nastajajočo družbeno kompleksnost, še posebej v 50. letih 20. stoletja. V zadnjem času, predvsem odkar je družbena kompleksnost kulture Jomon postala pomembna tema, je pogrebni običaj priznan kot pokazatelj sistema dednega razvrščanja. Vendar ni jasnih dokazov, da je takšen sistem dednega razvrščanja v družbi Jomon sploh obstajal, kot sem opozoril že drugje. Pogrebne običaje bi lahko preiskovali tudi iz drugega vidika, ne samo z iskanjem dednega razvrščanja v kulturi Jomon. Časovna in regionalna porazdelitev pogrebnih običajev kulture Jomon je bila razjasnjena. V okrožju Kanto so se v zgodnji fazi obdobja pozne kulture Jomon pojavili skupni grobovi. Takšno vrsto pokopov so odkrili samo na tem področju. V tem obdobju se nekateri pogrebni običaji pojavljajo tudi na drugih področjih vzhodne Japonske. Kljub temu, da je bila sprememba od srednje do pozne kulture Jomon priznana, še ni bila raziskana iz vidika družbene kompleksnosti. V članku bom poskušal preveriti spremembe pogrebnih običajev od srednje do pozne faze kulture Jomon z vidika družbene kompleksnosti.*

KEY WORDS – *Jomon; burial system; collective burial; social change; social complexity*

Introduction

Since the social complexity of the Jomon became an important issue (*Takahashi 2001; Yamamoto 2005; Watanabe 1990*), the development of burial practice has been recognised as an indicator of a hereditary ranking system. Some archaeologists have asserted the existence of hierarchical society in the Jomon because of the construction of large stone structures at some sites (*Fujimoto 1971; Goto 1953; Komai 1959; Kōno 1955*). These stone structures appear mostly in northeastern Japan of the Late Jomon period, and are thought to be related to mortuary practices. The early arguments were based on the large size of the stone structures, and the influence of historical materialism.

The recent discussion about the developing social organisation of the Jomon, which is based on ethnographical data on the hunter-gatherers (*Kobayashi 1986; 1988a; 1988b; 1996; Nakamura 1999; 2002; Ōbayashi 1971; Sahara 1985; 1987; Sahara and*

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Kobayashi 2001; Watanabe 1990), has been concentrated on whether a hereditary ranking system existed. Most studies analyse the burial system of the Jomon in order to find evidence of social inequality, but there is little evidence of hereditary ranking (*Yamada 2003; 2005*).

However, instead of seeking hereditary ranking systems in the Jomon, burial practices could be analysed from another point of view. There is a great gap between an egalitarian society and a society of hereditary ranking system. There must have been varieties of social types, which should be called social complexity. The discussion on the hierarchical society of the Jomon reveals a problem in Jomon studies, which is a misunderstanding about hunter-gatherers and their social complexity. According to anthropological and ethno-archaeological studies, hunter-gatherer societies exhibit various types of social complexity, including trans-egalitarian societies (*Hayden 1995; 2001*). The Jomon period lasted for over 10 000 years, and social changes such as settlement pattern and subsistence have been claimed for its former stages (*Habu 2004*), but for the latter there is still space for discussion.

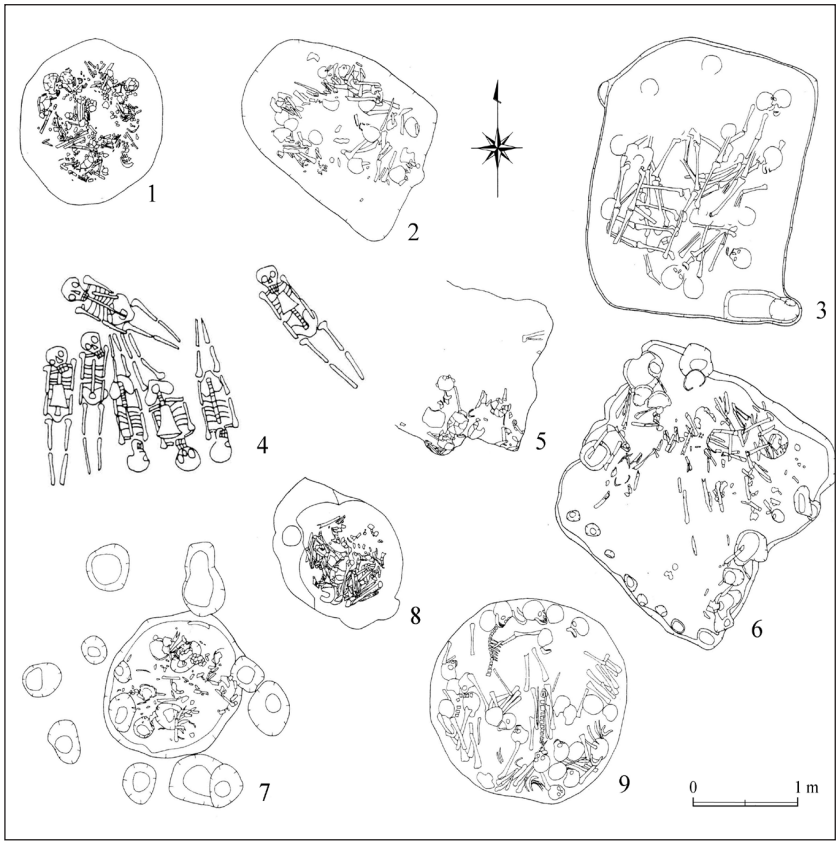


Fig. 1. Collective burials. 1 Gongembara. 2 Kosaku. 3 Miyamotodai. 4 Yahagi. 5 Hondatakada. 6 Gionbara (1). 7 Gionbara (2). 8 Gionbara (3). 9 Nakazuma (after* Yamada 1995.Fig. 1*).

In this paper, I will try to examine social change from the Middle (5470–4420 calBP) to the Late Jomon (4420–3220 calBP) (*Kobayashi 2008*) in terms of burial practice.

The changing burial system in the Late Jomon

The most popular burial practice in the Jomon was primary pit burial, in the extended or crouched position. The temporal and regional distribution of the Jomon burial practice has been clarified. I will focus on the burial system in the Late and Final Jomon periods around the Kanto district.

In the first half of the Late Jomon, especially in Eastern Japan, a new burial practice appeared. For example, graves enclosed in stone appeared in the central and north-eastern regions. In Northeasten Japan, large stone structures were constructed. Although the relation between these two regions has not been clarified, it is said that burial practices changed dramatically in Eastern Japan in this period.

	MNI	aspis (m)	minor axis (m)	depth (m)	shape
Gongembara	17	1.49	1.33	0.4	oval
Kosaku	14	1.8	1.3	–	rect.
Miyamotodai	15	2.37	1.85	0.55	rect.,pit
Yahagi	6	–	–	–	–
Hondatakada	28	–	–	0,2	rect.
Gionbara 1	6	2	2	0.1-0.2	rect.,pit
Gionbara 2	6	1.5	1.4	0.1-0.2	oval, pit
Gionbara 3	5	1.1	0.9	0.6	oval
Nakazuma	106	1.9	1.9	–	circular
Shimoōda A–C	40	–	–	–	oval

Tab. 1. Collective graves (after* Nishimoto *et al.* 2001; Yamada 1995*).

Although the changing burial system does not directly show the emergence of hereditary ranking, there must have been a sociological change which would have been within the range of complex hunter-gatherers at the beginning of the Late Jomon.

Collective graves in the Kanto Plain

In the Kanto district, collective graves appeared in the early Late Jomon. This type of burial has been discovered only in this area, and in this period. At the end of the Middle period, most sites existed for shorter periods compared to the periods before and after. Collective graves were constructed just after this chaotic period, which means that they were constructed at the beginning of new settlements. As I have written elsewhere (*Kawashima 2010*), after the construction of collective graves, ring-shaped earthen mounds were constructed. Such sites are thought to have been more long-term.

The collective graves contain both primary and secondary burials. More than ten grave pits have been found at these sites (Tab. 1, Fig. 1). Collective graves have the following characteristics:

❶ They were constructed at the beginning of the Late Jomon.
❷ Some graves had superstructure.
❸ In some sites, pit houses and graves are found around these graves.
❹ They are secondary burials mostly (*Yamada 1995*). Only at Yahagi a primary collective burial is clearly observed.

Of these sites, I focus on two: Nakazuma shell mound and Shimōoda shell mound, because mtDNA analysis of the excavated bones has been carried out.

Nakazuma shell mound

At the Nakazuma shell mound, a pit of secondary burial was found which contained more than 100 individuals. Bones such as the crania and the appendicular skeletons are thought to have been buried within a short period. MtDNA data on 29 individuals was recovered from the grave at Nakazuma. Nine different haplotypes were observed (Tab. 2) (*Shinoda* et al. *1998*), and two dominant haplotypes identified. The most frequent haplotype was observed in 17 individuals, while the second largest group consisted of 5 individuals. Other individuals have different haplotypes. As mtDNA is inherited through the maternal line, it is thought that a matrilineal system could have been adopted at the beginning of the Nakazuma settlement.

Haplotype	Specimen no.	n
1	N–1,2,15,17,110,140,148,150,155,161 163,175,184,185,190–1,190–2,207	17
2	N–4	1
3	N–5,111,137,158,206	5
4	N–12	1
5	N–18	1
6	N–113	1
7	N–138	1
8	N–186	1
9	N–203	1

Tab. 2. Haplotypes at Nakazuma (after* Shinoda *et al.* 1998.Tab. 2*).

Kinship among the residents at Nakazuma was also analysed by comparing the similarities in tooth size ratios (*Matsumura, Nishimoto 1996*). Compared to the data of Jomon tooth remains from neighboring, two of five groups were identified by cluster analysis as being closely related. These data were cross-checked with mtDNA haplotypes (*Shinoda* et al. *1998*). These two analyses share 21 individuals. Although it is difficult to find a strong correlation between the data from the two analyses, three pairs of strong correlation of tooth size ratios belong to the same haplotype. However, two dominant groups from the tooth size ratios share the same haplotypes. Although two dominant matrilineal groups were found by mtDNA analysis, in fact, it is difficult to assume that the society at Nakazuma practiced only matriliny.

Shimoōda shell mound

A similar result was obtained from the Shimoōda shell mound. 14 haplotypes were found from 25 individuals, yielding both Middle and Late Jomon specimen (Fig. 2) (*Nishimoto* et al. *2001*). For the Late Jomon, 13 individuals from one of the collective graves, pit A, represent 7 haplotypes. Of 13 Late Jomon individuals, 7 belong to one haplotype. Also, at Shimoōda, a matrilineal line could have been important. As I noted, many small and short-term sites appeared at the beginning of the Late period, but, Shimoōda is an exception as the site continued from the Middle Jomon. In the Middle Jomon, graves were located in circles, and the deceased was buried in a crouched position (Fig. 3). On the other hand, in the Late Jomon, in which collective graves were also constructed, primary burials were in the extended position and arranged in squares. Both periods represent different types of burial custom; however, the mtDNA data show a continuous genetic inheritance. This might indicate that the ancestors of the deceased in pit A – for example, type 6 and 8 – also

lived at this site in the Middle Jomon. Although this is only one example, this kind of continuity can be observed in pit B, type 5.

These haplotypes found at the Jomon sites have been compared with contemporary mtDNA data, which shows that the haplotypes at Nakazuma are not dominant in contemporary Japanese haplotypes (*Shinoda 1998*), and those at Shimoōda were found over a wide area, mainly in East Asia (*Nishimoto* et al. *2001*). Those found at the Jomon sites are thought to be neither specific nor dominant in the Jomon. Although a comparison with the Jomon haplotypes and more specimens are needed, the mtDNA data of the Jomon can be reliable to some extent.

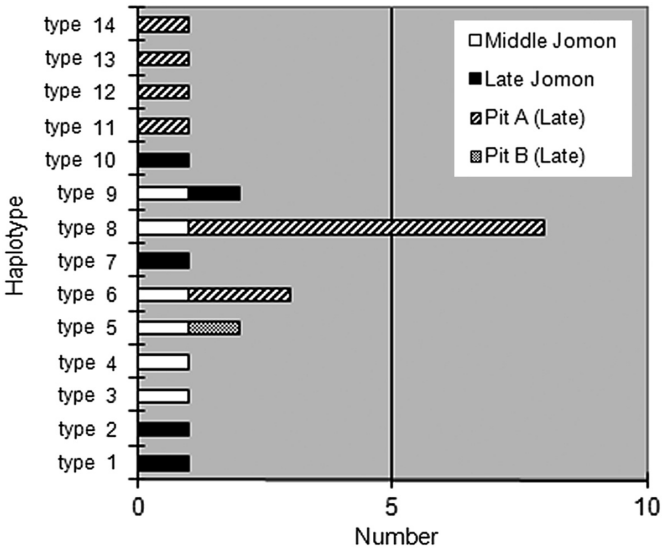


Fig. 2. Haplotypes at Shimoōda (after* Nishimoto *et al.* 2001.Fig. 5*).

Shimoōda is an exceptional case of site continuity from the Middle period, but at this site, collective burial began in the early Late Jomon period (Horinouchi 2 – Kasori B1 pottery type) (Tab. 3). In the collective graves at Shimoōda, matrilineal people, possibly descendants from the Middle Jomon, were buried. In the Kanto district, most sites, including Nakazuma, were formed in the early Late Jomon period. Considering the situation at Shimoōda, probably, Nakazuma was also inhabited mostly by descendants of people who had lived around Nakazuma. So, the change in the burial system could have been a cultural change, rather than a tribal migration.

Why did Late Jomon people adopt collective burial? In the case here, the difference in the settlement system may be the key to understanding changing burial practices.

The difference in settlement patterns between the Middle and Late Jomon

As I have noted elsewhere (*Kawashima 2010*), house structures changed from the Middle to Late Jomon (Fig. 4). Usually, pit houses in the Middle Jomon were dug deep into the ground compared with those in other periods. They have 4 to 5 main posts, and beams and rafters (*Kobayashi* et al. *2004.101*). On the other hand, houses in the Late period have small postholes along the wall, besides the main posts (Fig. 5). Some archaeologists think that small post-holes imply the existence of a daub wall structure (*Abe 1996*).

In order to consider the change in house structure, the differences in house structure among Native American tribes is useful for comparison. Mutō (*1995*) described the use of pit houses in the Jomon, referring to the houses of Native Americans. There are different types of house structure, according to region, such as plank houses on the Northwest Coast, pit houses in the Plateau region, and tepees on the Plains, and so on.

Among these, the use of pit houses in the Plateau region is significant for comparison. Pit houses are used only in winter; in other seasons, a simple plain dwelling called a mat house is used. Pit houses have the following characteristics among the three groups of Thompson, Sampoil, and Modoc (*Mutō 1995*):

❶ They are used from December to February, for a maximum of three seasons, and are sometimes abandoned after one season.
❷ It takes two to four weeks to build a new pit house.
❸ Size varies from 3 to 12m diameter.
❹ When a household member dies, the house is abandoned.
❺ Pillars are replaced, but pits are reused.

Angyō (Late)	3400–3220	
Soya	3470–3400	
Kasori B3	3530–3470	
Kasori B2	3680–3530	
Kasori B1	3820–3680	Shimoōda
Horinouchi 2	3980–3820	Shimoōda, Nakazuma
Horinouchi 1	4240–3980	
Shōumyōuji	4420–4240	

Tab. 3. Date of the Late Jomon (calBP) (after* Kobayashi 2008*).

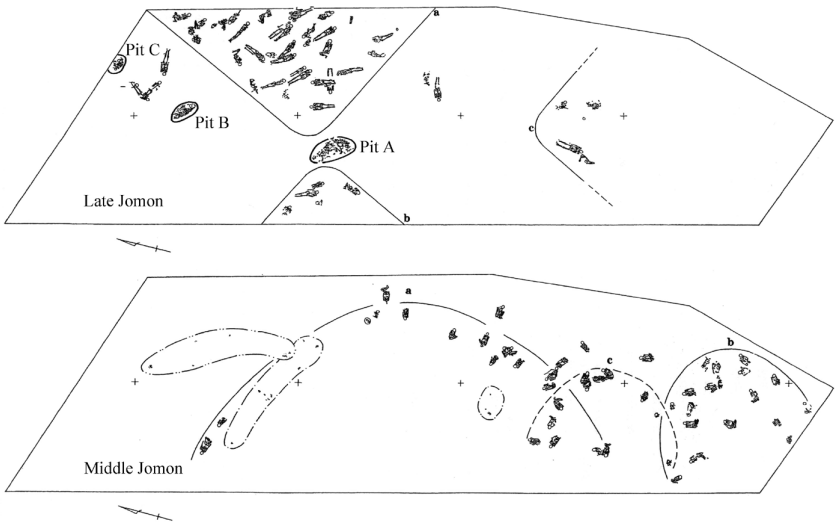


Fig. 3. Distribution of graves at Shimoōda (after* Nishimoto *et al.* 2001. Fig. 5*).

According to this comparative work, Mutō (*1995*) regards the Early and Middle Jomon as mobile societies, because many pit houses were constructed during this period. On the other hand, while pit houses were still constructed, society after the Late Jomon period is regarded as more sedentary, because of the increase of embedded pillar building which is suitable for sedentary lifestyle. Compared to the Middle period, the Late and Final Jomon houses tend to be reconstructed continuously at the same place, sometimes with an expansion or reduction in house size (Fig. 5). This implies continuous land use, longer than in the Middle period.

It remains a question as to whether pit houses in the Late Jomon can be equivalent to plank houses used in a relatively sedentary lifestyle. However, house structures in some areas of North America are significantly different, depending on the settlement pattern. Although the tribes of the Northwest migrate seasonally, they have permanent villages with plank houses. This is different from the more mobile people on the Plateau, who use pit houses in their winter villages.

Abundant pit houses in the Middle Jomon could be related to frequent seasonal migrations. Although most scholars oppose this idea, it is possible to think that the reduction in the number of settlements and houses in the Late Jomon was caused by a more sedentary lifestyle.

The meaning of changing burial practices

In the Middle Jomon, burials were performed in abandoned houses. As human bones have been recovered from just below the floor, the deceased could have been buried soon after death. Compared to the ethnographic examples from the Plateau region in North America, this could mean that pit houses were abandoned after a death, and the remaining occupants of the house moved. Although in some cases multiple bodies were buried in the same abandoned pit houses, the scale of burial was relatively small. They do not exceed the size of a household. On the other hand, the collective burial from the beginning of the Late Jomon period contains several individuals in a secondary burial. In the collective burial of the Late Jomon, the burial unit is thought to have become larger than that of the household.

Collective burials were performed only over a the short period. Considering the change in settlements, this burial practice could have been connected to sedentary settlements. From a point of view, they had to confront the deceased, the secondary burial could have been the solution. Primary graves were recognised and memorised, and bones were collected basically in terms of maternal lines. Yamada

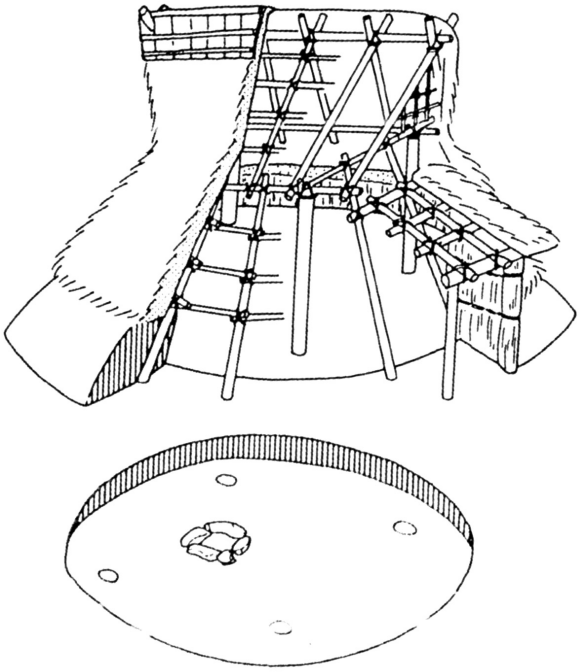


Fig. 4. Pit house of the Middle Jomon (after* Kobayashi *et al.* 2004.Fig. 6.3*).

(*1995*) asserts that this custom was performed in order to intensify social bonds by worshipping the ancestors of the settlement. From another point of view, people in the settlement had to claim their right to occupy it. In the case of Nakazuma, in terms of recovered pottery type, it is said that collective burial continued for the period of one pottery type, almost 40 years, according to ^{14}C dating. So, at some sites, the new settlement system was established within a very short period.

After the period of collective burial, several features appear in the same area, such as:

❶ several reconstructions of pit houses at the same point;
❷ large pit houses;
❸ the formation of circular mounds;
❹ rich ritual artefacts, including clay figurines and stone rods.

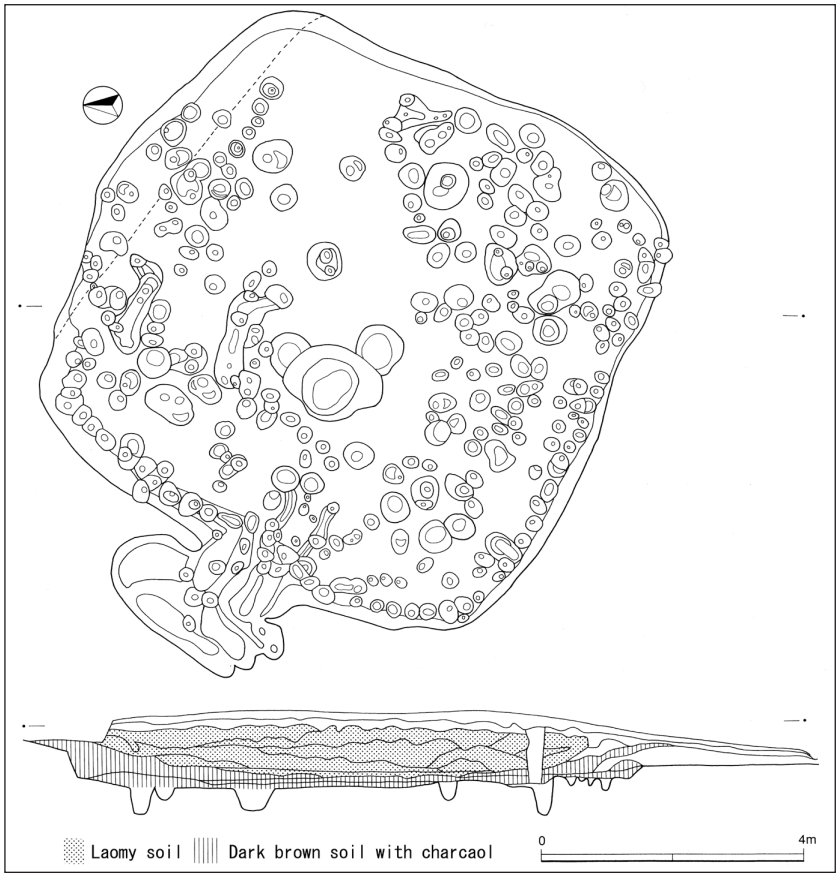


Fig. 5. Pit house of the Late Jomon (after* Yoshino 2003.Fig. 4*).

As I noted at the beginning, there is scarce evidence of hereditary ranked society in the Jomon. However, it is likely that the social structure after the Late Jomon was different from that of the Middle period. The examination in this paper suggests that the change in burial practices was closely linked to that of the settlement system. The appearance of collective burials at the beginning of the Late Jomon period could have been related to changes in social structure.

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Figurines in Pietrele: Copper Age ideology

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ABSTRACT – *Major trends in figurine production of the copper age settlement of Pietrele (Romania) are discussed. The bone figurines are seen as an ideological innovation of the Early Copper Age system in the Eastern Balkans.*

IZVLEČEK – *Predstavljamo glavne trende v produkciji figurin na bakrenodobnem naselju Pietrele v Romuniji. V koščenih figurinah vidim ideološko inovacijo zgodnjebakrenodobnega sistema na vzhodnem Balkanu.*

KEY WORDS – *Copper Age; Romania; Pietrele; settlement; figurines; ideology*

Introduction

Figurines are among the characteristic features of the South-East European, Anatolian and Near Eastern Neolithic and Copper Age, and have been attracting attention since the 19th century. They belong to the most thoroughly published class of objects, but the quality of illustrations remains a major problem in discussing their details. Elisabeth Ruttkay was one of the few researchers who had dealt with this problem, and in several articles explained how to recognise the details of figurines (*Ruttkay 1972; 1992; 2001; 2005*). In one of her outstanding studies, she showed the inter-regional connections of a certain symbol in the South-East European Neolithic and Copper Age which she had found on a spoon (*Ruttkay 1999*). Figurines were used in settlements of local communities, and modelled according to a regional style (of different 'cultures'), but their general features were rooted in a long tradition and were supra-regional (*Hansen 2007*).

During the 10th millennium BC, a major shift in figurine production took place. The whole posture of the figurines' bodies changed (Fig. 1). The upper part of their body is now slightly leaned back; the head is laid a little in the neck; their gaze is turned toward the sky. In comparison to Palaeolithic statuettes, which cannot stand on their bent-in legs and hold their head bowed down, Neolithic figurines constitute something basically new. In the Early Pre-Pottery Neolithic period, new types of representation and formal means of expression were invented; now we find both standing and seated figurines. There is an evident break between Palaeolithic and Neolithic sculpture.

Figurines belong to the Neolithic package which came to the Balkans via Anatolia. They seem to be closely connected with painted pottery. There is a sharp division between the Balkans and Western Europe, where figurines are completely absent from contexts of impresso or cardial ceramics.

After an Early Neolithic horizon of the late 7th and early 6th millennium with similar figurines from Turkish Thrace to the Middle Tisza region, already in the second half of the 6th millennium we observe regional variations in figurine style and quality, in the number of different types, and in the number of figurines found in settlements. In the 5th millennium, these variations between different regions became more and more obvious. In Thessaly, the style of the figurines changed profoundly and their numbers de-

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creased. In the Central Balkans, figurine production ended with the Vinča culture, around 4650 calBC according to the new radiocarbon dates (*Borić 2009*). The same is true for the Tisza culture in Eastern Hungary.

In most regions, figurine production came to an end in the middle of the 5th millennium. The apparently sudden end of the figurines was interpreted as the result of profound changes in spiritual life, and was seen in connection with migrations (*Gimbutas 1994*). But a closer look at the material shows that the causes were more complex. In this respect, it is worth looking back from the West to the Near East. It is surprising that also in the Near East, figurine production ceased in the 5th millennium. One of the latest examples comes from the Ubaid culture. In the cemeteries of Eridu and Ur, mostly female figurines, but also some male figurines were found (*Parrot 1981.96, Figs. 92, 93, 98*). The rhythm of figurine production in the Near East and South-East Europe seems to have been similar.

In contrast to the decline of figurine production in these regions, figurines became very popular in the Eastern Balkans. In the middle of the 5th millennium, when the KGK VI complex emerged between the Aegean and the Danube, figurine production was intensified and the number of types increased. It is noteworthy that some types were still in the tradition of Neolithic figurine production, like the large sitting figurine from Pazardžik (Fig. 2), but new types also appeared. One of the most remarkable changes is the introduction of bone figurines. Since the 10th millennium, anthropomorphic figurines had never been made of bone. Because the material and meaning of the figurines were closely related, the introduction of a new material can not only be seen as an innovation, but also as an ideological change. The same is true for the first metal figurines.

Pietrele at the Lower Danube

Before discussing some aspects of the figurines from Pietrele and their social significance, it is necessary to give a short general introduction to the Pietrele excavation. The Eurasia Department of the DAI, the Romanian Institute of Archaeology, and Frankfurt University, have been excavating in Pietrele since 2004 (*Hansen* et al. *2010* with bibliography of earlier reports). The 'Măgura Gorgana' settlement mound is slightly oval, with a diameter of 97m in the east-western direction and 90m in the north-southern direction (Figs. 3–4). The tell site is 9m high and the

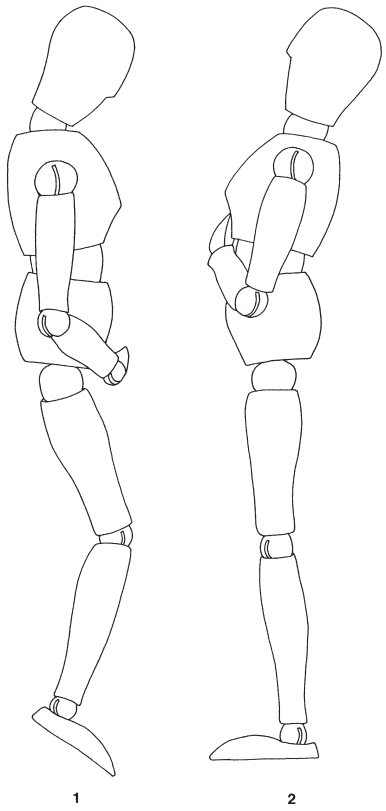


Fig. 1. Paleolithic and Neolithic body orientation of figurines (after* Hansen 2007*).

cultural layer is probably of the same depth. The Copper Age settlement ends around 4250 BC. We have reached layers which could be dated to around 4500 calBC. After the Copper Age, the mound has never been settled again (*Berciu 1956*).

Pietrele is situated on the left bank of the Danube, around 170km from the Black Sea coast. It was part of a system of settlement mounds along the lower Danube and in North-Eastern Bulgaria, most of which were probably erected at the same time before 4600 BC. It is worth noting that these mounds were the first settlements of this type in these regions: the latest tell settlements in South-East Europe.

Pietrele is part of the so-called Gumelniţa culture, which is considered part of the Kodžadermen-Gumelniţa-Karanovo VI (KGK VI) complex. Karanovo in Bulgarian Thrace is still the fixed point of Eastern Balkan chronology, even if its stratigraphy for the KGK VI period is quite low (less than 4 metres) compared to the Pietrele sequence with 7m and four houses.

The background of our excavation is the enigma of Varna (*Fol and Lichardus 1988*). The idea was to excavate at Pietrele to contribute to a better under-

standing of the increasing social inequality which is displayed in the burials in Varna. How was it possible that some persons, like the man in grave 43, were buried with an abundance of prestigious items like spondylus, gold, and copper? The question is important, since Varna is not a single case, but part of a widespread tendency (*Demoule 2007*). In South-East Europe this social inequality was a part and the result of a new system. Several elements characterised this system. First, the new copper weapons were the startingpoint for the relatively rapid development of weapon technology in the next 700 years. The need for weapons was the impetus of copper mining. A second major point was the new representation of power, not only in graves, but also in tell settlements. Tells were built to draw distinctions between people. Before 2008, no radiocarbon dates from Varna cemetery were available. By stylistic comparisons, Varna was dated to the end of the KGK VI sequence. With new radiocarbon evidence it became clear that the rich graves in the cemetery had to be dated between 4560 and 4450 calBC (*Higham* et al. *2007*). Varna stands at the beginning of KGK VI development, not at the end. Our excavation in Pietrele does not tell the story of development up to Varna, but from Varna on.

One of the results of the geophysics in the 2004 campaign in Pietrele was a plan of the settlement at the mound, which consisted of four rows of houses (Fig. 5). The second result was evidence of a much larger settled area around the mound. Since then, a completely new dimension of Copper Age settlement has required (*Lazarovici and Lazarovici 2007*). It differs from the small settlements which were reconstructed after the excavations in Bulgaria and Romania, and accords with similar large scale Late Neolithic settlements in Bosnia (*Hofmann* et al. *2007*) and Hungary (*Raczky, Anders 2006*). We have to excavate larger areas to discover if the settlement around the tell is earlier or contemporaneous. But it seems clear that living on the settlement mound differed from living around it, which could explain the wealth of finds on the settlement mound.

One surprising point was the high quantity of more than 60% of wild animals in the settlement. There were large-scale hunting and fishing activities. The distribution of artefacts enables the identification of specialised households. The occupants of the houses in trench F were mainly engaged in fishing and hunting. Almost all our hunting weapons/tools came from these houses. Two unburnt looms and several loom weights from the burnt houses show that weaving was one of the main activities of the occupants of the houses in trench B. The specialised craftsmanship of the Early Copper Age is visible in several products in the settlement mound, such as the copper artefacts. The specialists did not necessarily work in this settlement. Specialised and experienced craft workers were also needed to produce long blades of up to 30cm lenght.

In the settlement around the mound, we opened several trenches in the last two campaigns, with surprising results. In trench J, the Copper Age layers came to light at a depth of 170cm (Fig. 6). The preservation was not so bad. We found an oven and an installation for grinding. In the western part, a number of large sherds came to light which originally belonged to a pot standing on a clay bench next to the oven. Beneath one house, we were able to unearth a second, older house. This is the first time that such a sequence has been observed in a plane settlement.

Related to pottery processing, a large *pithos* with a height of 130cm and a capacity of 400 litres could be restored (Fig. 7). It is quite clear that the making of this *pithos* required specialised craftsmanship as well. The distinction between potters producing 'normal' pottery and potters making large pots has been shown by ethnographic studies. Such large vessels are not unknown from other Neolithic sites: a remarkable piece was found at Toptepe in Turkish Thrace (Fig. 8). But *pithoi* larger than one metre seem to have been produced only in certain Neolithic cultures.

Pietrele was a central place in a much larger economic and political system with a clear division of labour and social differentiation on the Lower Danube and in Northern Bulgaria.

Figurines in Pietrele

The use and working of metal since the Pre-Pottery Neolithic has been established for Eastern Anatolia, but metal was not in the Neolithic Package in which most of the innovative techniques came to Europe at the end of the 7th millennium and beginning of the 6th millennium. All in all, it was around 1000 years BC before people began to look for metals, to collect surface material, began mining and process the copper. In the first half of the 5th millennium, copper casting was established in the Central Balkans. In the middle of the 5th millennium copper and gold were used in large parts of South-Eastern Europe. It must have been a fascinating time. A new material

appeared; its qualities were different from most of what was known at that time. It was hard and soft; it was not easy to break it; it had special colours and was shiny. But the most important quality was that it was never destroyed. The dynamic and special attractiveness of metal lay in the fact that it could be melted. Every broken axe could be melted down and a new axe recast. Alternatively, a broken axe could be melted down in order to cast an object in demand, such as a bracelet or a chisel. Thus, two remarkable features were united in metal that were absent from other materials: reparability (that is, renewal) and convertibility.

With the possibility of re-melting an object and producing a new object, a new quality appeared: namely, the material remained (almost) whole; it was not used up. Once exploited in the mine and processed, metal could be used repeatedly to produce new objects. Thus unlike broken stone axes, it was sensible to accumulate metal for use when needed. All metal objects could, and usually were, reused. To summarise, the enormous technical and social possibilities offered by metal were a challenge to existing ways of thinking.

We will first discuss the first human representation in metal. In 2009, we found a gold pendant together with a large number of spondylus beads in one of the burnt houses on the mound (Fig. 9). Such golden amulets are often interpreted as human figurines. Three main distribution areas are known: Greece, where they were mostly found in caves; the Eastern Balkans, where they were predominantly found in settlement mounds (*Chohadziev 2009*) and in the cemetery of Varna; and in the Carpathian basin, where they were used as grave goods. In some cases, they were included in votive deposit. The case of the golden amulet also sheds some light on the practice of deposition. Its weight is half of the amount of the gold found in the richest grave in Varna. This shows that the accumulation of wealth was possible in different regions in Southeastern Europe at the same time. The use of gold for amulets or animal figurines, or even representations of certain bones, was supposed to transfer the qualities of the material to the representation.

Bone figurines are very common in KGK VI group settlements. They are quite numerous, and do not vary much in quality. Some still have their original copper ornaments. In Pietrele, we were able to show for the first time that clay beads were also used as ornaments. As already mentioned, bone figurines did not appear before the Copper Age. In the Early Copper Age, flat bone figurines were very common and widespread, and produced in large numbers. The close connection between human figurines and clay was not accidental – it was supposed to express some common qualities of human beings and clay as a material on a metaphorical level. Using animal bone to represent human beings must have opened a new horizon of thought. Animal bone was used for representations of women and men (Fig. 11).

The male figurines are clearly phallic. This is the only type of figurine which occurs in settlements as well as in graves. Figurines were normally not used as grave goods. Therefore, it is the only figurine group in the European Neolithic which allows a comparison between settlement and grave. In Varna, these phallic representations are known in the well-equipped graves, such as grave 36. An outstanding example of the male representations is a marble figurine (Fig. 10) from Grave 3 – one of the so-called mask graves in the centre of the graveyard – which was decorated with several golden *tutuli*. It is the only example of a copy of a bone figurine in marble.

Bone figurines are known from 20 graves in Varna, 14 kenotaphs and 6 burials. All of these were combined with metal and/or spondylus. All graves containing figurines belong to the small high status group. On the other hand, in grave 43, the richest one, no phallic figurine was found.

In Pietrele, we found six figurines on the settlement mound. A further three figurines have come from Dumitru Bercius' excavations of in the 1940's. All figurines were found in houses; not a single one came from open areas, street and courtyards.

In comparison with other settlement mounds, the number of figurines is relatively high in Pietrele (Fig. 12). Eight figurines were found in Ruse, and nine in Karanovo. In Goljamo Delčevo, four figurines were found. We have to consider that in all these places, a much larger part of the settlement mound was excavated than in Pietrele. In general, the high number of such figurines is an argument for the social significance of the settlement and the high status of its inhabitants. An interesting detail is the complete absence of these figurines in the Kodžadermen tells in Northeastern Bulgaria.

The bone figurines are representations of male genitals. As Hans-Peter Duerr has argued by using ethnographical and historical evidence, the demonstra-

tion of the penis is an aggressive demonstration of male power. In the case of Gumelniţa, it is underlined by their size. The social exclusivity which can be seen in the Varna graves shows that male dominance was expanding in the Early Copper Age at the same time as social differentiation was increasing.

In the Pietrele settlement mound the number of clay anthropomorphic and zoomorphic figurines is quite high. 391 anthropomorphic and 66 zoomorphic figurines were found on the mound where we excavated approximately 940m³. In the flat settlement, their number is much smaller, but it is too early for a precise comparison. The quality of the figurines is different, which is obvious in the modelling of the heads. There are very simple forms of heads, heads with holes in which copper ornaments were fixed, and figurines with plastic modelling (Figs. 13–14).

The Gumelniţa figurines rely on the Late Neolithic figurine types of the Tisza and Lengyel cultures much more than on the older tradition of Hamangia in the East, or the Boian in Southern Romania. One group consisted of standing figurines with outstretched arms, a position found among figurines in the second half of the 5th millennium BC in wider parts of Europe, as can be seen in the figurine from Zauschwitz in Saxony from Stroke Linear Pottery culture, a Lengyel site at Falkenstein-Schanzboden, and a KGK VI site at Krivodol (Figs. 15–17).

Human representations are widespread, and the great distance between Krivodol in Bulgaria and Zauschwitz in Saxony can be underlined by another case. In 2008, we found a pot with a flat bottom and vertical rim. The incised decoration is not very common in Pietrele. On the bottom, a human being is incised with raised arms and spread legs (Fig. 18). Similar pictures are known from several Stroke Pottery pots in Saxony and Bohemia (Fig. 19), where they were interpreted as people at prayer. But I would prefer an interpretation which takes into consideration the sexual dimension of these pictures.

The striking characteristics of all these clay figurines are the variety of types and their large number. Additionally, many other clay models exist, especially miniature furniture and small clay houses. Several house models came to light during the excavation campaigns in Pietrele. Lids with handles in the form of houses were also quite popular (*Reingruber 2008*). Jan Trenner (*2010*) could show that the occurrence of house models has a chronological and regional focus. They are very common in the 'Kodžadermen-Gumelniţa-Karanovo VI-complex', an earlier distribution centre is Thessaly and Macedonia. The large number of house models in Pietrele is not surprising compared to other settlements in the Eastern Balkans.

A large clay house was found in the Gumelniţa settlement of Malul Rosu near Sultana, com. Mânastirea, jud. Călaraşi (*Hălcescu 1995*). In the walls and the roof, seventeen holes with diameters of 4.5–5.0cm can be found (*Hansen 2007.Taf. 438*). The model house is 32cm long, 27.5cm wide, and 21cm high. Under the broken house, the excavators found 11 gold objects which were probably originally 'stored' in the clay house (Fig. 20).

Several fragments of a very large house (Fig. 21) were found in 2010 under the living level of the house where the gold pendant (Fig. 9) was found in 2009. The preserved length is 55cm and the height is 20cm. The walls are decorated with a chess pattern of reddish and whitish fields. Such decorations are known from the much older houses in Thessaly (Krannon, Larisa), as well as in Walachia (Jilava: *cf. Trenner 2010*).

The similarity of the pattern of younger and older models in two different areas should be interpreted as an expression of a common symbolic language in the South-East European Neolithic and Copper Age, as has been shown in the masterly article by Elisabeth Ruttkay (*1999*) already cited.

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Fig. 2. Seated figurine from Pazardžik (after Hansen 2007*).*



Fig. 3. Măgura Gorgana near Pietrele (Photo: S. Hansen).



Fig. 4. Măgura Gorgana (Model: K. Scheele).

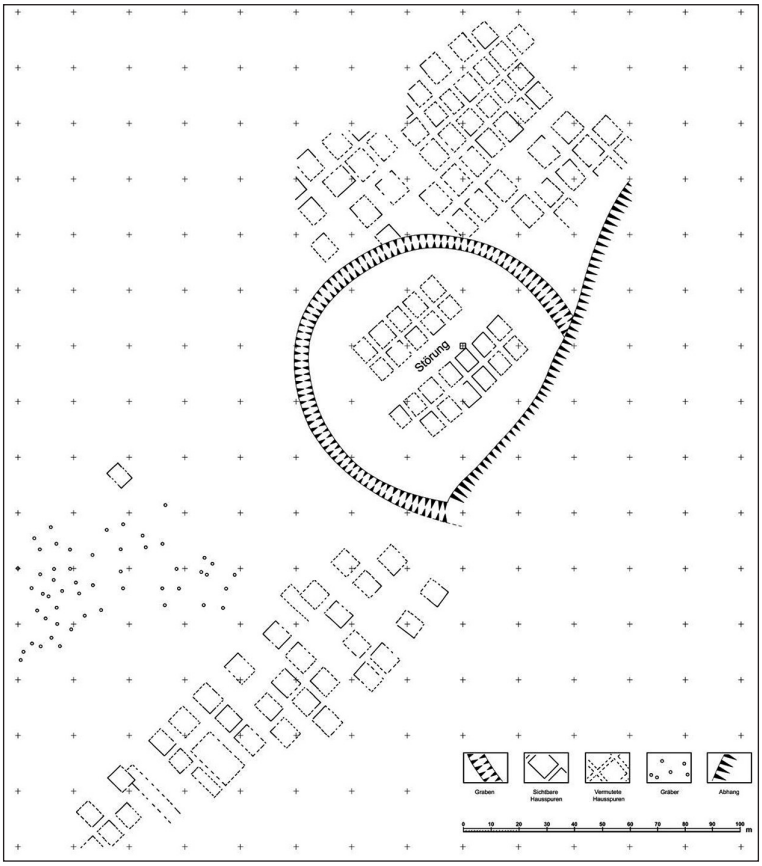


Fig. 5. Reconstruction of the settlement plan (Plan: B. Song).



Fig. 6. Pietrele. Trench J with remains of the oven and grinding installation (Photo S. Hansen).



Fig. 7.* Pithos *from Pietrele 1.2m high (Photo S. Hansen).



Fig. 8. Anthropomorphic pithos *from Toptepe (after* Özdoğan and Dede 1998*).*



Fig. 9. Gold pendant from Pietrele (Photo: M. Toderaş).

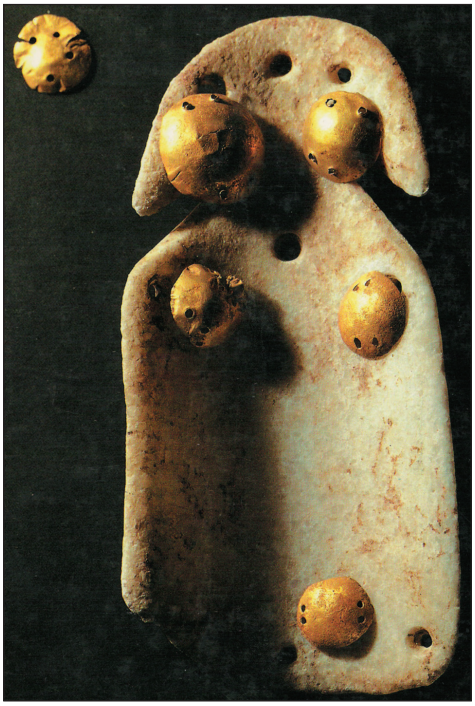
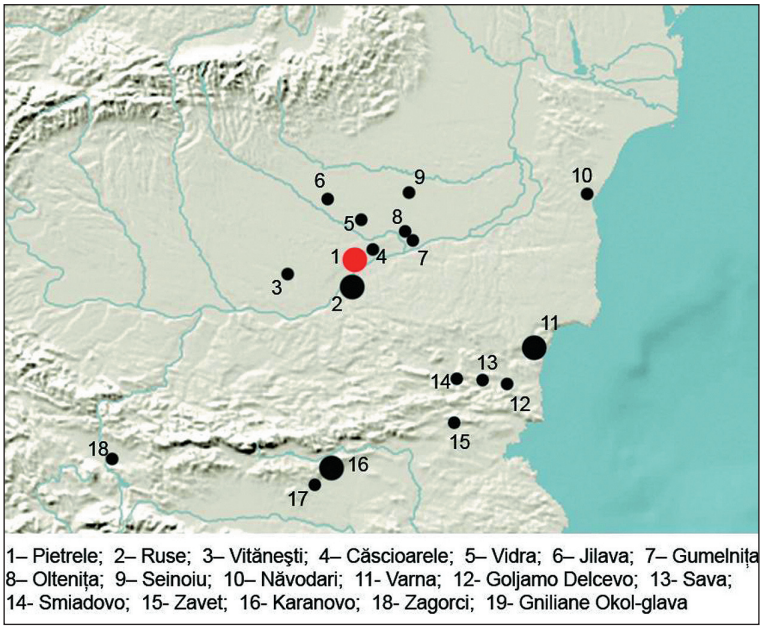


Fig. 10. Marble figurine from Varna (after Fol and Lichardus 1988*).*



Fig. 11. Bone figurines from Pietrele (Photo: S. Hansen).



1– Pietrele; 2– Ruse; 3– Vităneşti; 4– Căscioarele; 5– Vidra; 6– Jilava; 7– Gumelniţa 8– Oltenița; 9– Seinoiu; 10– Năvodari; 11- Varna; 12- Goljamo Delcevo; 13- Sava; 14- Smiadovo; 15- Zavet; 16- Karanovo; 18- Zagorci; 19- Gniliane Okol-glava

Fig. 12. Bone figurines in South-East Europe. Large symbols mark more than 7 figurines (Map: S. Hansen).



Fig. 13. Pietrele. Standing figurines (Photo: S. Hansen).



Fig. 14. Pietrele. Figurine heads (Photo S. Hansen).

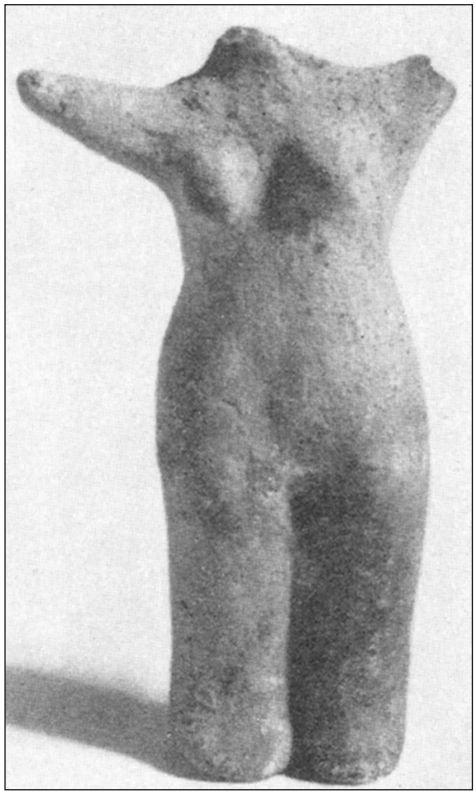


Fig. 15. Figurine from Zauschwitz (after Coblenz 1965*).*

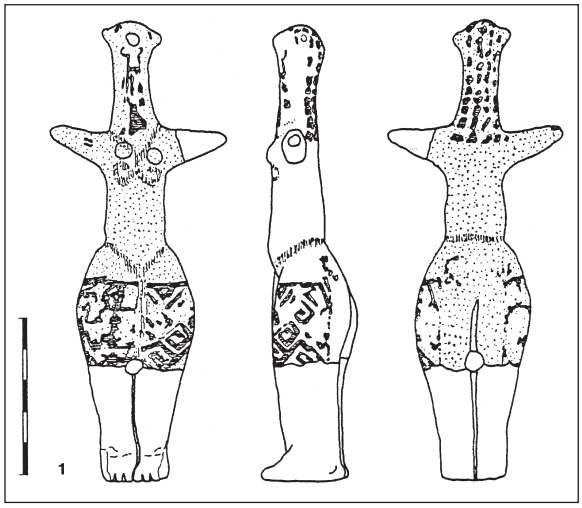


Fig. 16. Figurine from Falkenstein- Schanzboden (after Neugebauer-Maresch 1995*).*



Fig. 17. Figurine from Krivodol (Photo S. Hansen).





Fig. 18. Pietrele. Pot with incision on the bottom (Photo S. Hansen).

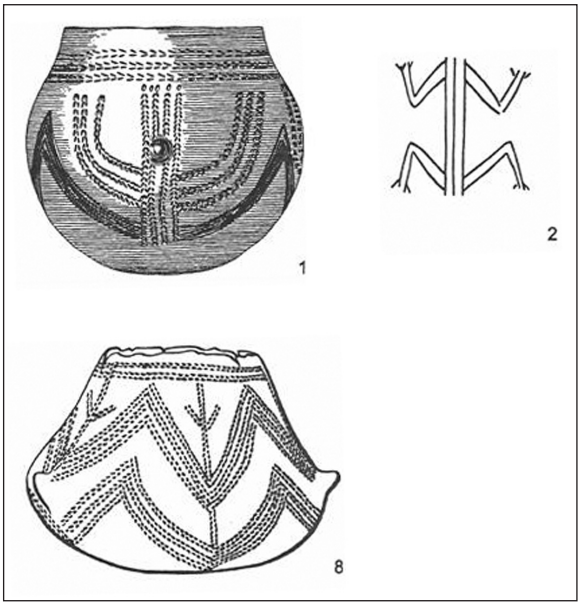


Fig. 19. Potsherds from Saxony and Bohemia (after Spatz 2003*).*

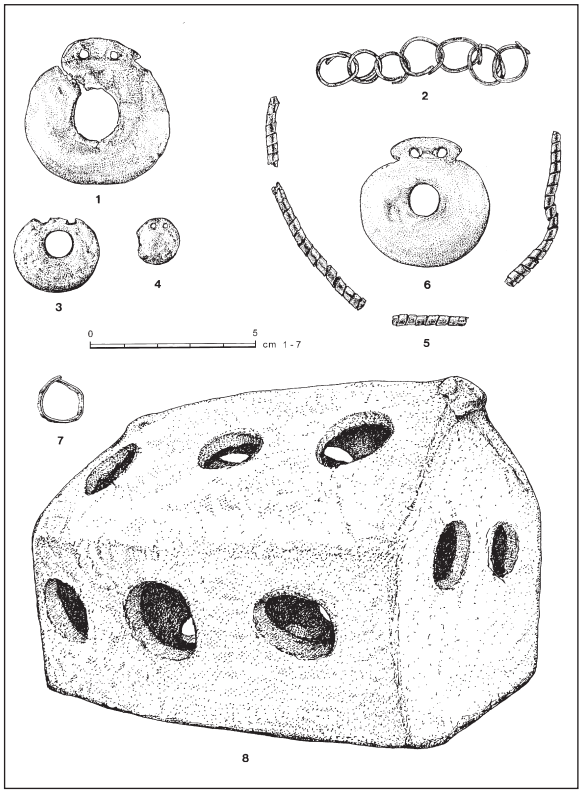


Fig. 20. Clay house from Sultana with gold objects (after Hansen 2007*).*

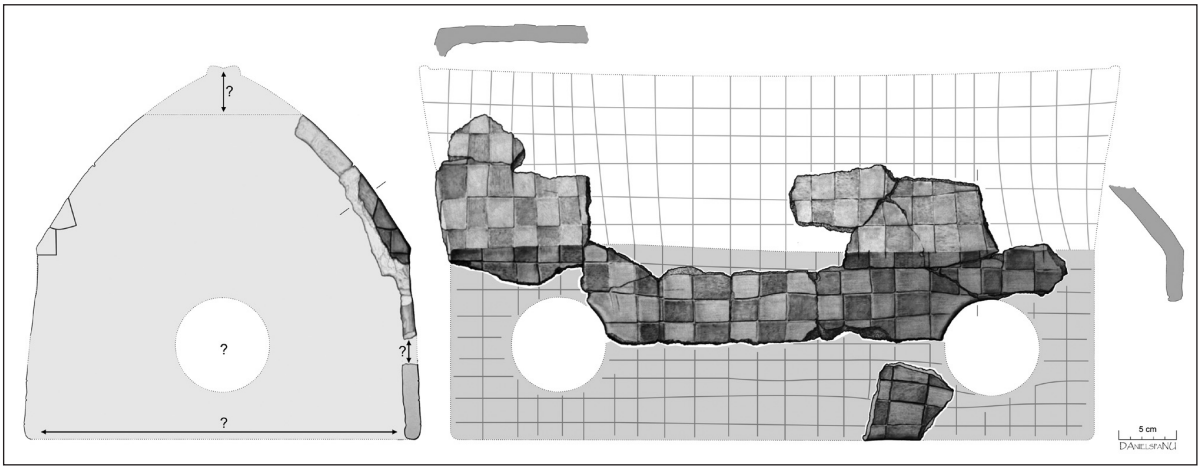


Fig. 21. Clay house from Pietrele (picture: D. Spânu).

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Arrangement of Vinča culture figurines: a study of social structure and organisation

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ABSTRACT – *In this working paper, I present a unique assemblage of 43 figurines and 11 miniature tool models discovered at the Late Vinča culture site at Crkvine, Stubline in Serbia. The distinctiveness of this find is that it was discovered in it original context, where the figurines were used, and that the objects were found in their original arrangement. I also discuss to what extent it is possible, considering the figurines arrangement, to understand hints of social structure and organisation of communities in the final phase of Vinča culture.*

IZVLEČEK – *V članku predstavljam poseben skupek 43 figurin in 11 miniaturnih modelov orodij, ki so bili odkriti na najdišču Crkvine, Stubline v Srbiji, ki datira v obdobje pozne Vinče. Posebnost te najdbe je predvsem ta, da je bila odkrita v originalnem kontekstu, kjer so bile figurine uporabljene, in da so bili predmeti najdeni v prvotni razporeditvi. V članku razpravljam tudi o tem, v kolikšni meri je mogoče glede na razporeditev figurin razumeti sledi o družbeni strukturi in organizaciji skupnosti v končni fazi kulture Vinča.*

KEY WORDS – *Vinča culture; Late Neolithic; figurines; settlements; social structure*

Introduction

The Late Vinča settlement at Crkvine is in the village Stubline, some 40km southwest of Belgrade (Fig. 1). It is situated on an elevated plateau, 500 metres long and 380 metres wide in the west, and 130 metres wide in the east. The streams bordering the north and south and sides of the plateau converge below its narrower end, while there are many springs in the immediate vicinity.

The first small-scale investigations at this site were undertaken by Belgrade City Museum in 1967 in order to establish basic information about the site stratigraphy, whereupon it was already concluded that this site offered unique opportunities for studying the architecture and urbanisation of Vinča settlements (*Todorović 1967*).

After investigations of limited scope carried out in 2006 (*Simić, Crnobrnja 2008*), we planned a detailed study of the entire site. A detailed field survey was conducted at the end of the same year, while geophysical investigations started in 2007. In the period between 2007 and 2011, the settlement area of 77 600m^2 was explored by geomagnetic mapping (Fig. 2), which established the northern and southern boundaries of the settlement. In the north, where the terrain slopes more gently, the settlement boundary consists of an anomaly indicating a double trench; in the south, where the slope is steeper, the recorded anomaly indicates a single trench. In the central settlement zone, an anomaly was found that indicated a trench from some earlier settlement phase covered with rows of houses from the final horizon of living in the settlement. By comparing the intensity of geomagnetic anomalies (which were checked on three occasions by excavations) and their dimensions, the existence of over 200 houses within the investigated area may be conjectured. The longitudinal axis of most houses is oriented north-north-east-south-southwest. The houses are arranged in many regular rows and at a small distance from each other (the space between the houses in a row is

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smaller than the width of the houses). We also encountered a few open areas flanked with houses on all four sides. The results obtained by geomagnetic mapping made it possible to comprehend for the first time an almost complete matrix of a single large open Late Vinča settlement, which was surrounded by trenches, and with densely arranged houses in an almost planned layout. At the end of 2009, we began the geoelectric survey of the profiles, which indicates so far that the anomalies noticed by geomagnetic mapping date from the same building horizon (750 metres of the profile were surveyed).

The archaeological excavations of the project also started in 2008. The results obtained so far (campaigns 2008–2010) have revealed that the geophysical investigations were exceptionally precise and made possible the creation of a reliable key for their interpretation and the planning of future investigations. There are no precise absolute dates for the final building phase, but considering the characteristics of the pottery finds and their analogues from sites already dated, the last horizon of occupation of this site could be dated to phase D–2 of Vinča culture, *c.* 4600 BC (*Borić 2009.234–236*).

In the course of investigating one of the smallest and, according to the geomagnetic mapping, rather poorly preserved houses in the settlement (house 1/2008; *Crnobrnja, Simić and Janković 2010*), we were fortunate to discover an exceptional find – an assemblage of 43 figurines, which is the subject of this work.

At the very outset, I would like to emphasise that on this occasion I will not go through some of the standard procedures found in most of the work on figurines; or make a typological classification of the figurines from Stubline, because there are no direct analogues for them. Nor will I make an extensive review of existing theories on the purpose of figurines, as this has been discussed on many occasions (*cf. Ştefan 2005–2006*). On the other hand, I must mention that for the basis of my methodological approach, I borrow from the work of Peter Ucko (*1962; 1968*), and an article by Richard Lesure (*2002*) in which, despite the critical responses to it (*ibid. 601–605*), there is a very interesting and inspiring suggestion for taking a complex methodological approach to studying figurines. The work of Douglas Bailey (*2005*) provided not only an important guideline for me, but was also an inspiration for a more universal understanding of the mutual relationship between figurines and the social contexts in which they originate.

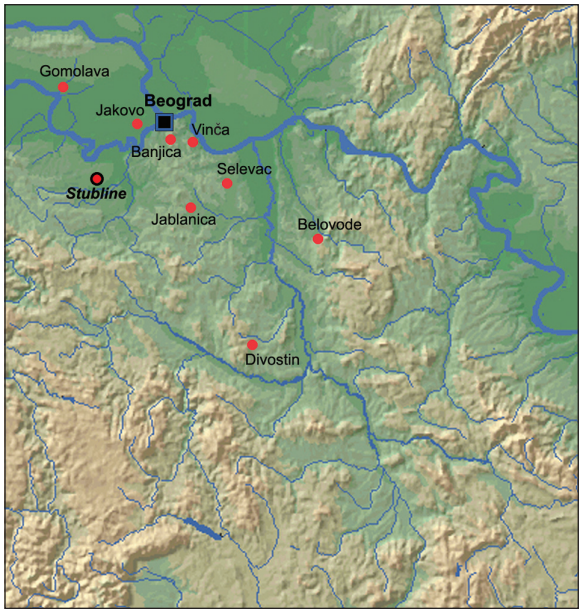


Fig. 1. Site location and the Vinča culture settlement mentioned in the text.

It is necessary to mention the large number of figurines originating from the Vinča culture in Serbia and the relatively small number of comprehensive works which have treated them in a more complex way (*Srejović 1968*), or which merely published certain collections of figurines (*Vasić 1936; Tasić 1973; Petrović, Katić and Spasić 2009*).

Despite a seemingly exceptional opportunity to draw various conclusions about the purpose of this assemblage, I did not want to take any risks. I was of the opinion that their genuine purpose is difficult to grasp, and that to seek that purpose would result only in a set of clever assumptions. On the other hand, this assemblage implies multifarious and multilayered meanings. The finding context of these figurines, their disposition, and the technique of their manufacture offer a unique possibility to deviate to a certain extent from the study of the usual questions related to figurines about their cultic and religious aspects. I decided to analyse one of the indirect messages which this assemblage could convey, a message about social structure and the organisation of communities in the final phase of Vinča culture, but without pretending to provide conclusive answers.

Finding circumstances

The house where the figurines were found (*Crnobrnja, Simić and Janković 2010*) is 9.1 x 4.8m and corresponds to standard patterns of architecture and interior organisation of the Late Vinča houses (Fig. 3). Another two figurines in a form common in that

period, and one clay model of a bucranium (0.2 x 0.3m) were also found in the house. Such objects are usually associated with a cultic or religious purpose. Also discovered in the house was a large quantity of objects, as well as some fixed structures of a mundane character – vessels for cooking, consumption and food storage, an oven and hearth, a fixed grindstone and a large fixed clay receptacle of undetermined purpose (altar?). It is conspicuous that there is an overlapping of spheres, the purpose of which could be roughly distinguished as sacred and profane.

The figurines were placed on a secondary burnt floor of packed earth (the floor in this house had no substructure), in front of the south-west corner of a large domed oven, *i.e.* its horseshoe-shaped firebox (Fig. 4). Most of the figurines (34 out of 43) were found under a rather large section of collapsed wall daub (Fig. 5). Before that, identical figurines had already been found in the same zone: two were found somewhat further from the oven, and another two were found next to the south-west corner, next to its south side, together with 15 loom weights.[1] On the periphery of the assemblage, a fine whetstone with no traces of use was found. Eleven whole and fragmented miniature models of tools or weapons (hammer-axes, pickaxes, long tools with blade, mallets or sceptres) were found next to the figurines (Fig. 6). The area with figurines was flanked from the north and south by burial pits of 18th century graves, so it could not be claimed with certainty that the original number of figurines was recovered.

The assemblage of the figurines and oven in front of which they was placed were located in the north, better preserved section of the house. It has been concluded on the basis of the microstratigraphic research that above this section of the house (with fixed clay receptacle, group of figurines and oven) there could have been an upper structure which could have been used as additional storage space (*Crnobrnja, Simić and Janković 2010.20*).

Figurines – appearance and manufacture

The forty-three figurines are of almost identical appearance, except the central one, whose description will be provided later (Pls. 1–3; Tab. 1). All other figurines have a stout cylindrical body with a bird-like head, characteristic of the Late Vinča period, with an oval foot and small hole near the right shoulder for inserting a tool handle. There are no additional anthropomorphic marks (eyes, gender characteristics, dress and the like), nor additional ornament, and – except for the central figure – the surfaces were not additionally treated or coated.

All the figurines are made of poorly refined clay of local origin, with no larger admixtures. In contrast to most vessels found inside the house, neither ground stone nor pulverised pottery was added to the clay. It seems on more close inspection that they were produced in great haste and rather carelessly. In our experimental production of identical figurines, we concluded that they could literally



Fig. 2. Crkvine, Stubline. Magnetometric plan and location of house 1/2008.

1 The loom weights show traces of use.

be shaped in five basic moves, and that a mere 60 to 90 seconds were enough to make one specimen. Traces of careless and hasty production are also conspicuous on their surfaces:

- traces of fingers are conspicuous on the body of most specimens;
- two traces of carelessness could be detected on the feet: first, the small hole necessary for stability executed in one stroke; and the other is that the feet are not fully circular due to the palm position in the manufacturing process, and the finishing touch is also lacking;
- the most obvious example of carelessness in execution is that when the perforations were made for the handle of a model tool/weapon, the body of the figurine was sometimes damaged (visible on 24 specimens), and the damage only roughly repaired without additional trimming (Fig. 7).

The only figurine which was somewhat more carefully modelled is the central and largest specimen (Pl. 1.1). Its head is slightly different, and a spherically modelled cranium is discernible; besides the standard bird-like face, the shoulders are also discernible and rounded (the hole for handle is on the right). The cylindrical body resembles the shape of standard Vinča figurines of that time, and the front has contours which resemble stylised dress representation (or perhaps the contour of the standard Vinča figurine?). In contrast to the other figurines, its surface is coated with slip and is more carefully finished. Much greater attention was paid to the production of miniature tool models. The precise execution resulted in the production of exceptionally accurate miniature copies of tools/weapons, but we shall pay more attention to this later. Their surface was smoothed, and the holes for handles carefully perforated. Seven miniature models are completely preserved (Pl. 2.A–F; 3.G–K), and among them we can recognise the following artefacts: two types of hammer-axes (Pl. 2.D, F), three variants of tools resembling pick-axes (Pl. 2.C, E; 3.H) and three spherical objects (Pl. 2.A; 3.I, J; mallets or sceptres?). Three fragmented models have just half of the tool preserved. Two of these are fragments of long implements resembling pick-axes (Pl. 2.B; 3.K), while the forth has a vertical blade on the end of long body (Pl. 3.G).

A figurine which roughly resembles the specimens from Stubline (but does not have the hole for a handle) was discovered at the site at Medjulužje (*Petrović, Katić and Spasić 2009.167, no. 231*), and a miniature model of an axe was also found at the same site (*ibid. 164, no. 227*). Unfortunately, both objects



Fig. 3. Ground plan of house 01/2008 (after* Crnobrnja, Simić and Janković 2010.13, Fig. 5*). 1 platform with figurines. 2 oven no. 2. 3 altar. 4 quern. 5 zone with pottery. 6 oven no. 1. 7 pottery group 1. 8 bucranium. 9 beam impression. 10 pithos.

are chance finds lacking context. Two miniature models of tools were also found at Kormadin near Jakovo, but photographs have not been published (*Jovanović and Glišić 1961.125*).

The grouping of figurines within the context

Perhaps the most important fact for this and any future analysis of the assemblage of figurines from Stubline is that it was found in the original context. It was found at the spot where it was used, and the figurines were in their original positions.

Of the 43 figurines, it is possible to identify the precise positions within the arrangement for 38 of them, while the remaining five were at smaller or greater distances from the arrangement (the farthest is no. 39 at 1.18m), which could be ascribed to their dislocation when the 18th century graves were excavated.

It is possible to distinguish eight groups of figurines within the arrangement (Fig. 8). The central and at the same time the largest group (I) consists of 10 figurines. The largest, central figurine was at its centre, surrounded by nine smaller ones of uniform shape. This central group was surrounded by two

circles of figurines. In the first circle, looking clockwise from the south, groups II (six figurines), III (six figurines), IV (six figurines) and V (three figurines) were arranged. The second 'circle' consists of groups VI (three figurines) and VII (three figurines). We must also note the isolated figurine no. 32, which was located to the north of the central group at the same distance as group VII; thus, because it was found at the very edge of the recent burial pit, it could be assumed that it belonged to the destroyed group VIII.

Sex and gender identification

None of the figurines from the Stubline composition has any sex or gender indicators. Complete and detailed analyses of sex/gender identification of the Vinča figurines have never been performed, but first results indicate that most of the figurines do not have pronounced sex/gender indicators, while some have discernible characteristics of both sexes (*Tasić 2008.145; Milenković, Arsenijević 2010*). What could be said about these figurines regarding sex and gender? I think that a sound answer could be offered on the basis of the miniature models of tools and weapons.

If one asks who could have used these tools/weapons within the traditional division of labour, the first association is with men. However, we will not stop at a first association, but we should check the admittedly rather meagre data from archaeological investigations. So far, only two published Late Neolithic figurines carrying tools (sickle and axe) have been found at Szegvár Tüzköves (*Borić 1996.81; citing Korek 1987. 53, Fig. 14; Trogmayer 1990. 66–69, Abb. 52–84*), and they were also explained as representations of men. At Gomolava, only one excavated and well documented necropolis of Vinča culture (*Borić 1996; Borić 2005.222, Fig. 35*) comprising 27 male skeletons has been discovered (*Stefanović 2008*). The position of axes and flint sickle inserts in the burials indicates that tools were always placed above the right shoulder of the deceased (*Borić 1996.81*).

Considering the similarity between the 'iconic form of representation in burial and particular figurine iconography', Dušan Borić has suggested that this position of tools within two contemporary but neighbouring cultures (Vinča and Tisza) could be explained as the representation of gender-specific separation in different media of corporeal display (*Borić on-line*). When Borić was preparing his presentation, the Stubline figurines had not been discovered, and it is important to mention that the necropolis at Gomolava and the settlement at Stubline date from the same period, and that the distance between them is a mere 45km.

Let us recall once again that all the figurines from Stubline have a small hole in the right shoulder for the handle of a tool/weapon (Fig. 9). Could all the above be sufficient to classify with great probability the figurines from Stubline as a group of male individuals?

The position of the figurines: why were they there?

A comprehensive discussion of all aspects of the three-dimensionality of the figurines and their implications is offered by Douglas Bailey (*2005.36–41*). I will try on this occasion to examine the importance of understanding the spatial positioning of the figurines.

It is important to note that the platform with the figurines scene arrangement covered an area of

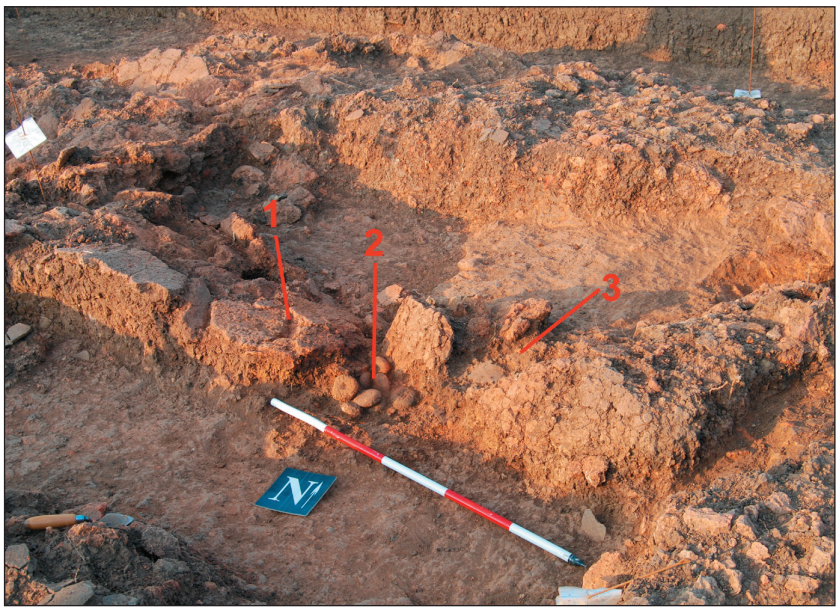


Fig. 4. Location of the figurines immediately before discovery. 1 section of collapsed wall under which the figurines were found. 2 loom weights. 3 oven.

around 1.2m²; given the internal area of the house (around 44m²), this is not insignificant. The disposition of figurines (as they were found) and miniature models of tools indicate that they had been completed and were not in the process of manufacture, and that they were carefully arranged in the position in which they were discovered, *i.e.* that we almost certainly found them in their original position in the place chosen for their disposition and use (Fig. 10). It is almost certain that the person who arranged them had not intended them to remain in that position for long, nor in that position within the house, where everyday life was going on. The dimensions of the figurines, their fragility (additionally increased because of the position of the tools), as well as the space they occupied (around 1.2m²) do not allow the possibility that they were to have remained in that location for a long period. Therefore, we may conclude that the house that contained them burnt down immediately after the figurines were arranged in the position recorded in 2008 (hours rather than days after being positioned). Knowing the cause of the fire might help us discover something more about the purpose of the arrangement. Therefore, we should consider how some of the theories on the causes of fires which destroyed houses in the Late Vinča settlement correspond with the context in which the composition of figurines at Stubline were found.



Fig. 5. Composition of figurines in situ.

The ritual burning of houses at Late Neolithic sites is a very popular theory (*Stevanović 1997; Chapman 2000.111–112; Gheorghiu in press*). If this had been the cause of the destruction of house 1/2008 at Stubline, one possible explanation for the composition could be related to some kind of memorial, as a marker of the community occupying the settlement before its ritual 'closing' (*Chapman 2000. 112*). Another possibility could be that the house was destroyed in an accidental local fire. If this were the case, then the question of purpose and meaning of the arrangement would be entirely open and could be related to any aspect of life. It would not be possible to establish any correlation between the cause of house destruction and the arrangement of the figurines.

A third possibility suggested in the literature (*Jovanović 1979; Tasić 1983; Draşovean 2007*) is that the house was destroyed as a consequence of the violent destruction of the settlement by outsiders. In this case, we might suppose that the arrangement of figurines was created as a response to an imminent threat. If we take into account the characteristics noted above (figurines made in great haste and equipped (or armed?) in a hurry with tools/weapons; the disposition of figurines resembling the disposition of structures within the settlement, *i.e.* reminding us of the position of 'clans' gathered around a 'leader') and the assumption that the approach of a general threat must have been anticipated, it could be asked, although with the utmost caution, whether the creation of the composition could have been connected with some external threat.

Similarity of conceptual patterns

As I have already mentioned, figurines are an almost regular inventory in the Late Neolithic/Early Eneolithic of the Balkans, as well as of Vinča culture itself. Dragoslav Srejović noticed over four decades ago that broken figurines in the Vinča culture are mostly found outside houses, while complete ones are found inside (*Srejović 1968*). The figurines' arrange-

ment from Stubline confirms this conclusion, but also raises new questions. Was the arrangement of figurines inside houses exceptional or customary, which we do not recognise due to the low level of investigation, and because the number of Late Vinča houses investigated is very small? Or did the house have a special function? Although the find from Stubline is hitherto unique, attention should be drawn to the fact that a few more groups of figurines have been recorded for Vinča culture. I have in mind seven figurines from house 1 at Selevac (*Milojković 1990.400*), seven figurines from house 23 at Divostin (*Bogdanović 1988.83*) and four zoomorphic figurines (cattle) discovered in front of the oven in the house at Belovode (*Šljivar, Jacanović 2005*). Particularly interesting from our point of view is the group of figurines from Divostin. All the figurines are basically of identical shape, with variations in their decoration, but one (fragmented) was substantially larger than the others (*Tripković 2010.21*). Boban Tripković explains the groups of figurines from Selevac and Divostin in relation to the clay model house with eight figurines from Platia Magoula Zarkou (*Gallis 1985*) and recognises in them symbolic representations of the household (*Tripković 2007. 38–39; 2010.21–23*), and the possibility of assuming on the basis of these figurines how large the household was and how its size changed (*Tripković 2007. 13, 39*).

How reliable is the adoption of patterns from Platia Magoula Zarkou and the attempt to apply them to the Late Neolithic in Serbia? Could something that functions as a model in Greece – *i.e.* in tell-type settlements – be applied to another, entirely different environment? Stubline, Selevac and Divostin are large open settlements which, judging by the settlement plan at Stubline (as most comprehensive), have entirely different arrangements. There is no longer a single dominant household (or family, no matter how large) as the basic organisational unit within the settlement; instead, the houses are in clusters, forming the basic settlement matrix. It is possible that both arrangements transfer through time the voiceless imprint of life organisation at these two places.

At Platia Magoula Zarkou, there is a settlement of the tell type, and evidence that for someone in one of the houses, it was very important to represent the nucleus of the community – the family within one household. The situation at Stubline is rather different – in the small house on the periphery of a large and well-organised settlement, there was a group of figurines, which, according to the analogy with Platia Magoula Zarkou, illustrates what was at that time essential in that place, and that was the wider community.

But what could have constituted individual figurines in the composition from Stubline? While considering the answer to this question, the comparison with the group of figurines from Platia Magoula Zarkou came to our attention. On the basis of the individual characteristics of each figurine (size, shape, ornament) these were identified as a few generations of one family (*Gallis 1985.22; Tripković 2007.12*). The figurines from Stubline have no individual characteristics and, as we shall see, their position or role in the group/community was determined by the tool/weapon they were holding.



Fig. 6. Detail of composition of figurines in situ.

Thus when comparing the groups of figurines from Platia Magoula Zarkou and Stubline, we notice a few oppositions:

- Platia Magoula Zarkou – Stubline;
- Representation inside the house – representation in open space;
- Individual household – wider community;
- Emphasising individual characteristics – negation of individuality;
- Head of the family – leader of the community;
- Genealogical division – functional division.

The indirect similarity at one level of consideration could be also identified in Vinča

culture itself. When analysing the group of figurines from Divostin, Boban Tripković (*2010.22*) identifies an indication of a pater familias in the largest figurine, and on an analogy with the central figurine from the Stubline composition concludes that: "*therefore, in future, a detailed contextual analysis of the figurines may actually be an important indicator in the nature of interpersonal relations in the Divostin and other Vinča households*" (*ibid. 23*).

This conclusion alone may indicate the illogicality that could lead further investigations in the wrong direction. Are relations within a household the most relevant for studying the social processes of Vinča society? Is the household really the basic nucleus of the matrix of large open Late Vinča settlements such as Divostin, Selevac and Stubline?

I think that results obtained to date during investigations of the settlement at Stubline forewarn us that focusing on the household as representative of the social organisation of that time could lead in the wrong direction. The household is quite as important as in any other period, but it is more than evident that it physically does not form the basis of the settlement matrix. The geomagnetic survey from Stubline reveals a relatively high degree of settlement organisation, with an apparent arrangement of houses not only in rows, but also in groupings of so-called 'blocks concentrated around the open spaces between them. In this case, in fact, a group of houses (5–12) comprises the basic module of settlement texture. The organisation of a single household could, no doubt, indicate certain aspects of the social process, but they would primarily concern processes within one family (or extended family). But is it sufficient to think about organisation on the wider community level only this basis? Although their interaction is indubitable, can we generalise social processes within one household to the entire community, or it is more reasonable to assume that processes taking place on a higher level (settlement, group of settlements) would have had much greater influence on processes on the lower level (household)?[2]

The arrangement of figurines from Stubline suggests a possible answer. A similarity in conception between the groups of figurines from Divostin and Stubline certainly exists, and is discernible in the suggestion of hierarchy on two levels – within one household (Divostin) and the wider community (Stubline). But we must ask ourselves what kind of community could represent the composition of figurines, or perhaps – what group of communities they could represent.

Purpose of the figurines and messages they convey

When we first published the preliminary results of the investigations at Stubline, including the context of the figurines' arrangement, we stated that a detailed study of this group of figurines would be the topic of another paper, but it should be mentioned that regardless of whether this was a cultic group or a game set, this exceptional find clearly indicates at least two things:

- the transposition of a distinct system of thought or beliefs from the level of community to the level of cultic practice, or a game had preceded the act of production of this composition;
- the presence of 42 figurines of identical shape, and one larger, more elaborately modelled specimen in the centre of the composition, suggests the possible existence of an acknowledged hierarchy in the community, or relates to the religious system of that community (*Crnobrnja, Simić and Janković 2009.21*).



Fig. 7. Examples of damage done during the making of holes for tools on the figurines.

2 Later could be asked what size of the community was the largest common denominator, *i.e.* what was possible highest level of organization in the time of Late Vinča. Should we consider the settlements, groups of settlements or regions? To what level of social organization reached mutual recognition of 'collectiveness' and at what level started the recognition of 'otherness'?

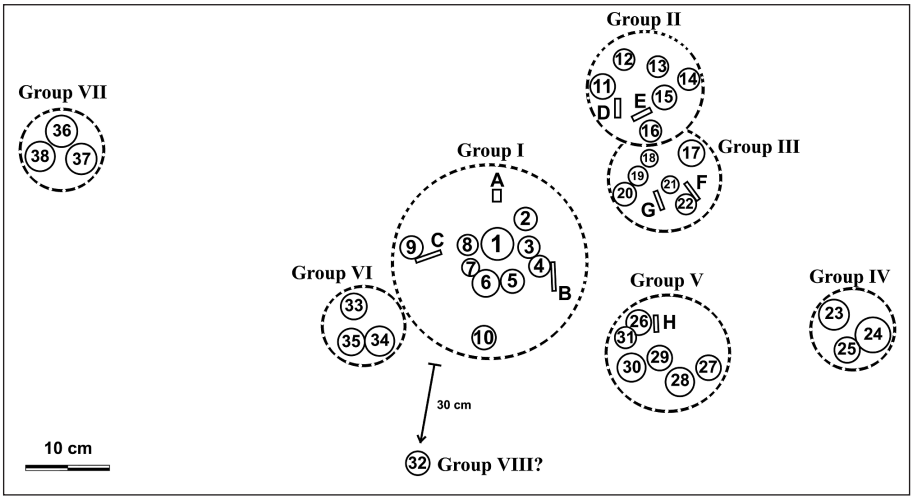


Fig. 8. Plan of disposition of figurines within composition.

In a review of our article, Lolita Nikolova (*on-line*) offered a series of possible interpretations, including that it was a group of figurines made by craftsmen for exchange, story-tellers, a lineage-genealogical symbolic group, and a cultic or game group. Boban Tripković (*2010.22*) quoted as our interpretation three suggested possible purposes: the subject of cult, a symbolic procession of warriors or game group. It is interesting that both authors quoted from our work the suggested purposes of figurines as literal interpretations without attending to the more important elements and our reservations concerning the suggested assumptions.

But the point is that this arrangement, regardless of its genuine purpose (any of the assumed purposes or any other which could come to mind) was made by a person or persons on the basis of concepts inherent in their community. In the materialisation of that pattern we could identify a distinct arrangement of figurines and a clear illustration of hierarchy on a level surpassing one household or group of households. I would also like to mention an interesting article by Mihael Budja (*1998*) about objects usually interpreted as seals, toys, and clay cylinders, which the author identifies as clay tokens – supplementary elements for counting.[3] Perhaps each of our figurines also symbolises a certain number of individuals. The number of figurines in the composition certainly exceeds the number of members of one household, while their uniformity additionally indicates that certain groups of figurines in the composition could not be identified with members of the household. Did each figurine represent one household, an extended family or a distinct category of people?

The message suggested by the method of production of the figurines is also interesting. Although they are of very simple and reduced shape, the details of their manufacture say much about the symbolism within this composition. As we have already emphasised, it seems that figurines were rather carelessly made and that their form and appearance were not very important in themselves, for whoever made them or used them. Nevertheless, the tools/weapons were exceptionally meticulously executed. They are true copies of the originals and could even be typologically identified from original tools from other sites. The impression is that these miniature models of tools/weapons are actually crucial to understanding the symbolism of individual figurines within the composition.[4]

The disproportion in the attention and time invested in the production of the figurines in comparison to the production of model tools suggets that for whoever made and used them, it was more important to clearly emphasise the different roles of individuals or groups in the community (through tools/weapons) than the individuals (figurines) themselves.

Their basic human character, devoid of individual personal characteristics, is indicated precisely by the roughly denoted anthropomorphism of the figurines. In fact, the meticulously executed tools/weapons carry information about the distinctiveness of each individual person within this strange composition. This could indicate not only a vertical stratification (hierarchy), but also a distinction of activities known and understood by everyone, given the meaning of certain occupations or roles played by individuals and groups. Whether this could be understood as an indication of horizontal stratification, *i.e.* the exis-

3 M. Budja states that such finds are lacking within the territory of the Vinča culture (*1998.226–227*), but more recent finds from Jablanica warn about their existence (*Petrović, Katić and Spasić 2009.167–168*).

4 We cannot disregard the possibility that some figurines carried other objects of organic materials, which are not preserved.

tence of a clear division of labour within Vinča communities?

Regardless of its genuine purpose, this arrangement of figurines is an unambiguously symbolic representation of individuals (figurine) within a given community (composition), and each individual role was generally understood at the time.

We may suggest, however, that this was a representation of a hierarchical community with clearly assigned roles. It seems that the personal characteristics of individuals were subordinated to the needs of the community and that individuals found full expression within an already assigned role, *i.e.* in a position and assignment planned for that person that was indispensable to the community.



Fig. 9. Figurines with tools.

Analysing the social structure of the Late Neolithic on the Great Hungarian Plain, characterised by large open settlements similar to those of Late Vinča, William Parkinson (*1999.5*) assumes four-tiered structural models: large, probably multi-family residential groups, integrated into house clusters, which were integrated into large villages, which, in turn, were incorporated into three discrete spheres of intensive interaction, which probably indicate some sort of supra-village level of integration.

After comprehensive studies, Marko Porčić (*2010. 361*) concluded that there are no reasons to classify Vinča societies as highly ranked or stratified, but they could be classified as trans-egalitarian.

Nevertheless, the traces of vertical social stratification within the communities from which a group of figurines from Divostin and the composition from Stubline come are more than evident. And given the figurines, which emphasise the institution of *pater familias* on the family level (Divostin) and on the settlement level or an even higher organisational level (Stubline), could this be simply ignored? The find from Stubline is particularly interesting, because the arrangement of the figurines in groups surrounding a central group with the largest figurine at the centre indicates a hitherto unrecorded complexity. If the finds from Divostin and Stubline really reflect distinct vertical stratification (hierarchy) on many levels within the community, indicating the complexity of Vinča societies, we must certainly ask whether Vinča settlements could actually be described as 'societies of houses' and whether the absence of communal and ritual structures really suggests the absence of a central authority in the village (*Borić 2008*)? Or could the conclusions offered by Borić be understood as the interim results of the hitherto low level of investigations of Vinča settlements? Some recently published work indicates the possible social differentiation in Vinča culture. Porčić indicates that there is a possible correlation between house size, amount of inventory and the incidence of copper in Divostin (*Porčić 2010.209–213*). After analysing in detail many parameters, the same author also suggests that the dimensions of certain Vinča settlements approached the limit, after which the occurrence of social hierarchy could be assumed, *i.e.* that the appearance of simultaneous hierarchy and ranking or the appearance of sequential hierarchy could be assumed at many sites (*ibid. 355*). Also rather interesting are the most recent results on the Late Vinča necropolis at Gomolava. The DNA analysis has revealed that all 25 buried persons are male, and all related, *i.e.* they could have been members of one

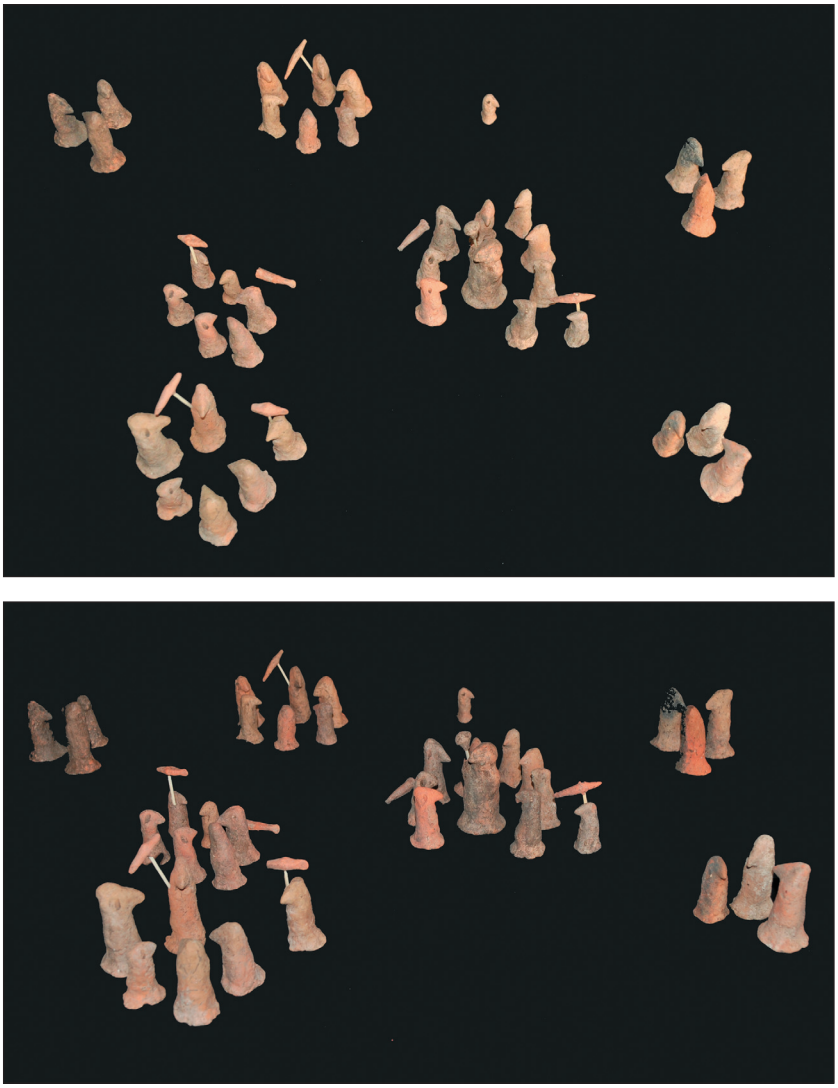


Fig. 10. Reconstruction of the original position of figurines in the composition.

patrilineal group, which could indicate the kinship structure (*Stefanović 2008.97–98*).

Conclusion

The discovery of the composition of figurines from Stubline is unique in the Neolithic of Southeast Europe. Despite the discovery of some other groups of figurines, its uniqueness is evident in many ways:

- so far unrecorded finds of tools/weapons on figurines (only 11 tools were found, but all figurines have holes for inserting tool handles);
- clear context of discovery within the house;
- devised arrangement of figurines within a composition;
- found where they were used (in whatever way).

I think that after analysing the technology and quality of manufacture of the figurines and their arrangement in the composition, it could be assumed with considerable certainty that at Stubline, and very probably throughout the territory of Vinča culture, society was vertically stratified, *i.e.* hierarchical.

Such a conclusion – or at least, soundly based assumption – raises a whole series of questions related not to the cult and religious systems that are the most common aims in the study of Neolithic figurines, but to the organisation of the communities where they were created, and whose conceptual system was transposed into this composition and materialised in it.

The evident existence of many levels of organisation, which could be perceived in the arrangement of figurines in many groups surrounding the central group with the largest figurine in its centre, indicates the complexity of social organisation. Complexity of organisation on the settlement level could be assumed also on the basis of the settlement plan at Stubline obtained by geomagnetic survey. But how far could the borders of, conditionally speaking, the political units of Vinča society have extended? The demonstration of hierarchy on the settlement level is a sufficient condition for assuming greater complexity on a higher, regional level (*Porčić 2010.354*), and I also suggest a possible similar complexity on the micro-regional level (*Crnobrnja, Simić and Janković 2010.22; Crnobrnja 2010*). We must bear in mind that the size of the given settlement – *i.e.* its population – depends on the role the settlement has in satisfying its own needs, as well those of the system to which it belongs.

The composition of figurines also poses the question to what extent the horizontal stratification of the Vinča societies was developed. As already mentioned, all figurines except the central one are of uniform highly schematised form, with no ornaments to suggest their individuality except for the miniature

models of tools/weapons they carried. We assumed that this fact could indicate the possibility that in the composition, the functions or roles of figures/individuals and not their personal characteristics were more relevant. Could this fact also be transposed to the community level and understood as an indicator of differentiation within the community on the basis of distinct occupations, *i.e.* roles assigned to individuals?

But, in the end, we should return to the composition itself, its position and the meaning that it could have had within the house where it was found. It is unique to have a complex find in a clear context. The composition was discovered in front of the oven, and the particular symbolism of ovens in Vinča culture is confirmed in the production of their miniature models (see *Petrović 2001* for a discussion). I will not discuss here the details of the cultic aspects of ovens and hearths, but I would still like to ask the question – is this simple analogy sufficient evidence for assuming that the Stubline arrangement had a cultic purpose? At this level of investigation, I would rather point to some more reliable evidence. As noted earlier, among other things, the final objective of the production of the figurines was their planned arrangement denoting the roles of certain figurines in the group with the models of the tools/weapons they were carrying. Obviously, a complex pattern and a story was told in the material. These facts raise important questions for the further study of figurines – was this composition a story or segment of a story which was generally known in the community, or was it the result of momentary inspiration? Was this a symbolic representation of the community structure in the Late Vinča period, or an idealised aspiration for such a structure? If it was really the pattern of thinking in the Vinča society, how we should proceed toward its recognition? Why were messages about stratification in the society suggested by the Stubline composition concealed in the investigations conducted so far?

Considering all the questions raised by the figurines from Stubline, we must also wonder which approach should be taken in future investigations of Vinča culture, at least in Serbia. Investigations in Serbia, for various, mostly financial reasons, have been focused so far on single structures, or at best on a few dozen structures within a single settlement (Vinča, Divostin). The assumed area of most sites has been supposed on the basis of rudimentary site surveys, while the positions of excavated houses within the settlements are not known, as is the case with the settlement matrix. The message which the finds from Stubline convey – the definitive existence of elaborate vertical stratification and possible existence of levels of integration higher than the settlement level – suggest that our energy should perhaps first be directed to understanding settlements in their entirety. The settlement as the clearly discernible highest unity of hierarchy should be the starting point, and we should then continue by planning two subsequent directions of investigation: firstly, to tackle the lower organisational levels within the settlement (house, household, group of houses), and secondly, and much more difficult to understand, the possible higher organisational levels (groups of settlements, micro-regional and regional connections of the settlement).

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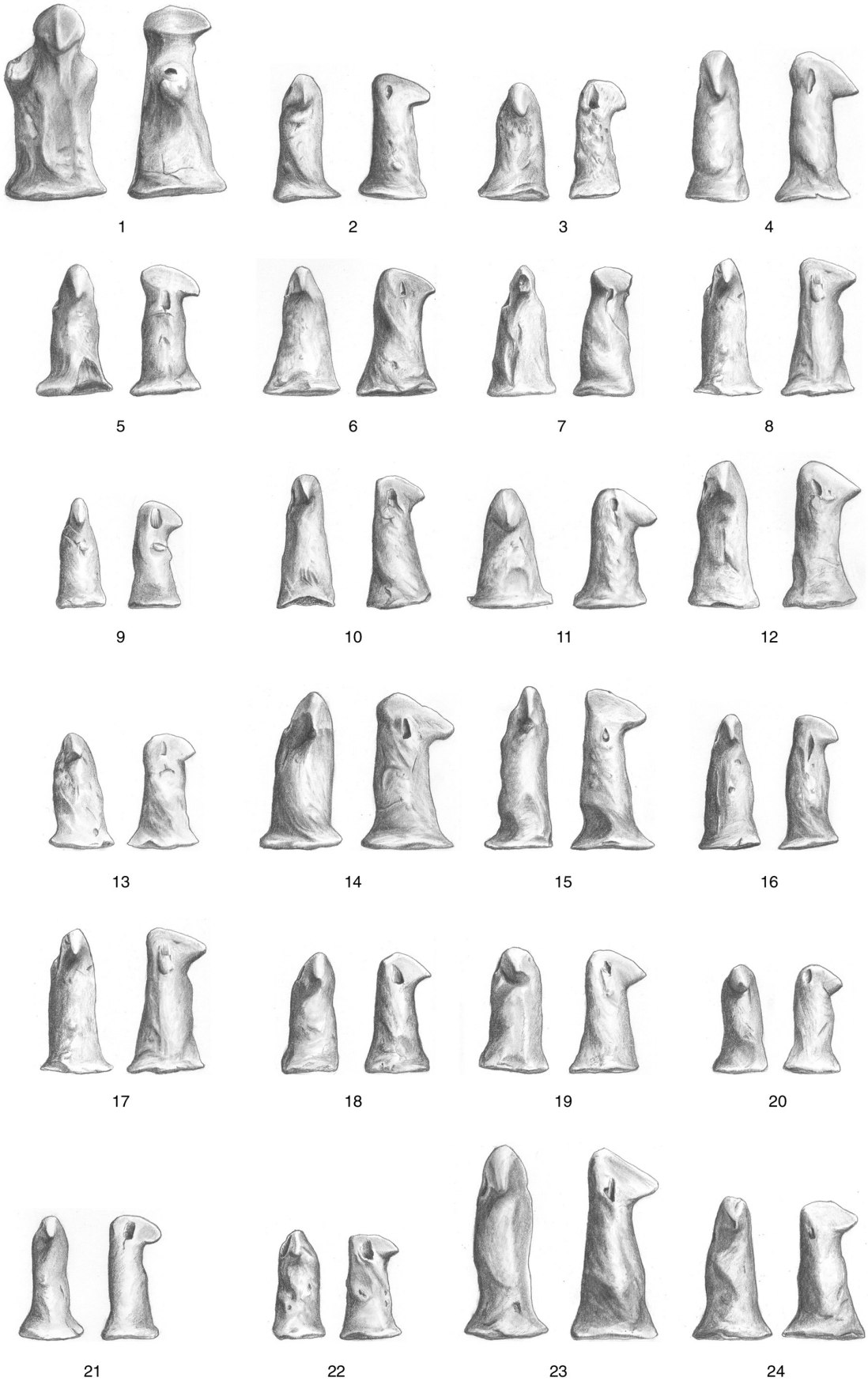


Plate 1. Ratio 1:2

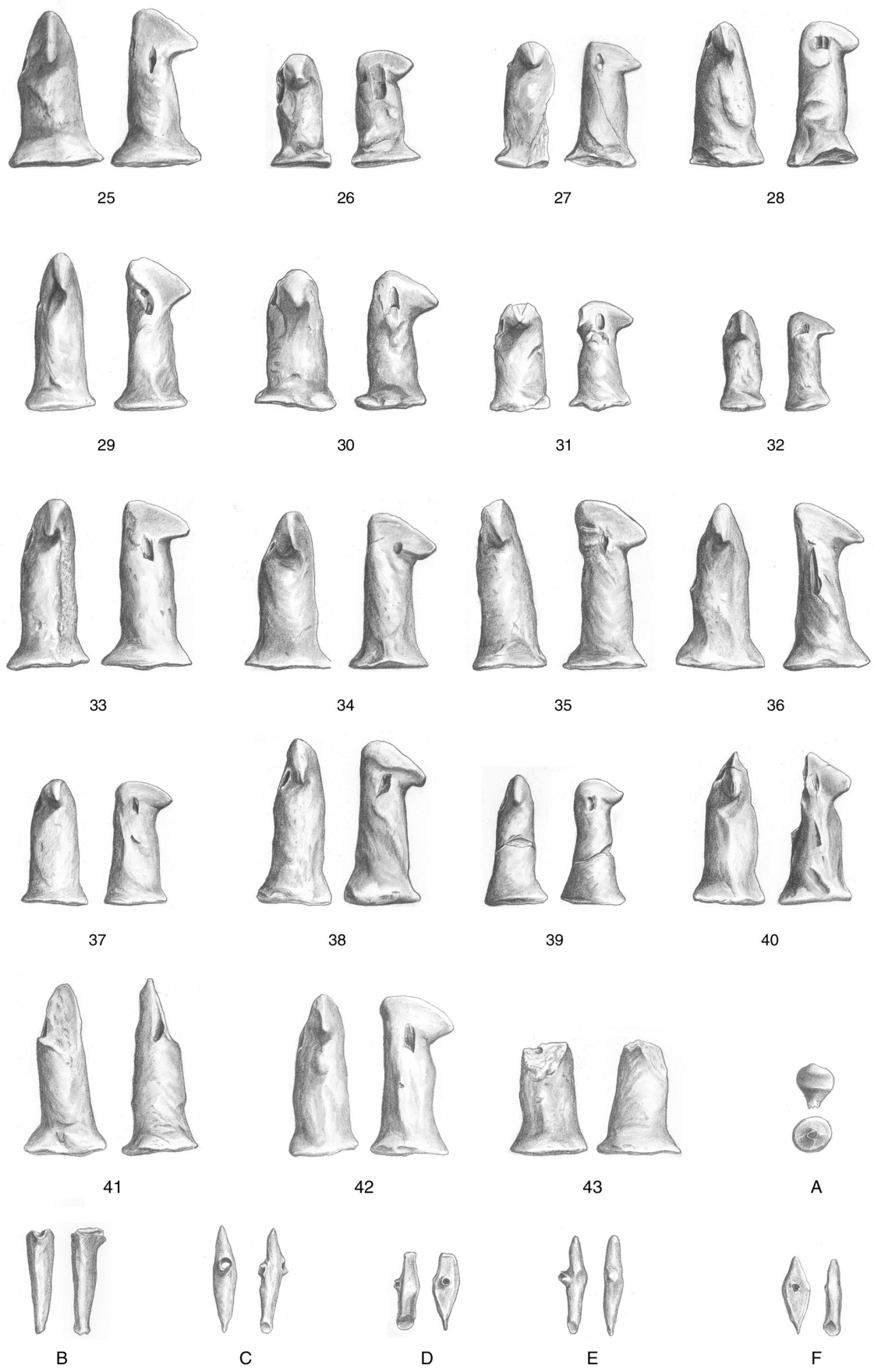


Plate 2. Ratio 1:2



Plate 3. Ratio 1:2

Number in Plates	Group	Height (mm)	Foot diameter (mm)	Damage of handle hole	Registered number
1	I	67	35	–	45–1/2008
2	I	45	25	–	45–16/2008
3	I	41	23	+	45–3/2008
4	I	52	28	–	45–27/2008
5	I	46	26	+	45–29/2008
6	I	45	28	–	45–15/2008
7	I	45	23	+	45–13/2008
8	I	49	25	–	45–23/2008
9	I	37	19	+	45–2/2008
10	I	46	23	+	45–17/2008
11	II	41	28	+	45–28/2008
12	II	50	27	+	45–33/2008
13	II	41	24	–	45–10/2008
14	II	56	32	–	45–36/2008
15	II	58	30	+	45–32/2008
16	II	47	22	+	45–4/2008
17	III	47	25	+	45–21/2008
18	III	40	21	–	45–14/2008
19	III	40	24	+	45–11/2008
20	III	35	18	–	45–9/2008
21	III	41	21	+	45–5/2008
22	III	36	20	+	45–7/2008
23	IV	63	31	–	45–50/2008
24	IV	48	28	–	45–51/2008
25	IV	55	34	–	45–52/2008
26	V	37	23	+	45–6/2008
27	V	43	24	+	45–19/2008
28	V	49	24	+	45–20/2008
29	V	52	25	+	45–25/2008
30	V	45	27	+	45–22/2008
31	V	36	24	+	45–8/2008
32	VIII(?)	33	16	+	78/2008
33	VI	57	32	–	45–41/2008
34	VI	53	31	–	45–37/2008
35	VI	56	28	+	45–30/2008
36	VII	55	31	+	45–31/2008
37	VII	41	23	–	45–12/2008
38	VII	55	26	–	45–35/2008
39	–	42	22	–	69/2008
40	–	51	26	+	45–18/2008
41	–	55	26	–	45–24/2008
42	–	51	26	+	45–26/2008
43	–	36	29	?	45–34/2008

Tab. 1. Figurines.

Letters in Plates 2–3	Group	Length (mm)	Registered number
A	I	14	45–38/2008
B	I	33	45–39/2008
C	I	34	45–40/2008
D	II	25	45–42/2008
E	II	32	45–43/2008
F	III	25	45–44/2008
G	III	33	45–45/2008
H	IV	39	45–46/2008
I	–	19	45–47/2008
J	–	13	45–48/2008
K	–	17	45–49/2008

Tab. 2. Tools/weapons.

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Anthropomorphic figurines from Vinča excavations 1998–2009

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ABSTRACT – *The paper presents figurines from excavations at Vinča 1998–2000 dated to the very end of the Late Neolithic. Along with a presentation and analysis of these objects, the paper addresses questions of the development of sculpture in Vinča, and matters of symbolism in the Late Vinča period. Some interesting contexts with an abundance of anthropomorphic figurines are presented and discussed.*

IZVLEČEK – *V članku predstavljam figurine iz izkopavanj na najdišču Vinča v letih 1998–2000, ki datirajo na konec poznega neolitika. Poleg predstavitve in analize teh izdelkov se ukvarjam tudi z vprašanji razvoja kiparstva v Vinči in vprašanji simbolizma v poznovinčanskem obdobju. Predstavljam in razpravljam o nekaterih zanimivih kontekstih s številnimi antropomorfnimi figurinami.*

KEY WORDS – *Vinča; anthropomorphic figurines; symbolism*

Introduction

Publishing Neolithic figurines is always a real treat for any researcher. The theme ensures attention, but also triggers empathy with those who manufactured the figurines so many centuries ago. Every time they appear from the ground, the magic of these objects is conveyed to researchers. Field methodology and procedures are being adjusted and fine-tuned in order to capture as many details as possible. One cannot be too meticulous or too diligent when excavating and recording them.

Archaeological excavations at Vinča-Belo brdo have been carried out since 1998, in order to continue research at this famous site and further investigate the material culture, and acquire the new knowledge necessary to interpret it and its impact on the social organisation of Neolithic society. Excavations were envisaged and conducted as a continuation of Vasić's work in the 1930s and the work of Tasić, Srejović and Garašanin in the 1980s. Sector II was excavated during campaigns from 1978 to 1986 and has yielded nine houses of the latest Vinča culture phase, as well as numerous Copper and Bronze Age pits, and a medieval necropolis. The follow-up to the excavations occurred directly underneath the final Vinča culture building horizon. In the course of these excavations, three building horizons were identified, all dating to the final phase of Vinča D or Vinča-Pločnik II, and filling almost one metre of cultural deposit. The field methodology during the new excavations at Vinča evolved from the square grid inherited from previous excavations to the unit system, but recording techniques were precise and accurate in both systems. The fact that three dwelling horizons ascertained during new excavations were packed into less than a metre of deposit explains their rather poor preservation. It should be mentioned that a number of unfired objects were discovered which left very few traces of architectural remains, apart from isolated kilns and post-holes. Extensive leveling activity has been ascertained, which is linked to the foundation of the most recent Vinča settlements. For reasons already mentioned, the position of finds can be ambiguous and perhaps misleading, since the vast majority of objects discovered are not in their primary context.

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The material culture discovered is typical of the late Vinča culture phase (Vinča-Pločnik II after *Garašanin 1984*), and differs from contemporary finds only in the somewhat finer quality and variety of its pottery, figurines, and other archaeological material.

The aim here will be to present the most noteworthy anthropomorphic figurines discovered in the last ten campaigns at Vinča. I would like to offer some comments and personal impressions regarding some interesting details, and contribute some examples for further discussion and interpretation. For the sake of easier presentation, the corpus of figurines has been arranged by type, which should not represent any commitment for other researchers. It is to be hoped that an old style of typology does not deter those interested in somewhat more modern approaches, since such a quantity of newly available anthropomorphic statuettes (classified and systematised) unquestionably yields many elements for further research.

Type 1 (Fig. 1)

No. 1. This cruciform figurine is the best representative of Type 1. It is hard to envisage a simpler model of a depiction of a human figure in terracotta. Anthropomorphic representation is apparent, and beyond any doubt, owing to the rather realistic proportions between the dimensions of the head and the rest of the body. There are no details on the figurine. The triangular form of the head is, in this case, the most convenient choice, since in this way the figure acquires the shape of the head, eyebrows, and nose at the same time. The vertical axis emphasises perfect symmetry. The foot of the figurine is oval; the middle of the figure is somewhat thinner and two dimensional. It is not possible to determine gender for this figure, and this seems irrelevant. However, on a few figurines attributed to this type, one can see representations of breasts as plastic appliqués. Anyway, the relationship between male and female figurines will not be discussed here, since breast representation, as we can see from other examples from Vinča[1], is not decisive for determining the gender of anthropomorphic figurines. What catches the eye is the fact that there is no trace of the representation of robes on this figurine, but it is not clear if it is vested or not. This further suggests that in some cases this dilemma is irrelevant. Traces of paint, discovered on some other figurines (Fig. 1. 19), could hint at another technique used for decoration and the representation of costumes.

No. 3. This figurine is characterised by its extremely long neck, which is seldom seen on Vinča culture terracottas. Otherwise, it fits well in Type 1.

No. 4. The head of this figurine, preserved as a bust, is typical and modeled in the simplest way to represent a human figure. The top of the head is round and somewhat more extruded than the sides. In the arm region, one can observe two perforations on the left side of the figure, but we can suppose that the same number of perforations also existed on the right side. Heads like this can be seen rather often in the form of protomes on pottery or altars.

No. 5. On the triangular head there is a detail which represents the mouth, which is seldom represented on Vinča culture figurines from the Belo brdo site. A perforation in the nose area adds to the realistic appearance of the face.

No. 6. This figurine, with its attributes drawn to an extreme, could clarify the attempts of Vinča artists at expression within the specific canon of representations of the human figure. The bird-shaped head with grotesquely extruded nose is probably the limit of this sculptural strategy. Its anthropomorphic character is determined with two plastic breasts. There is also an unusual number of perforations; apart from those so frequently found in the arms or at the back of the head, there are more in the neck region. The function of these perforations is still being discussed. It is possible that they served for inserting feathers, hair, or string with some other ornaments or robes hanging from it.

Nos. 7–10, 12, 15, 16. These cruciform, symmetrical, minimalist figurines have no hint of individuality.

No. 11. This figure looks as if it were on the move. Alas, given the traces of burning, it is also possible that this apparent movement is a consequence of the great heat to which it was exposed. More important than the shape of the figure is that it is decorated with rows of painted parallel lines which are not often detected in this phase of Vinča culture. On the front side, white painted line decoration is obliquely positioned, while on the back, lines run parallel to the base of the figure. Unfortunately, the pigment is not of exceptional quality; it rubs off, and it has not been possible to decalcify the entire figurine, so the decoration is still partly hidden. White paint was not used frequently in Vinča. Only a few objects bearing

1 There are figurines with undoubtedly female characteristics incised in their abdominal part and no breasts represented at all.

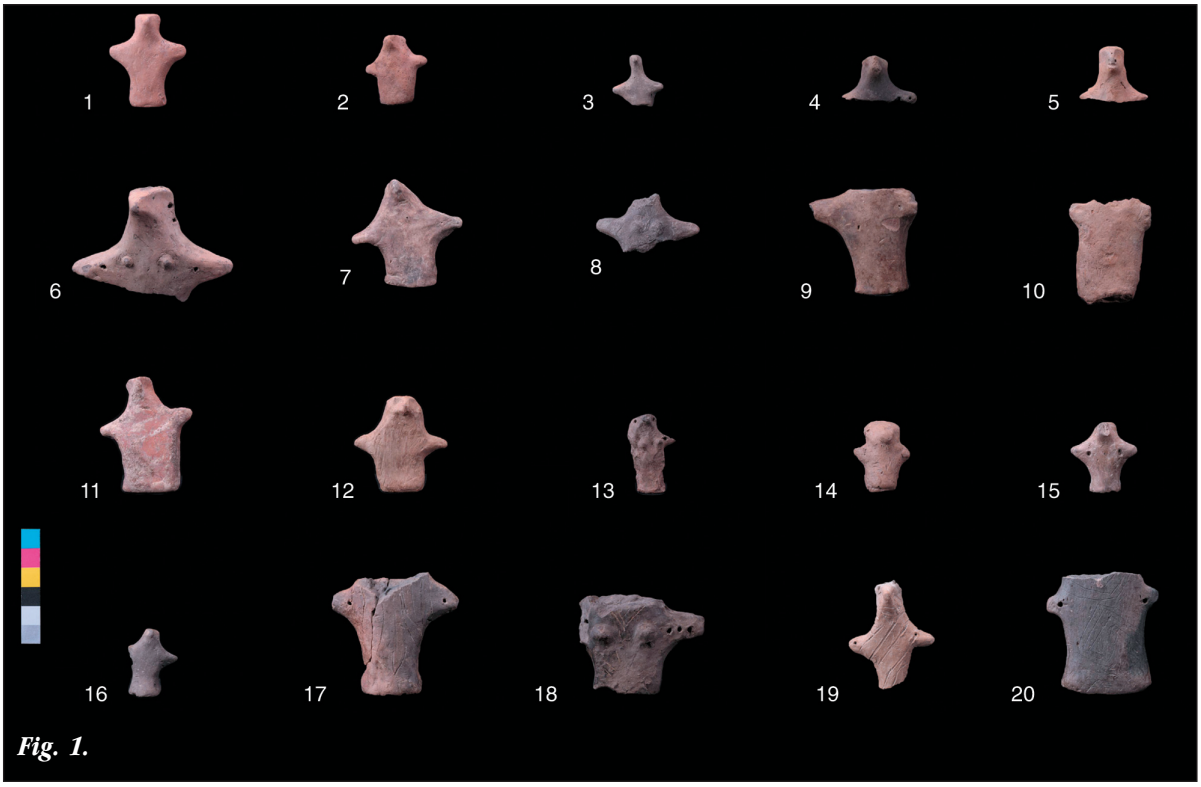


Fig. 1.

traces of white pigment have been discovered. On the other hand, numerous traces of red paint – made either from cinnabar or ferric oxide – denote that incisions and burnishing did not comprise the entire repertoire of decorative techniques (*Mioč* et al. *2004*).

No. 13. This ineptly modelled figure of smaller dimensions has a damaged surface in the lower part of the body. It has two appliqués which represent female breasts. The eyes are represented with two points sharply incised in the clay, which is unusual for Vinča.

No. 14. This is a figurine, rather small in dimensions, characterised by a disproportionately large, round head, with no further details or decoration.

No. 19. This cruciform figure with short, poorly modelled hands, represents a group of figurines modelled as a two-dimensional form. The body is divided from the head with horizontal incisions, slightly different from those that decorate the rest of the figure. It is commonly believed that these lines and decoration more or less realistically represent actual robes and costume (*Tasić 2008*). Here, the decoration of the costume is also made with incised lines. Following the path of an instrument, one can reconstruct the strategy of the maker. He or she started the incision at the left shoulder, running it down to the right hip and back to the shoulder to complete the line. The same procedure was repeated with less success and precision. The figurine's two perforations were apparently made after the incisions had already been made (one of the perforations runs over the incised line).

No. 20. The notable feature of this figure is the unusually small hands. At chest height, where the small hands protrude from the body, there are two perforations. This figurine is fragmented and lacks a head and neck. It is fully two-dimensional and well-suited to be decorated with incisions. A meander formed of three lines runs from the left shoulder to the chest. Another meander, or rather an attempt at a meander, is incised into the lower part of the figure. Two different sets of lines have been ascertained here: deeper and more precise lines (1) are applied in the chest area, and it seems they were incised first (Fig. 2). The difference in the weight and precision of the lines could be due to different tools, or due to a different hand guiding the tool for the second set. This can be also seen in the 'stratigraphy' of interwoven lines. The trace of a string (2) on the chest of the figurine is also an interesting clue. The upper meander was apparently incised after the string impressions were made. It is also later than the decoration on the lower part of the figure, and according to the form and depth of incisions, contemporary with the decoration on the back. This analysis demonstrates

that some time must have elapsed between the first use of the object and its final decoration. These elements are in accordance with earlier assumption that figurines were used for long periods. Given that it has been established that representations of costume denote the individuality of objects and probably their owners, we can suppose that this figurine might have changed owners during its life-time and therefore obtained another set of lines which then represented the new owner (*Tasić 2008*).

Type 1 (Fig. 3)

The figurines presented in this illustration were selected as subtype 1a. These objects differ slightly from type 1, primarily in their larger dimensions and in the fact that their cruciform shape is less pronounced.

No. 1. Only the head with part of a bust has been preserved of this figurine. It could be easily placed among the most numerous of type 1. The head is rounded, with four perforations. There are incised lines running around the body; on the back, these are entwined to form a kind of meander. There are two perforations in the arms.

No. 2. This is by far the most interesting figurine of either type 1 or 1a. It is a female figure depicted with few details. It is flattened and suitable for incising. This particular figurine is an exception in the repertoire of the Late Vinča at Belo brdo, since it is decorated with series of incisions which cover surfaces bordered with flimsy lines, later painted red. In the lower part of the figure is a skirt bordered with rows of triangles. In the neck region, there is a square positioned so that its diagonal is aligned with the vertical axis of the figurine. Two free-standing triangles, painted and filled with incisions, are placed just above the breasts, which extrude from the body. The emphasised glutea which characterise this specimen are rather unusual for this phase of Vinča culture, but the decoration technique and red paint are also unusual.

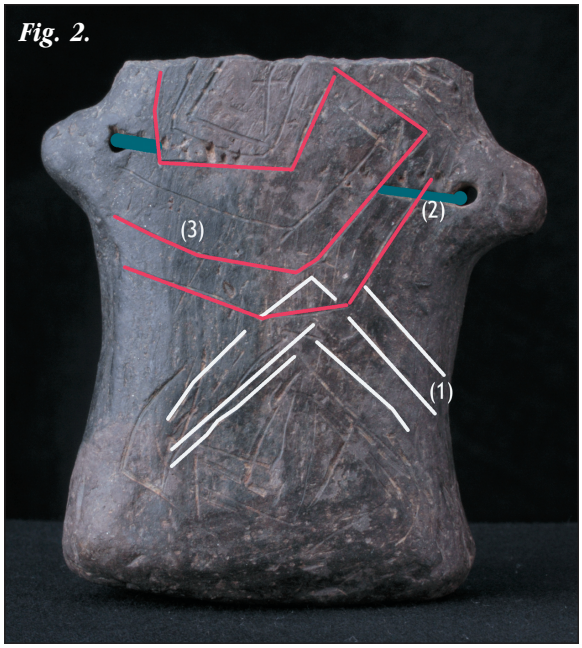


Fig. 2.

No. 3. Although greatly fragmented, and almost obliterated, this figurine still has enough details to be placed in this type. It is interesting for its general state of preservation, which suggests possible secondary use, probably as a pestle of some sort. Does this mean that the sacred or ritual character of these objects was lost when they were broken? The method of their disposal and secondary use suggest as much.

Type 2 (Fig. 4)

Type 2 was distinguished as independent on the basis of the shape of the figurines. All of those of this type are flat, but have glutea depicted two-dimensionally as another curve in the lower part of the body at the height of the hips. This silhouette adds to the feminine impression of these figures. The majority have other female attributes, such as breasts (Fig. 4. 5–7), a pregnant abdomen (Fig. 4.5, 12) or pubic triangle (Fig. 4.12). It is interesting that all are fragmented, and apart from number 2, the head is absent.

No. 1. This fragment is classified as type 2 only according to analogies with figurines 9, 10 and 12 presented in Figure 4.



Fig. 3.

No. 2. This object is an exception with its small dimensions and proportions. It is not certain if the figure is anthropomorphic at all. The head is not unusual for this phase of Vinča culture. The incised V-shaped line would also suggest that this represents a human figure. On the other hand, two perforations placed in a most unusual spot, in the centre of this object, would suggest a more functional role, such as a button, perhaps.

No. 5. The surface of this female figurine is matte; the edges on the fractures are rounded and it seems to have spent some time in water. It has breasts and a swollen belly. Below the neck area is a typical V-shaped incision, frequently associated with representations of costume, rather than with a necklace or other decorative element.

No. 6. This female figurine, decorated with incised ornamentation, is fragmented and preserved as a torso with neither head nor arms. There are two perforations on the hips, and had the arms been preserved, there would probably have been perforations on them also. Representations of such details as the navel are quite rare in Vinča culture. An interesting and unique representation of the costume is another valuable treat: the upper part of the body is more naked than clothed; the incisions probably represent bands which run from the shoulder to the waist and entwine with another which runs from the other shoulder. A short skirt is represented on the lower part of the figure.

No. 7. This item is extraordinary in more ways than one: it is the only example decorated with polished lines and not incised, and it is also the only one with perforations on the hips, while those at the arms are absent. It demonstrates that the technique of decoration is sometimes irrelevant and that different methods were used, such as incisions, and burnished and painted motifs.

No. 8. Traces of red pigment can be observed in the thin sharp incisions which ornament this figurine. The proper cleaning of figurines discovered at earlier excavations has shown a great number of figurines were decorated with painted motifs. Sometimes figurines were immersed in paint, and sometimes the paint was used to cover reserved patches or certain portions of them.

No. 9. This figurine is a miniature, but unique in some elements. It is fragmented and lacks a head. Analogies with other figurines discovered in the same occupational phase suggest that it was probably modeled as a 'bird-shaped' head. The manufacture of this figure is exceptional; in spite its small dimensions, great care was taken to represent some details seldom found on larger specimens. It is undoubtedly female and has a pregnant abdomen. The almost obligatory V-shaped incisions under the neck and rows of parallel lines around the hand/s adorn the upper body. There is also a 'belt' in the hip region which divides the body of the figure into two parts.

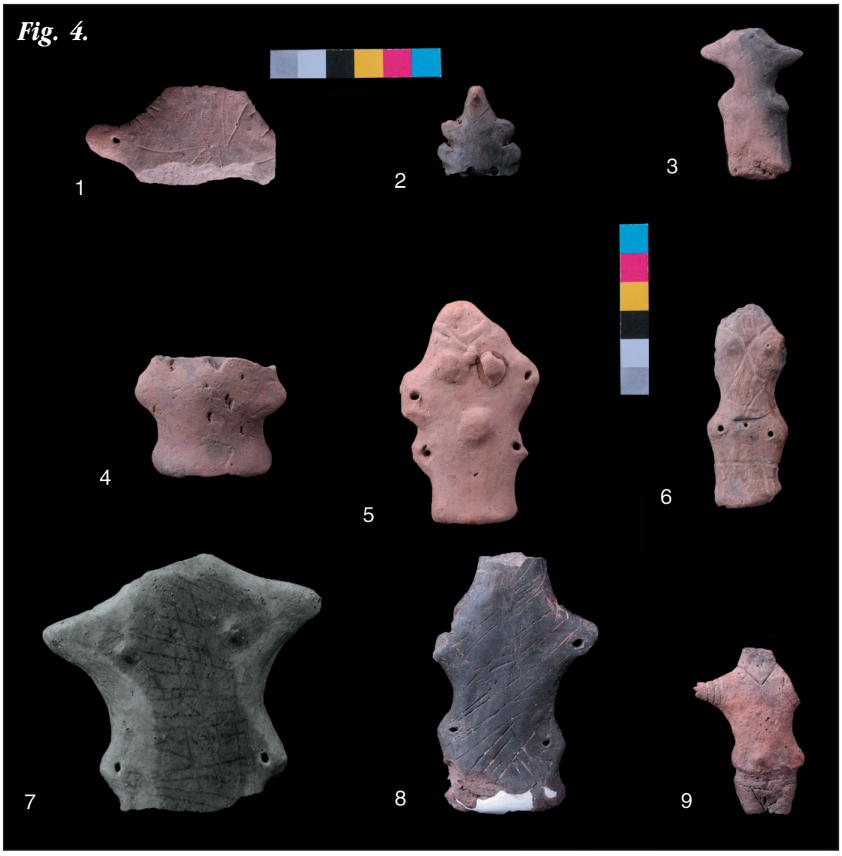


Fig. 4.

All the figurines of this type are fragmented. Apart from this, what is striking is the fact that no two of these could have been remotely associated with the same maker. The forms are different, the lines are different, sometimes by design (Fig. 4.9. *e.g.*) and sometimes randomly ap-

plied, sometimes incised and sometimes burnished. Each is different in size and quality, and has its own individuality. However, they share the same general form of the human figure and the same two-dimensional representation.

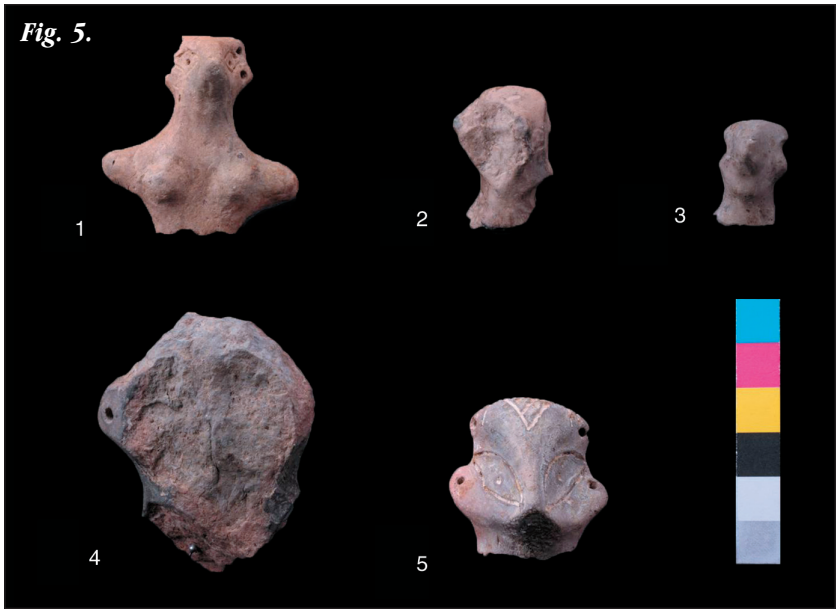


Fig. 5.

Type 3 (Fig. 5)

The bust of a female of Type 1, as well as other specimens of the type presented in Fig. 5, has a pentagonal face, which is an attribute of earlier phases of Vinča culture at Belo brdo. Type 3 has been singled out for these qualities. It is a pity the head given here as number 2 was damaged in such a way that it lacks a nose and the better part of the face. However, from what was saved, we can see an archaic form of a head, from the so-called Vidovdanka period (Fig. 6) dating to the mature phase of Vinča culture (5.40m in traditional Vinča chronology, *i.e.* the beginning of the Vinča C or Vinča-Pločnik I phase). The same would apply to number 4, and it should be said that these were presented here in order to show that the inhabitants of the last phases could have been aware of the styles and art forms of previous generations, probably due to some building activities at ancestral sites. Figurines 1, 3 and 5 also appear older than the rest of the corpus of figurines discovered from 1998 to 2009. The pentagonal faces, incised eyes and overall appearance have been dated to the beginning of the Vinča D (*i.e.*, the end of Vinča-Pločnik I) phase. An interesting feature is the representation of eyes with a pinprick in the centre (Nos. 1 and 5), which adds a realistic touch not so fashionable in the latest phase.

Type 4 (Fig. 7)

The type presented here is distinguished from the dominant form of human representation by the shape of the lower part of the body. Only four figurines have been singled out for this type; all have their legs represented not as part of an unelaborated lower portion of the body, but rather as two reticent protrusions carrying a few details. Figurine number 2 is flat and of somewhat larger dimensions. It is similar to those of type 1a. It is perhaps interesting for the unarticulated doodling on the abdomen area and perforations in the hip area, where the trace of a cord can be observed. This is the only example with hands directed downward. Figurine 3 is by far the smallest discovered at Vinča. Thanks to its compact size, it was preserved intact. It has a 'bikini' which covers its private parts and hands raised as in adoration.

These are not all the terracotta objects discovered at Vinča in the last ten campaigns, but apart from zoomorphic figures, which will be discussed elsewhere, there are some highly fragmented pieces which could not be attributed to any of the types presented here.

Due to the poorly preserved architectural objects and intensive levelling and truncation activities which were ascertained throughout the investigated area,


Fig. 6.



Fig. 7.

a contextual analysis of these objects is possible for two groups of figurines. One is a group of finds which belong to the very horizon which has destroyed other contexts (Fig. 8). The collective endeavour of leveling has been materialised in what we have labelled Unit 830, which consists of characteristic light-brown sediment, 40cm thick, very compact and laden with an extraordinary quantity of pottery fragments, bone and stone material, as well as tools and figurines. This levelling horizon, which spreads over the better part of the area excavated, yields material culture remains which are contemporary with, or earlier than the time of this activity. The other context is very similar to the previous one and represents the levelling horizon of house 6. The units in the foundation of this structure could easily be equated with unit 830. With the exception of the figurines discovered in these particular contexts, there are few which were discovered in other contexts, such as a foundation trench, house rubble, *etc.*, but their positions cannot add significantly to solving the riddle of their function or use.

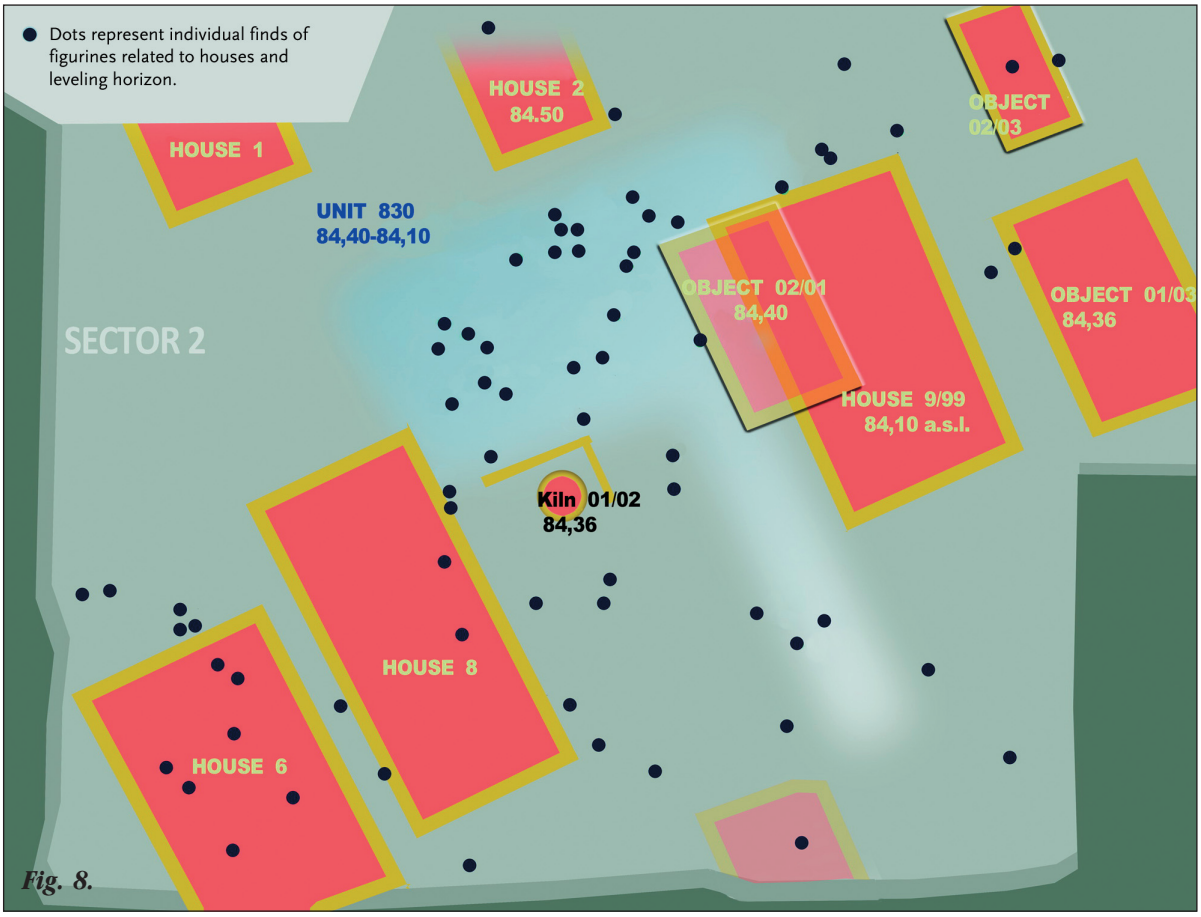


Fig. 8.



Fig. 9.

The examples in Figs. 9 and 10 were discovered in these two contexts. Apparently, there are different types of figurine, anthropomorphic and zoomorphic, big and small, fragmented and intact, decorated and plain, elaborate and simple. Apparently, there is no rule. Along with figurines, there are numerous other objects, such as pottery, bones, malachite, stone tools and their fragments. What can be ascertained here is the dominance of simple forms (Fig. 9.1, 4, 13, 14), and presence of intact, unbroken figurines without, as far we can see, any specific clues or peculiarities. The case is similar regarding the objects discovered under house 6 (Fig. 10), except that here, two marble figurines similar in shape to the dominant types manufactured in clay were found (Fig. 10.6, 8). Apart from the fact that marble figurines are quite rare at the Vinča site, it is impressive to observe how the dominant style is projected in stone, where other techniques of modelling and polishing are used. The result is thrilling and shows that the canon of the epoch was 'stronger than a stone'. It is easy, therefore, to agree with Hansen when he says that: "*... their extreme stylization, that is, the omission of any personal individuality, is a further form of generalization. These unchanged and inert forms exude a sense of stability. Likewise, the repetition of the same representational*



Fig. 10.

type holds within or symbolizes stability in societal order" (*Hansen 2007*).

However, the fact that figurines tend to differ, even within the strict canon, shows that something of the previous epoch survived in times which were, as we know, coming to a close. The individuality depicted in the unique decoration of robes and costumes so often seen on statuettes of the classic Vinča phase (7–5,5m) remained in traces in its final period.

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Containers and grains: food storage and symbolism in the Central Balkans (Vinča period)

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ABSTRACT – *Since Flannery, who showed that types and locations of storage facilities provide a variety of associations for explaining social change, the economic and social role of storage has been reviewed numerous times. So far, no research pertaining to storage practice has been conducted in the Central Balkans. However, storage strategies play an important role in the agricultural history of the region. Similar, or exactly the same storage techniques have been practiced from the Early Neolithic until modern times, and even today some are practiced by traditional farming communities. Hence this article, which is intended to lay the foundations for understanding the relation between economic and social processes as reflected by storage behaviour in the Late Neolithic-Early Eneolithic in the Central Balkans region.*

IZVLEČEK – *Gospodarska in družbena vloga skladiščnih prostorov je bila že večkrat pregledana, odkar je Flannery pokazal, da zagotavljajo tipi in lokacije shramb raznolika združevanja za pojasnitve družbenih sprememb. Do sedaj ni bila opravljena še nobena raziskava praks skladiščenja za področje centralnega Balkana. Podobne ali celo povsem enake tehnike skladiščenja so v uporabi od zgodnjega neolitika do sodobnega časa, nekatere tehnike se še danes uporabljajo v tradicionalnih poljedelskih skupnostih. V članku nameravam postaviti temelje za razumevanje odnosov med gospodarskimi in družbenimi procesi, kot so izraženi v vedenju pri skladiščenju v poznem neolitiku – zgodnjem eneolitiku v centralni balkanski regiji.*

KEY WORDS – *Central Balkans; economy; grain storage; houses; social strategies*

Introduction

The idea of food storage is related to the need to preserve an asset and use it when the distinctive need for it arises. The most common cases are poor harvests or general shortages. Stockbreeding or the possession of prestige items may have a similar role, reflecting the potential of a household to act within particular social/economic networks. In all cases, storage mediates between acts of production and consumption. Since Flannery, who showed that the types and locations of storage facilities provide a variety of associations for explaining social change (*Flannery 1972; 2002; see also Flannery 1993*), the economic and social roles of storage have been reviewed numerous times. So far, no research pertaining to storage practice has been conducted in the Central Balkans region. However, storage strategies play an important role in the agricultural history of the region. Similar, or exactly the same storage techniques have been practiced from the Early Neolithic until modern times, and even today some are practiced by traditional farming communities (*Jevtić 2011*). Hence, the idea for this article, which is intended to lay the foundations for understanding the relation between economic and social processes as reflected by storage behaviour in the Late Neolithic-Early Eneolithic in the Central Balkans.

The Late Neolithic-Early Eneolithic economy of the Central Balkans

It is universally accepted that the agricultural societies that existed between 5300–4600/4500 BC in

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the Central Balkans maintained high economic and technical standards, evinced by long-term settlements with elaborate architecture (*Chapman 1981; Tripković 2007*), intensive agriculture, possibly by means of ploughing (*Chapman 1990; cf. Porčić 2010*), copper mining and smelting (*Jovanović 1982; Borić 2009; Radivojević* et al. *2010*), involvement in an intercultural exchange network (*Chapman 1981*), *etc*. Pottery decorated with channelled ornaments on dark fired and burnished vessels, the highly standardised production of figurines, altars and other objects (*Garašanin 1979*), as well as evidence of displays of personal individuality in the wearing of exotic jewellery (*Dimitrijević, Tripković 2006*) are all parts of the same cultural pattern.



Fig. 1. Map of Starčevo and Vinča settlements mentioned in the text.

This universal view of regional Late Neolithic-Early Eneolithic conflicts somewhat with the varying physical and biological features of the Central Balkans, which argue against such a simplified view of the cultural landscape (Fig. 1). The Central Balkans, with its economic and cultural differences, was characterised throughout the late prehistoric and historic eras and to this day by many specific traditions within a regional cultural practice. Therefore, the rooted opinion that the Late Neolithic-Early Eneolithic periods were periods of elaborate domestic practices is debatable, given the inconsistency in understanding the multitude of specific local histories. For example, the latest research shows that exotic and valuable resources were not equally available to all communities. On the one hand, it is easy to identify communities like Vinča, with nearly a thousand years of agriculture, accompanied by trade in objects made of *Spondylus* and *Glycimeris* marine shells (*Dimitrijević, Tripković 2003; 2006; Tripković 2006*), obsidian from the Carpathian region (*Tripković, Milić 2008*) or *Dentalia* fossil beads collected from the area surrounding the settlement (*Dimitrijević, Tripković, Jovanović 2010*). On the other hand, many settlements in the vicinity of Vinča do not seem to have had such an elaborate social and economic system (*Chapman 1981*). Therefore, the existence of such diversity demands further explanation.

In recent decades, there has been a growing body of evidence regarding the occurrence of Vinča settlements in varying geographical settings (*Chapman 1981; 1990; Tringham 1992*). In some, a hunting based economy was predominant, as was noted in Opovo (*Tringham, Brukner and Voytek 1985; Tringham* et al. *1992; Russell 1993*) and Petnica (*Orton 2008*). Other settlements show a strong dependence on domesticated plants and animals, as discovered in Divostin (*McPherron and Srejović 1988*). In addition, some of the long-lasting settlements, like Selevac (*Tringham, Krstić 1990*) and Gomolava (*Orton 2008*), bear witness to a gradual change in the local economy. During the earlier phases of the Selevac settlement, hunting had a very important role, whereas in later phases the use of domesticated animals became more common (*Legge 1990*). These changes, as stated previously, are part of a widespread tendency in the character of Vinča settlements that were transforming from more mobile into more sedentary communities (*Kaiser, Voytek 1983*), resulting in the emergence of the household as an autonomous socio-economic unit (*Tringham, Krstić 1990*).

Research aims

The variety of economic practices in the Central Balkans during the Late Neolithic-Early Eneolithic clearly indicates production, distribution, and consumption on differing scales, a trend found in the Late Neolithic in other regions. Accumulation and storage, as well as the agents between production and consumption, may connect the different levels of

the Central Balkans economy into a comprehensive picture, thus giving important answers to questions regarding social and economic practices during the 6th and 5th millennium BC. From the Early Neolithic, agricultural products in the Central Balkans were stored in pits and large ceramic vessels, as documented at many archaeological sites. More than fifty storage pits were found at Biserna obala near Nosa (*Garašanin 1959; 1961*). Although information regarding the character of the settlement is still pending, the fact that many of the pits were intersected indicates that storage was practiced for an extended period in the same segment of the settlement. The pits' location in an open area indicates their public character, which continued for several generations (*Garašanin 1959*). The cases of three storage pits located in the housing area at Divostin (*Bogdanović 1988*), and another in the same context as querns from Zlatara (*Leković 1988*) suggest different storage organisation or varying rhythms of retrieving and processing stored goods.

My aim is to review storage activities in the Central Balkans during the Late Neolithic-Early Eneolithic, that is between 5300–4600/4500 calBC. The intensive production, distribution, and consumption which occurred with Vinča culture are part of a new economic and social context in which innovation and the further development of storage techniques played an important role. Therefore, it is important to understand the social contexts in which food storage occurred, as well as the levels of its reflexivity, regardless of whether meat or grains were being stored. Some of the most important questions are:

- How was the idea of storage utilised by the socially and economically diverse Vinča communities?
- Are there local and regional differences in storage techniques?
- What is the correlation between food storage and the accumulation of other goods?
- Is the role of food storage simply to ensure the survival of the group (family, household, community) or does it also play an important role in the social strategies of Vinča communities?

Attention is given to the preserved plant remains and objects which have been ethnographically identified as storage structures. To find answers to the proposed questions, one must focus on two sources. The primary source of information is long-lasting settlements, which have been extensively researched and well dated by radiometric methods. This has enabled the determination of different methods of storage, as well as its change through time. Secondary sources are the notes on storage from other excavated settlements, mainly those where an extensive research context is lacking, which are necessary to understand the role of storage in local histories.

Grain storage in the Central Balkans: the evidence

The partial understanding of plant storage in the Central Balkans is due to the relatively small number of extensively excavated sites and relatively late adoption of paleobotanical analysis in archaeological research. Respectively, evidence of storage has been limited to the macroscopically confirmed presence of cereal and legume remains (Fig. 2), as well as containers whose role has been ethnographically attested. This allows a direct association of containers with certain goods and the expansion of research regarding storage techniques to similar objects, regardless of whether any plant remains have been discovered in them. Implemented on a regional scale, this approach can provide a good result. Therefore, different storage techniques, *i.e.* storage containers such as pits, bins, and large ceramic vessels, will be used to reconstruct the relation between the economic and social processes that took place during the Late Neolithic-Early Eneolithic in the Central Balkans.

Storage pits

These are recognised by their regular, bell or cylindrical shape, and in some places it is possible to find traces of an above ground edifice. In order to sufficiently isolate the content, they were usually dug into a hard non-porous base or, when this was not the case, their sides were covered with platter and then plastered over with clay. The primary role of such pits was to store agricultural products, and occasionally they would be opened for retrieving and consuming the contents (*Buttler 1936; Gronenborn 1997.435–436; Reynolds 1979*). Storage pits have been noted in more or less all agricultural areas, but regional prospects in European prehistory are still rare (*Šumberova 1996*). The reason for this can be found in decades of attention to researching household contexts, but also the relatively late integration of paleobotanical analysis into archaeology. There are also additional problems in defining storage pits. Ethnography clearly states that many pits are of regular shape, some resembling siloi. In cases where they do not contain remains of stored goods, it is possible that they were used for other purposes (*Gronenborn 1997; Evans 1982; Reynolds 1979*). In addition, the bell or pear-shaped pits may be the result of wall erosion, where the uppermost parts of

Sites/ References	Storage pit	Granary	Clay bin	Perishable container?	Pithos	Small vessel
Banjica (*Tripković 2007*)				concentration of grains within house 7		
Beletinci (*Chapman 1981*)			grains within house 1			
Gomolava (*van Zeist 1974*)	grains					
Medvednjak (*Galović 1975*)				concentration of cereals (*Triticum diccocum*, *Triticum aestivum*, *Triticum monococcum*) within a house		grains – two vessels within a house
Selevac (*Tringham and Stevanović 1990*)	*Triticum diccocum*, *Lens esculenta* – silo A; concentration of grains – silo B	*Triticum diccocum* within house 7				
Stapari (*Chapman 1981*)					grains within house 1	
Tuzla (*Baum 1958*)					grains	
Valač (*Tasić 1960*)				concentration of grains within a house		
Vinča (*Vasić 1936; Tasić, Đuričić and Lazarević 2007*)				concentration of *Triticum diccocum* within house 01/06		grains within house ▼2.98/3.48

Fig. 2. Storage containers with the evidence of cereals in the Central Balkans, Late Neolithic-Early Eneolithic.

the pit would remain intact due to support from roots (*Bowen, Wood 1968; Reynolds 1979*).

In the Central Balkans, some regularly shaped pits contained concentrations of grains and other plants. This information was used to determine the storage purpose of these pits. Two such pits (Silo A and B) were discovered in Selevac (*Tringham, Stevanović 1990*). Silo A has a semi-circular base and its sides are covered with platter that was plastered over with clay (Fig. 3a). On the bottom was a 5cm layer of charcoal. The inside of the pit was filled with earth mixed with ash and carbonised grains of *Triticum monococcum* and *Lens esculenta*. On top of the fill, an anthropomorphic figurine was discovered (*Tringham, Stevanović 1990.59*). Silo B served a dual purpose, because a clay wall divided it (Fig. 3b). It also contained earth mixed with ash and carbonised wheat grains, with one-half of the pit containing a concentration of grains (*Tringham, Stevanović 1990. 61*). An unmarked pit at Gomolava provides additional evidence of grain storage (*van Zeist 1974*). It is not clear whether feature 41 at Opovo, dated to the oldest phase of the settlement, was also used for storage. Feature 41 was probably comprised of two pits which were not noted as such during the excavation. The pit on the west side was plastered with clay and contained a large amount of cereals; it is assumed that it was used as a silo (*Borojević 1998.172; 2006*).

Only a small number of pits in the Central Balkans contain organic remains; however, small pits with a clay lining and the remnants of a superstructure can be added to the body of evidence. Many of these, such as the additional four or five at Selevac, have a clay lining and are interpreted as silos (*Tringham, Stevanović 1990*). There is further evidence at Banjica, with three or four storage pits in the open area from the oldest phase of the settlement, as well as five more from the later phases located inside houses (*Todorović and Cermanović 1961; Tripković 2007*); at Vinča there are five bell-shaped silos grouped in the open area dating to the oldest settlement phase (*Vasić 1936.147–148; 1948*), and also a pear-

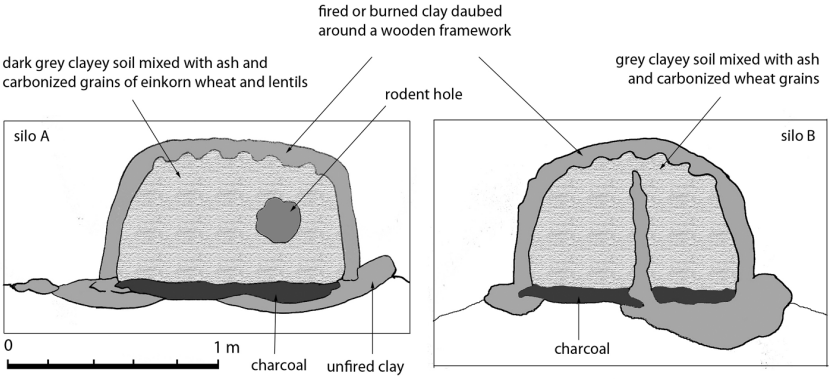


Fig. 3. Selevac – silos A and B from 1969–1970 excavation, trench 7 (adapted after* Tringham, Stevanović 1990*).

shaped pit from Crkvine-Mali Borak (*Živanović and Spasić 2008*), which is a typical example of a storage pit (Fig. 4). In Aradac in Vojvodina, an earlier excavation uncovered two storage pits (*Karapandžić 1923*), while two additional ones were supposed by using a formal analogy (*Tripković 2009a*). Pits 3 and 5 from the same site contained pithoi which occupied the whole area of the pit (*Karapandžić 1923*). In Crna Bara, three bell-shaped pits were discovered. Two pits that contained traces of a superstructure (*Garašanin, Garašanin 1957*) were most probably used for storage. In the older phase of Potkućnica site, a repository with a diameter of 2.1m and depth of around 1m was noted. It was plastered with the same clay as the floor, and the trace of a post was found at its centre (*Derikonjić 1996. 102, Fig.19*).

Bins

These types of storage structures were usually located inside houses. While one cannot speculate on the function of the structures without contextual data, in instances where such evidence exists, it is doubtless that they were used for storage (*Bogard* et al. *2009; Kalicz, Raczky 1987.19*). The remains of unspecified cereals in the Central Balkans were discovered in one of the two bins located in the south side of house 1 in Beletinci (*Chapman 1981*). The body of evidence can be extended to other settlements as well. In the three-roomed house, 2/79, at Banjica, four-sided bins were located in the adjacent rooms next to an oven containing pithoi and fragments of pottery (Fig. 5). In one of these, a pair of bull's horns was also discovered (*Todorović 1981; 2007.95*). Similarly, a trapezoid bin from the central room of house 01/06 from Vinča also contained two pithoi (*Tasić, Đuričić and Lazarević 2007; Vuković 2011*). In houses 13, 14, 15 and 17 at Divostin, the storage bins are of varying shapes – some were empty and others contained pottery, loom weights, and flint blades (*Bogdanović 1988*). At Parţa and Uivar in Romanian Banat, bins were also a regular part of house inventories (Fig. 6). The building in trench XI at Uivar housed four containers in a row containing a stone axe blade, a turtle shell and huge storage vessels (*Schier 2006*). Similar clay bins containing carbonised cereals were found in houses P9 and P18 at Parţa. Shrines 1 and 2 at the same site housed a few more containers, probably with a ritual function (*Lazarovici, Draşovean and Maxim 2001*).

A certain regularity can be observed regarding the location of bins; most are located in the vicinity or in the same room as the oven (Banjica, house 2/79; Divostin, houses 13, 14 and 15; Vinča, house 01/ 06); only in rare instances are the bins located in other rooms (Beletinci, house 1). In cases when the entrances to the houses can be identified, it is noted that the bins are located opposite the entrance, in a deeper part of the house (Banjica, kuća 2/79). In houses containing multiple bins, certain regularities can be observed, possibly of local importance. For instance, in house 1 in Beletinci, two four-sided bins were found in a lateral room which does not contain an oven, while in Divostin the bins were located in different rooms always containing an oven (*Bogdanović 1988*). This regularity in the distribution of bins in houses at Divostin contradicts the irregularity of their shapes; they are square, triangular, trapezoid or round. Also, the bins contained ceramic vessels and other artefacts such as loom weights and flint blades, thus indicating that besides storing daily necessities, they were used to store other objects. This observation serves to remind us that the study of storage should not be limited to necessities or exotic goods; at the same time, it opens a new perspective for understanding the dynamics of domestic activities in Vinča houses. The contents of bins in Divostin houses, also house 2/79 at Banjica, clearly indicate that the house inventory can be divided into objects that were being used and deposited objects that were not being used. Among these one should look for the starting point for understanding the cyclic nature of domestic practices in Vinča houses (*Tripković 2009a*).

The frequent use of storage bins for storing grain or depositing objects indicates a possibility that houses

where bins have not been observed had containers made of organic materials for storing goods. Namely, on the floors of some Vinča culture houses, concentrations of grains were found, and until now it has often been proposed that at least some of these were in a container made of organic material which did not survive; this includes concentrations of cereals found on the floor in the house at Medvednjak (*Galović 1975*), in house 7 at Banjica (*Todorović and Cermanović 1961; Tripković 2007*), in house 01/06 at Vinča (*Tasić, Đuričić and Lazarević 2007*) and in house at Valač (*Tasić 1960.17–18*). Also, due to the detection of a large concentration of grain in the building labelled house 7 at Selevac, it is supposed that the structure was not used for habitation, but that it was a raised floor granary.

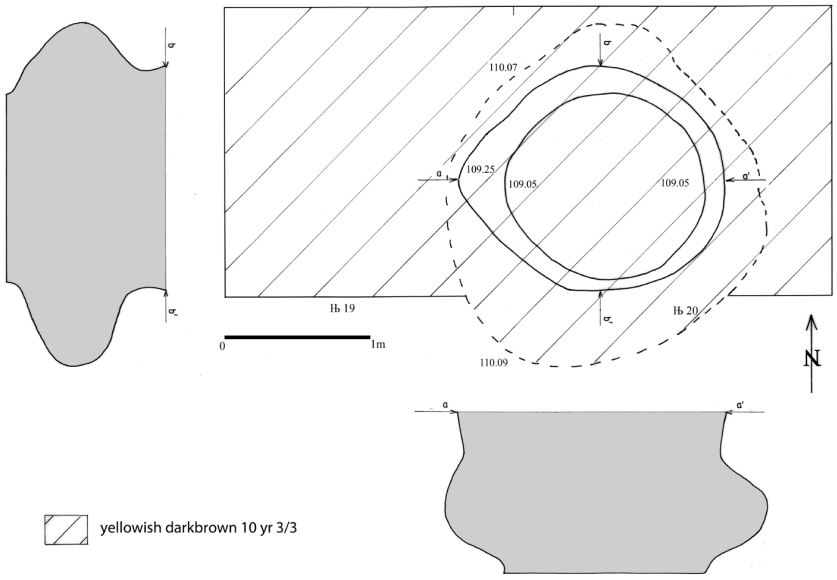


Fig. 4. Crkvine-Mali Borak – storage pit (adapted after* Živanović, Spasić 2008*).

Pithoi and other ceramic vessels

The abundant evidence regarding large volume vessels from the Late Neolithic of Central Balkans clearly indicates that storage in ceramic containers played an important role in the economic strategies of Vinča households. A functional analysis of vessels from Belo Brdo in Vinča points to a wide variety of options for the storage both of dry and liquid contents in vessels of varying sizes (*Vuković 2008*), indicating that the correct interpretation of ceramic containers is the key to understanding the daily routine of Vinča households. Dilemmas about the goods stored are also multiplied by numerous testimonies through prehistory and history regarding the wide variety of goods stored in them (*Christakis 1999*). If we wish to observe these plant remains from Central Balkans, the evidence is unfortunately rather scant. It can be narrowed down to the remains of cereals in large vessels discovered in house 1 in Stapari (*Chapman 1981*) and Tuzla (*Baum 1958*). Other larger or smaller vessels may have been used for holding cereals in certain situations, also serving as vessels with a particular function. In this context, we may mention the small vessels with grains in the house at Medvednjak (*Galović 1975*), as well as another example found in a sunken storage pot in house 3 at Vinča (house 3/1980 – *M. Jevtić, personal communication*). They could have been used as measures for retrieving grain stored in the larger pithoi or bins. For this reason, small vessels of different types discovered in a storage context can be attributed to domestic practices occurring between storage and food preparation. Moreover, the recognition of vessels with organic remains and their interrelation could lead to a better understanding of the measurement systems used by Vinča culture households.

A certain variability can be observed in the size and number of storage vessels. Three roomed house in Jakovo (house 2) contained more than 20 storage vessels, some of which were used to house dried foods and others for liquids (*Jovanović, Glišić 1961*). Another three unit houses, like 4/75 at Gomolava (*Petrović 1993*), 2/79 at Banjica (*Tripković 2007*), and house 1 at Beletinci (*Brukner 1962*) also contain several pithoi. The average area of these houses is 35m^2. On the other hand, the large houses in Divostin whose areas vary from 40 to 100m^2 (*Bogdanović 1988*) contain only one or two pithoi (*Madas 1988*), thus pointing to the fact that the number of storage vessels does not correlate with the area of the house floor, respectively the size of the household group (Fig. 7). The reasons for these inconsistencies could be different local economic and social histories (*Tripković 2009a*).

Variability can also be observed in contexts in which pithoi have been found; some have been found inside as well as outside houses. Pithoi noted inside the house are in the same or in different rooms, mostly on the ground floor. Some are also sunk into the floor, as is evidenced in house 2 at Opovo (*Tring-*

ham, Brukner and Voytek 1985). In house 2/79 at Banjica, pithoi were found in two rooms in storage bins next to the oven (*Todorović 1981; 2007*). Pithoi have also been recovered on the outside. It is interesting to note that in Aradac a pithos was discovered in at least one storage pit (*Karapandžić 1923*). The fact that pithoi can be found in different contexts, despite their dimensions, makes them convenient for understanding the dynamics of storage in Vinča culture households.

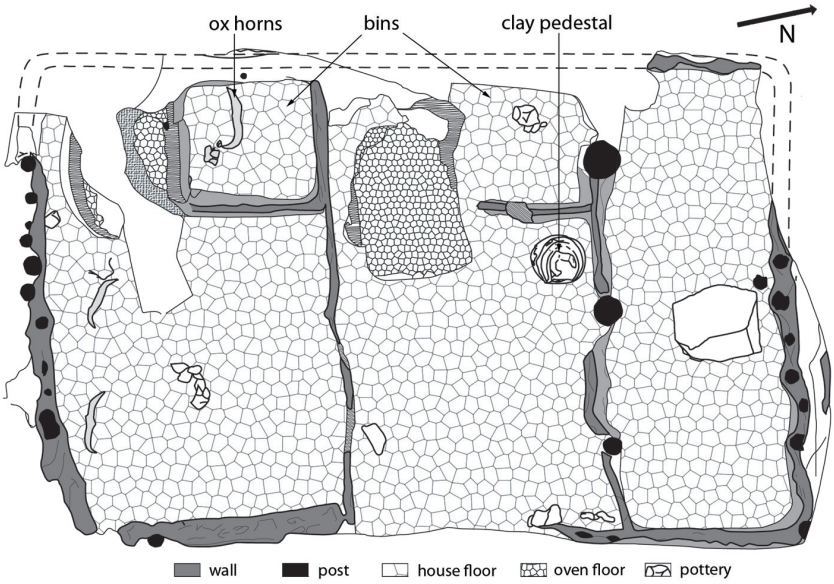


Fig. 5. Banjica – house 2/79 (after* Tripković 2007*).

When studying storage in pithoi, the six Divostin houses play an important role in explaining the complexity of storage behaviour in Vinča culture. Pithoi in these houses can be observed within the social context of households, thus allowing for their comparison. Each of the houses that were found contained a pithos, while houses 13, 15 and 18 contained two pithoi. They were usually located in the corner of a room, next to or opposite the oven; they were usually not decorated and some had handles. By examining the pithoi, a certain individuality in the households within the settlement can be observed. Namely, unlike other vessels which have been reduced to only a few types, no two pithoi are alike in the houses at Divostin (*Madas 1988*).

The rare occurrence of pithoi, considering the unusually large size of the houses, increases the possibility that other types of vessel were used for the same purpose. If the contents of Divostin houses are carefully observed, their inventory is comprised of large pots and bowls usually interpreted as vessels used in food preparation and consumption (*Madas 1988*). It is possible that a certain number of these large vessels were also used for food storage.

Discussion

There was a variety of storage techniques in the Central Balkans during the Late Neolithic-Early Eneolithic. In most cases, this diversity was not chronological by nature, nor a result of specific local preferences, because all of the storage techniques have been noted in different phases of Vinča culture and often in the same settlement. More probably, it was the result of the society's rational need for the planned use of stored goods, where certain types of containers were ascribed a specific function. Following this line of interpretation, in the same settlement, storage in pits, bins, and pithoi could have been practiced together, from long-term storage in pits to medium- and short-term in bins, pithoi, and other ceramic containers. This can be postulated particularly in places where a variety of storage containers have been found in the same context: in house 7 at Banjica, where in the 'deeper' rear part of the house, a storage pit (*Todorović and Cermanović 1961*), a concentration of cereals (in an organic container?) on the floor of the house, and pithoi (*Tripković 2007*) were discovered; in Divostin (*Bogdanović 1988*), and house 2/79 at Banjica (*Tripković 2007*), where storage was divided between bins and pithoi; or house 01/06 at Vinča, where bins, pithoi, and a concentration of processed cereals (*Tasić, Đuričić and Lazarević 2007*) were discovered. On the other hand, it is apparent that this variety is absent from other settlements. For instance, the inhabitants of Jakovo used ceramic containers for storage in their houses (*Jovanović, Glišić 1961*), which was also probably the case with most of the households in Gomolava (*Petrović 1993*). In house 2 at Jakovo, there were 22 storage vessels, and in house 4/75 at Gomolava, at least 11 storage vessels were found. Intensive production by households, and possibly, storage time scales were all represented by a large number of storage vessels of varying types, which were deposited in all three rooms of the houses (*Tripković 2009a*).

Based on the location of containers, it is possible to notice certain changes during the life-span of the set-

tlement. These are evident in the gradual transformation of storage from the public to the private domain, which has been noted in more or less all the settlements (Fig. 8). Storage pits outside houses are common in the early phases of the settlement. Similar to the tradition of the Early Neolithic period, they are sometimes located in groups, suggesting that these particular parts of the settlement were used for a long period. That most of the storage pits discovered were from the early phases of settlements (Fig. 9a, b), storage outside suggests something interesting about the nature of the society that started the settlement. Following Chapman's idea regarding settlement histories (*Chapman 2008*), it is highly probable that the grouped storage pits in the founding settlements, or at least in some of them, reveal the communal nature of the society. The nature of this communality pertains to the way the Vinča settlements were founded, which at present is unknown. Ethnographic research shows that the establishment of new settlements can be accomplished through a social group connected by kinship, which might have been the case in the Central Balkans. This might be further supported by the DNA analysis of 25 male individuals whose remains were discovered at Gomolava. The result of the analysis indicates that all of them belonged to a single kinship group (*Stefanović 2008*).

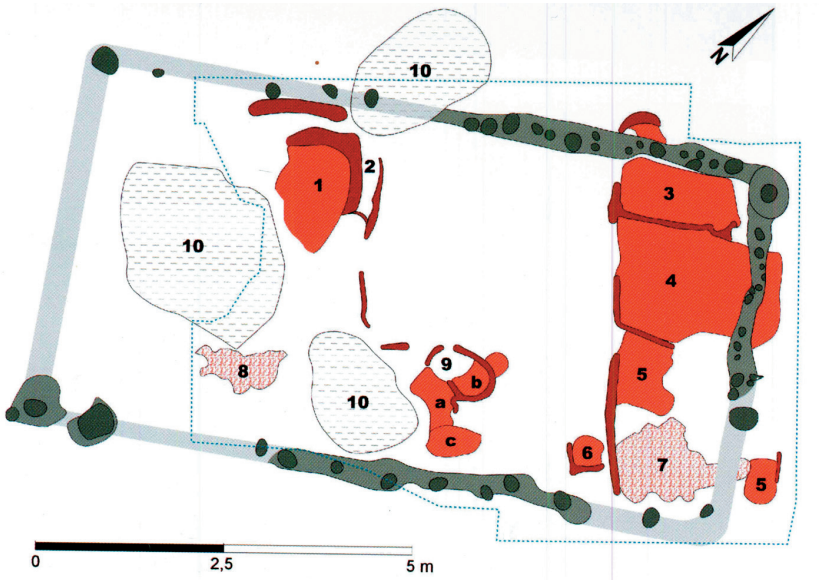


Fig. 6. Building from trench XI at Uivar (after* Schier 2007*). 1 Large fireplace. 2 Half-tube with compartments. 3 Cassette made of thin loam walls containing an axe blade and a turtle. 4, 5 Similar cassettes. 7, 8 Broken storage vessels. 6, 9a–c Fireplaces. 10 Medieval pits.

In the later phases of settlements, grain storage was mostly inside houses. The gradual shift from storage outside to storage inside the house happened in the Central Balkans as part of important social and economic changes. The character of these changes is reflected in a more sedentary life style, as well as intensified use of resources, especially in late Vinča culture (*Kaiser, Voytek 1983*). Tringham accordingly defined the move from the public to the private domain in Vinča culture as the emergence of the household as an autonomous socio-economic unit (*Tringham, Krstić 1990*). Yet there was no further consideration of whether, in the variety of social reproduction in the Central Balkans, the symbolism of storage may have carried a different communal connotation. There are several examples of this. Within the occupational horizon II at Banjica, storage pits are located in the central areas of long houses. The houses covered an area of between 100–200m^2, and as postulated, were occupied by multifamily or extended family households (*Tripković 2003*). The symbolic representation of the centralised organisation system is represented by the central position of the storage pits and hearths. In this particular case, the building of long houses and the location of storage containers constitute the local cultural norm that aimed to internally homogenise or control these small 'house societies'. More or less at the same time as when the building horizon II at Banjica was occupied, some 200km to the south at Divostin near Kragujevac, there is a different example. In houses 13, 14 and 15, which had 1–2 rooms additionally built, the ovens were always placed in the old and the new parts of the house (*Bogdanović 1988*). During the contextual analysis of the house inventories at Divostin, additions to the houses were interpreted as part of the social reproduction process of the household, representing the spatial demarcation of the new family (*Tripković 2009a; 2009b*). Contrary to the houses at Banjica, where storage has a tendency to show internal order, the storage containers in the expanded buildings at Divostin reflect a more complex social message (*Tripković 2009a*). The pithoi, with the exception of house 13, are located in the older part of the building, reflecting the control of storage by older members of the household. On the other hand, dissatisfaction and social tensions can be observed based on the location and

form of the storage bins and ovens in the added units. They are generally located opposite their counterparts in the older part of the building; also, the storage bins have a different shape, while ovens are decorated with different motifs (*Tripković 2009a*).

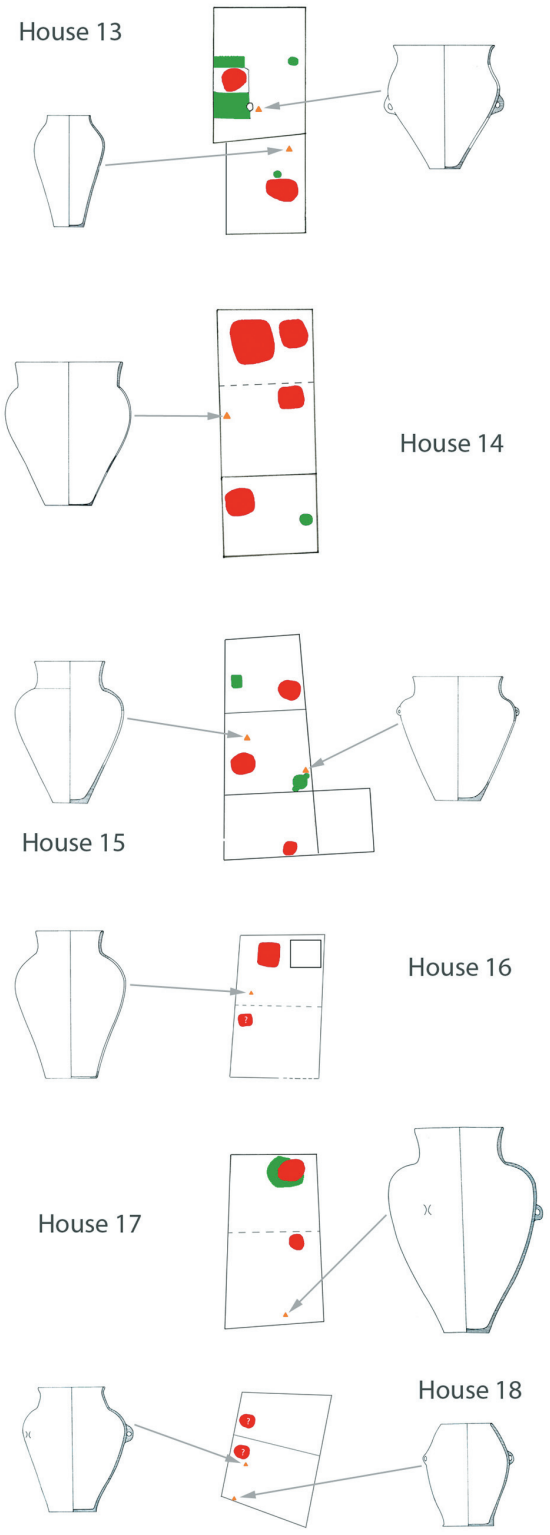


Fig. 7. The pithoi in Divostin houses. Marked in red – fireplaces; marked in green – bins (made after* Madas 1988 *and* Bogdanović 1988*).

So far Opovo is the only examined Vinča culture settlement where all three building horizons provide no clear evidence supporting the change from public to private storage (*Tringham, Brukner and Voytek 1985; Tringham* et al. *1992*). The reasons for this may lie in the economy of the settlement, which was based on wild rather than domesticated resources, while long-term storage of cereals was of less importance. Opovo is located in a marshy environment which is not conducive to intensive agriculture; only small quantities of cereals were discovered even in structures resembling storage pits, while the houses contained insignificant evidence of cereal processing (*Borojević 1998; Tringham* et al. *1992*). Therefore, the lack of long term change in the character of grain storage can be interpreted as a result of the settlement's non-reliance on agriculture for survival; we can also accept that social status was achieved through the distribution of meat rather than the accumulation of grain (*Russell 1993*).

In the case of Opovo, the possibilities of a further review of storage practices in the Late Neolithic period of the Central Balkans can be expanded, because besides accumulation this aspect can be observed through the distribution and consumption of meat. Some recent ethnographic and archaeological research has shown that the accumulation of plants and distribution of meat are two opposing economic strategies (see *Bogard* et al. *2009*). The first is directed only at the economic survival of the group, with a clear notion that storage extends the useful life of certain items, and that the benefit is clearly seen during bad harvests. On the other hand, the distribution of meat is seen strictly as an activity that ensures social status. It is usually manifested through conspicuous symbolism in the form of bucrania, carvings in stone stellae, or zoomorphic figurines. There is some evidence in the Central Balkans to further corroborate this. For instance, all of the storage containers in house 7 at Banjica are located deep inside the house (*Todorović and Cermanović 1961*), indicating their private and strictly economic character. An example to the contrary would be the pits from Opovo, which are filled with animal remains, indicating the practice of communal feasting (*Russell 1993*). However, we do not consider 'opposing strategies' as a valid term, mainly because of the reflexive nature of goods (*cf. Sherratt 1999; Robb, Farr 2005*) as well as 'regimes of value', which may be constantly changing (*Koppytof 1986*). While in some instances in the Central Balkans storage can be understood as a strictly economic strategy, there is a multitude of instances where certain types of plant had

a symbolic use. Silo A in Selevac, filled with cereals with a figurine on top, is the most obvious example. The combination of storage bins and pithoi in the building in trench XI at Uivar, which in the preliminary report was interpreted as a ritual building (*Schier 2006*), or grains inside a provision vessel found in a cassette within shrine 2 at Parţa (*Lazarovici, Draşovean and Maxim 2001.386*) may be evidence of further expansion of research regarding containers and cereals in a symbolic context.

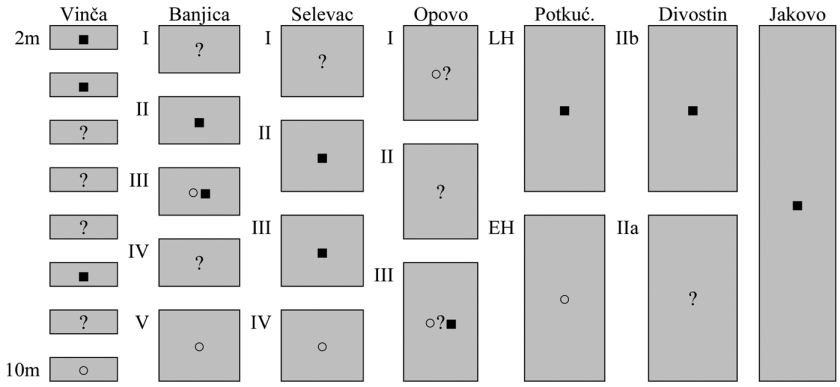
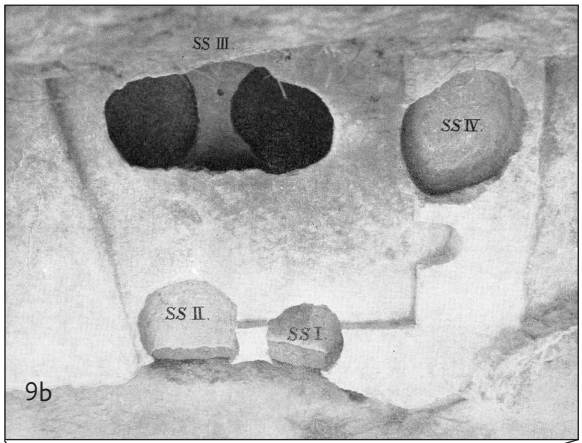


Fig. 8. Storage containers from the central Balkans in their settlement context: ❍ – storage on the outside; ■ – storage within the houses.

According to this research, it can be expected that pithoi and other large volume vessels had the most dynamic role in social strategies (which include storage). Namely, the possibility of role transformation is at its highest in pithoi. They can be used for the long-term storage of a considerable amount of material, as well as for everyday consumption. In addition, pithoi are portable, and with a little effort could be placed in any context, inside or outside a house, in a pit or above ground (on the ground level of a house or in the mezzanine). All of these contexts have been observed in the Late Neolithic-Early Eneolithic in the Central Balkans. This is best illustrated by the pithos in a storage pit at Aradac or pithoi in storage bins in house 2/79 at Banjica and house 01/06 at Vinča. Therefore, in certain situations, pithoi can become a political means by which social differences are hidden or accentuated.

Still, in most cases, the answers remain hidden. For instance, some pithoi were decorated and some not, as is the case at Gomolava, Jakovo, Banjica, and at other settlements. We suggest that the social role of the decorated pithoi is defined through the visual message that should not be separated from messages conveyed by other aspects of material culture. Also, in situations where there was a need to move the pithoi, there must have been some kind of mechanism to make the process easier. Probably for practical reasons, some pithoi in Vinča culture houses have handles and some do not. The examination of their positions shows that those without handles occupied a fixed position, mostly standing in the central or main room of the house, near the oven, in association with the quern. These were usually decorated. Meanwhile, pithoi with handles in all houses were undecorated and not placed in any specific position (*Tripković 2009a*). The two types of pithoi, the decorated examples without handles and undecorated ones with handles, apparently conve-



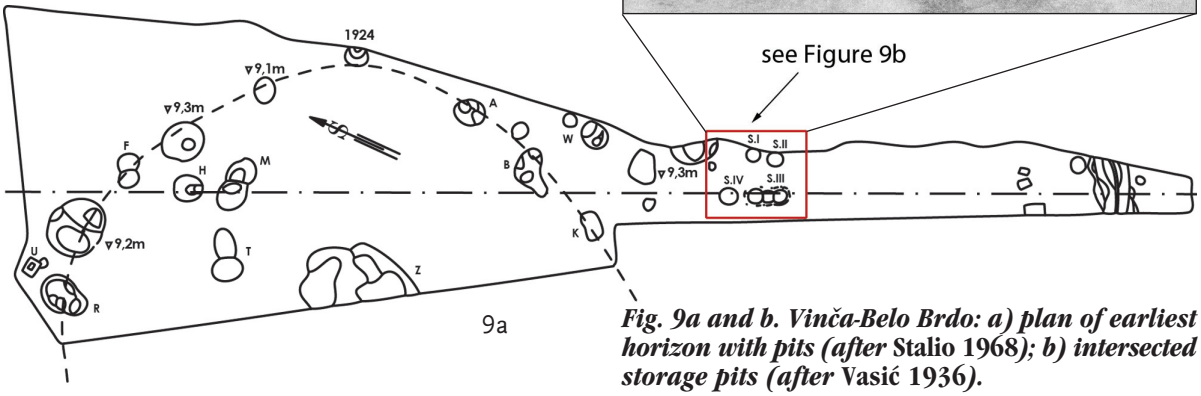


Fig. 9a and b. Vinča-Belo Brdo: a) plan of earliest horizon with pits (after* Stalio 1968*); b) intersected storage pits (after* Vasić 1936*).

yed different social messages. These messages suggest that pithoi were used in more complex ways than merely to store and preserve agricultural products.

Conclusion

The review of storage techniques from the Late Neolithic-Early Eneolithic in the Central Balkans shows that different kinds of consumable goods, as well as artefacts, could have been stored for later use. In the case of grain storage, two important facts have been discovered. The first is the complementarity of storage techniques, where pits, bins, and pithoi were used according to a different time-scale of storage, ranging from long-term to short-term. The second is the gradual movement of storage containers from public to private spaces, which can clearly be associated with social change within Vinča culture societies. In the early phases of settlements, storage facilities were located in open areas, whereas in the later stages of the settlements, goods are stored in houses in pits, bins and pithoi. Based on the examples from Banjica and Divostin, one can argue that it is essential to redefine the strictly practical role of storage containers in the household context during the Late Neolithic-Early Eneolithic in the Central Balkans. In addition, observing individual settlements, rather than attempting to find an all-encompassing definition, could provide better overall insights into storage behaviour. In the future, pithoi could play an important interpretative role, considering that they have important social and economic attributes: they could be used for long-term, intermediate, and short-term storage, and they could be moved from one context to another.

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Mr. Blademan. Macrolithic technology – Eneolithic vocabulary and metaphors

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ABSTRACT – *The Eneolithic period witnessed a technological breakthrough of a significance comparable to that of the technological revolution in historical times, accompanied by a matching revolution in social and economic relationships. This transition no doubt led also to the creation of new and momentous metaphors, which in their turn triggered new senses and planes of communication. It goes without saying that the Eneolithic technology that had the greatest potential for metaphors promoting new ways of looking at the world was metallurgy. Nevertheless, before Eneolithic communities came to fully appreciate the properties of metal, many of their number resorted to an idiosyncratic flint technology to produce macrolithic implements. It seems that the production and exchange of macrolithic artefacts led to the development of a new vocabulary and grammar that served, among other things, to describe the social inequalities discernible in Eneolithic communities.*

IZVLEČEK – *V obdobju eneolitika je prišlo do tehnološkega preboja, ki je po pomenu primerljiv s tehnološko revolucijo v zgodovinskih časih, skupaj z ustrezno revolucijo v družbenih in ekonomskih odnosih. Ta prehod je nedvomno pripeljal tudi do nastanka novih in pomembnih metafor, ki so po drugi strani sprožile nove pomene in ravni komunikacije. Ni potrebno posebej poudarjati, da je eneolitska tehnologija, ki je imela največji potencial za metafore, ki so spodbujale nove poglede na svet, bila prav metalurgija. Preden so eneolitske skupnosti pričele v celoti ceniti lastnosti kovine, so se mnoge izmed njih zatekle k idiosinkratični tehnologiji kremena za izdelavo makrolitskih orodij. Zdi se, da je proizvodnja in izmenjava makrolitskih artefaktov pripeljala do razvoja novega besedišča in slovnice, ki sta med drugim služila za opisovanje družbene neenakosti, ki so vidne v eneolitskih skupnostih.*

KEY WORDS – *macrolithic technology; metrological concept; vocabulary; Eneolithic; Central Europe*

Introduction: the impact of technology on vocabulary development

The words and metaphors we use to describe the reality around us are not accidental creations, although we rarely pause to think where they come from. The philosopher Richard Rorty treats vocabulary as a contingency, as something that happens to people (much like a mutation) in the course of their complex history and which is not readily attributable to a single source (*Rorty 1989*). Rorty is, of course, right when he says that it is not easy to indicate any one source of a vocabulary – of 'romantic vocabulary' (*i.e.,* the vocabulary of Romanticizm), for example. That said, an exploration of the process of vocabulary emergence might perhaps be a less hopeless endeavour. And what if we went back in time even further and took a look at the development of the mechanistic worldview and vocabulary that was the target of the Romantics' criticism? I believe that in this case, the very name of this paradigm and manner of describing the world already speaks volumes about its origin.

There are many who would link the mechanistic paradigm with the development of Newtonian physics, but in fact the roots of the mechanistic vocabulary

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go much deeper (*Berryman 2009*). It is highly probable that an important contributing factor in its emergence was the invention of the mechanical clock. Consider, for example, this employment of the clock metaphor by Kepler, who in 1650 summed up his research project in astronomy as follows: My aim is to show that the heavenly *machine* is not a kind of divine, live being, but a kind of *clockwork*, insofar as nearly all the manifold motions are caused by a most simple, magnetic, and material force, just as all motions of the *clock* are caused by a simple weight. And I also show how these physical causes are to be given numerical and geometrical expression (after *Koestler 1989.345*; the emphasis is mine).

In this passage, Kepler defined the essence of scientific revolution, a concept that was later to be elaborated by Galileo and Descartes and completed by Newton. Kepler's metaphor was wonderful and highly appealing to many of the thinkers of his day. Soon thereafter, this pattern of thought came to be applied to all of nature in its vast complexity and to humans. One of the most vehement proponents of this way of thinking was Descartes, who viewed the material world as a machine and nature as something governed by the laws of mechanics. Everything that was part of the material world was to be explained in terms of systems and the movements of the various discernible elements. A new paradigm was created which went on to become a guiding light for all scientific observations and to underlie most scientific theories dealing with natural phenomena right up to the 20th century, when theoretical physics again started changing the picture of things. Descartes put in place a general framework of scientific thought and came up with a theory of nature as a perfect machine operating according to mathematical rules. How did all this come about?

The clock, a machine that measures time, had inspired many enlightened minds and altered the lives of ordinary town dwellers since the Middle Ages. Thanks to clocks, medieval towns emerged as centres of authority and production, contrasting with rural communities which lived in tune with natural cycles (*Le Goff 1980*). Clocks did not appear out of nothing, however. They were descendants of other machines – mills and windmills, which helped elevate European culture to the rank of world leader in economy and technology (*Gimpel 1992*). The clock was but a prominent example of the machine technology which co-shaped the modern humanistic worldview.

Nowadays, we tend to overlook that in the past, machine technology was the source of key metaphors describing reality, people and society. As demonstrated by Jonathan Sawday in his most recent book, diverse devices, sometimes highly complex and greatly boosting the power of human muscles, were part of the everyday environment of crafts-persons and engineers since the Middle Ages, and virtually throughout the continent. Historical records, the lives of Renaissance engineers and philosophers, literary works and paintings dating from that period all contain evidence of the increasingly prevalent discourse on the idea of mechanisation, on the precise regulation of human actions, and even on the idea of artificial entities devoid of soul and yet acting exactly like human beings. As a consequence, the idea of clock and machine took firm root in European political, aesthetic, and philosophical thought (*Sawday 2007*).

Thanks to developments in machine technology – medieval mills, and later clocks, being prominent elements thereof – philosophers and scientists, and eventually ordinary people, came to believe that they were describing the world around them much better, with greater precision and more effectively that their ancestors, who had employed an archaic vocabulary. Today, we are likewise convinced that the Renaissance or Enlightenment vocabulary is not adequte in many areas, that it has become anachronistic. What is at work here is a basic principle governing complex historical processes: the replacement of an existing vocabulary with a newer one which, as we come to realise sooner or later, is also inadequate as a means of describing reality. In this sense, vocabulary is a contingency as described by Rorty. It appears that we are constantly seeking a better vocabulary and never feel satisfied with the results of our quest.

Metaphors

The words and metaphors we use to describe the universe have a direct influence on our actions. Consider, for example, the popular metaphor that time is money. How did this become part of our culture? This saying is attributed to Benjamin Franklin, who supposedly advised a young merchant in this way. Without going into details, we can safely assume that this metaphor could have emerged only in specific conditions – when the passage of time came to be associated with the monetary economy. In order for this to happen, money had to exist, and an opinion prevalent in society on the value of time gau-

ged in relation to the value of money. Time had to acquire a certain value which allowed it to be associated with money. In a way, time assumed a concrete form subordinated to human actions and came to be seen as useful or otherwise to people, and this development had to take place in specific socio-economic conditions. This is why we now understand and experience time as something that may be invested, planned, squandered, saved, *etc*. (*Lakoff and Johnson 2003.8–9*). Needless to say, a metaphor of this kind occurring as a mutation would stand little chance of being accepted in a Pygmy or Stone Age society. Bearing in mind the preceding remarks on the mechanistic vocabulary, it is now clearer that it has more in common with machine technology than we normally assume.

Metaphors are "*fundamental mechanisms of the mind*" and they create social reality. George Lakoff and Mark Johnson argue that metaphors, usually combining to form networks of metaphorical texts and concepts, may function like road signs, guiding our future actions, which then, in their turn, may (or may not) correspond with our metaphors. Accordingly, if someone raised in the Western culture tells me that I am 'squandering my time', I should be prodded into action. Otherwise, I will not educate myself properly, find an attractive job, earn money, establish a family, buy a house, a car, a wide-screen TV or home cinema; I will not go on vacation – put simply, I will ruin my life! (*cf.* the 'time is money' metaphor.) A feedback mechanism is thus in operation here. If our actions conform to the metaphors we use, the potency of the latter will increase while we experience complete and satisfactory lives in tune with what we say about the world and how we perceive it. In this sense, metaphors may even be treated as self-fulfilling prophecies (*Lakoff and Johnson 2003.156*).

Blades 'made to measure': the issue of new Eneolithic technologies

The above inquiries into the nature of vocabulary inspired me to consider the issue in the context of prehistoric Europe. The Eneolithic period on this continent witnessed a technological breakthrough of a significance comparable to that of the technological revolution in historical times, accompanied by a matching revolution in social and economic relationships. No doubt this transition also led to the creation of new and momentous metaphors which in their turn triggered new senses and planes of communication. It goes without saying that the Eneolithic technology with the greatest potential for metaphors promoting new ways of looking at the world was metallurgy. Nevertheless, before the Eneolithic communities came to fully appreciate the properties of metal, many of their number resorted to an idiosyncratic flint technology, producing macrolithic implements. We must bear in mind that the intense development of the novel copper technology coincided with the peak period of this specific flint-working tradition. This intensification of flint technology usage may be interpreted as a specific response to the new metal technology to a limited extent only, and there is much to suggest that it was the other side of the same coin – of the production of catchy metaphors.

The Balkans

The ever intensifying activities of specialists (flint-workers/metallurgists) are best visible in the relics of the Balkan Eneolithic communities of the mid-5th millennium BC which are described in the literature as comprising the Varna culture. In addition to yielding metal assemblages of a richness quite extraordinary for the times, the Varna sites contained the first examples of macrolithic blades (also dubbed 'long blades' in the literature), this idiosyncratic invention of the Copper Age. It is here that the special flint-working techniques of production of this exceptional class of tools developed alongside intense copper production activities.

The macrolithic tools were detached from suitably prepared flint nodules using pressure techniques. While these techniques were known already in the Palaeolithic, new varieties now emerged, probably relying on special devices increasing the pressure applied to flint cores. Researchers and experimenters exploring this issue tend to agree that macrolithic blades could not have been produced using only the strength of human arms (*Manolakakis 2005; Pelegrin 2006; Migal 2006*). In order to strike off a blade of the required length, pressure had to be applied to the core with such precision and force as to be beyond the capabilities of a single person. The production of 40-cm blades thus required special devices comprising a vice and a lever or a press of some kind.

Numerous researchers studying the Copper Age in Bulgaria suggest unequivocally that blade dimensions were of major significance. The length of blades recovered from graves increases in step with the affluence of burials. The presence of long blades in

rich graves, contrasted with the many discoveries of less affluent or downright poor burials containing fragments which may be treated as blade imitations, clearly shows blade length to have been a characteristic with a special value for Eneolithic communities in Bulgaria (*Manolakakis 2005.230*). Tsoni Tsonev (*2004*) believes we ought to assume that members of Eneolithic communities had unequal access to the blade distribution system. This author believes that the macrolithic blades underscored the distinct lifestyles of their owners, and thus emphasised social inequalities. The owners of these blades and the tools made from them sanctioned their own social status by maintaining ties with the relevant production workshops – that is to say, with specialists who must have been very highly valued. The owners may also have controlled the blade production and distribution system itself. The subsequent redistribution and circulation of these artefacts could have then created subordination relationships and favoured the emergence of certain 'social identification groups'. Social evolution of this kind could have proceeded along the lines of the patron/client systems frequently described in ethnological literature (*cf. Douglas 1958*). The macrolithic blades may well have played a central role in a system of this kind.

North of the Balkans

In slightly later times the production of macrolithic blades was taken up, alongside intense metallurgical production, by communities inhabiting the Carpathian Valley and territories further north. It is believed that these were more mobile communities, relying considerably on animal husbandry. The best known and at the same time largest cemeteries from this period include Tiszapolgár-Basatanya in Hungary and Tibava in eastern Slovakia. The burial rites in these cemeteries were clearly dichotomous, reflecting the sex of the deceased. Men were buried in a slightly flexed position on their right sides, while the women rested on their left, although occasional departures from this rule were recorded in later periods. There were other burial rite features in addition to these cardinal ones. The male burials contain characteristic objects such as copper and lithic adzes and flint axes, albeit these are not found very often: copper adzes were recovered from one in sixteen male burials, with axes being slightly more frequent (*Lichter 2004.282*). Copper and gold ornaments are to be found in male and female burials alike.

Macrolithic flint tools were also characteristic of Tiszapolgár male burials in these cemeteries. Around one in five of these finds, made from imported Volhynian flint, are relatively large specimens, exceeding 10cm in length. Most of the macrolithic finds recovered from burial sites had been severely fragmented before being deposited in the graves. This is not to say, however, that the graves in question were modestly furnished. On the contrary, they were rich in metal artefacts and other valuable objects such as adzes, axes, wonderfully ornamented ceramics, and even gold. Let us take a closer look at them.

The most important thing to note is the distinct correlation between the numbers of blades in inhumations from that period with the abundance of other grave goods or, in other words, with the relative richness of the graves' furnishings (Fig. 1). While the rich graves yielded much greater numbers of blades, these were fragments rather than whole specimens. If we consider blade length distributions in rich and poor graves, the picture of blade fragmentation in the latter is not that clear. The blades in those graves represent the medium-sized categories, 5–8 and 10–14cm in length. The corresponding situation in rich graves is more clear-cut. These yielded very short fragments, 1–4cm in length, medium-sized specimens 7–10cm long, and 'decent' macrolithic blades measuring 16–22cm. Analyses show that classical burial characteristics such as ceramics quantities and numbers of artefact categories are correlated with the numbers of blades and blade fragments, but that there is absolutely no correlation with the lengths of the latter finds. The distribution of blade lengths presents a complex picture (Fig. 2).

These observations suggest that the metric characteristics of blades were subject to a specific selection process in the Eneolithic communities inhabiting the Carpathians, in the context of the social differences within these communities which are discernible in grave furnishings. The selection was related to the age of the deceased and the visible differences in the opulence of grave goods. One of the graves in Tibava (Slovakia) yielded 25 blade fragments of various lengths; this happened to be one of the richest of all the graves of the community in question, also containing gold objects, a copper adze, copper bracelets, and other artefacts (*Šiška 1964*).

So what exactly were the macrolithic blades found in graves left by the communities in the Carpathian Valley? Their interpretation as merely prestige objects could indeed explain some of the behaviours apparent in the material culture of the Balkan communities, but it is less helpful when we turn to the

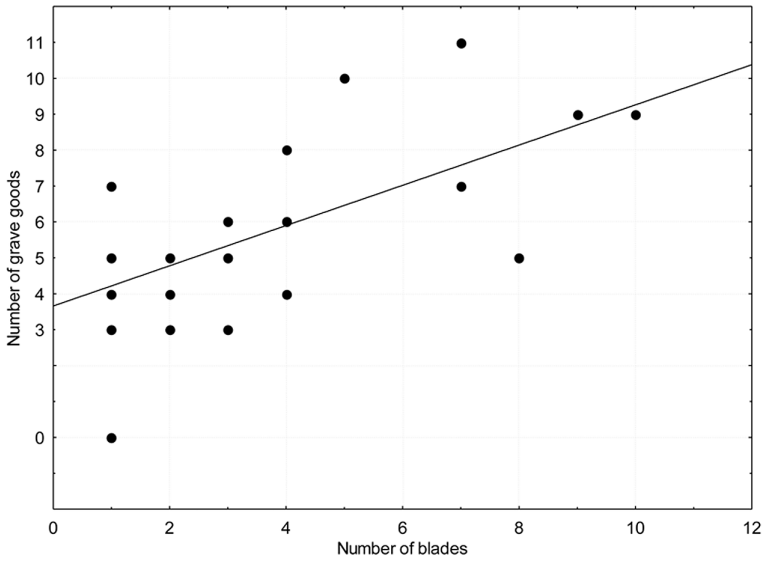


Fig. 1. Scatter diagram showing the relationship between numbers of blades and numbers of goods categories in Tiszapolgár graves in the Basatanya cemetery.

Carpathians, since it is the poor graves there which contain complete macrolithic blades, with the rich inhumations yielding only fragments of such artefacts. The occurrence of macrolithic blades in Varna did indeed correspond with rich burials. The Varna blades were longer and more regular in shape than similar specimens recovered further north in Europe. They were also distinct in that many of them had no traces of use. Researchers speculate that they were produced for use in burial rituals alone (*Manolakakis 2005.303*). The key to understanding the various relationships we are observing appears to be the phenomenon of blade fragmentation.

What is the purpose of fragmentation?

Fragmentation practices are in fact so widespread in Eneolithic cultures that we can regard them as a *signum temporis*, alongside a number of socio-economic transformations described by many authors. Chapman discussed this phenomenon in the context of Eneolithic materials from south-eastern Europe, contrasting two seemingly opposite trends – enchaining and accumulation – and examining their intensity in the prehistory of the region in question. The author perceives fragmentation as a special vehicle of social practice consisting in the forging and upholding of social ties: "*It has been argued that, throughout the Neolithic and Copper Age, the dominant form of social relations was constituted by relations of enchainment – whether through genealogies or exchange networks – which were underpinned by analogous social practices involving artefact fragmentation (...) The enchainment of social relations using fragmentary objects is the only hypothesis which attempts to explain the widespread distribution of fragments of objects*" (*Chapman 2000.74*). Relations of enchainment and accumulation, however, are in Chapman's study connected to objects made of clay and copper. The fragmented spondylus shell rings from cemeteries like Varna and Durankulak, which are supposed to reveal enchained relations constitute another example "*linking the domain of the living and the domain of the dead*" (*Chapman, Gaydarska and Slavchev 2008. 158*).

Paradoxically, the phenomenon of fragmentation is more readily discernible in the macrolithic flint industries of Eneolithic cultures such as the Tiszapolgár, the Lublin-Volhynian, the Funnel Beaker, or the Globular Amphorae; this is because of the different technological properties of the raw materials involved. In one of her studies of macrolithic blades, Zakościelna turned her attention to the fragmentation of these artefacts in Lublin-Vohlynian culture. She immediately noticed that the blades had been frag-

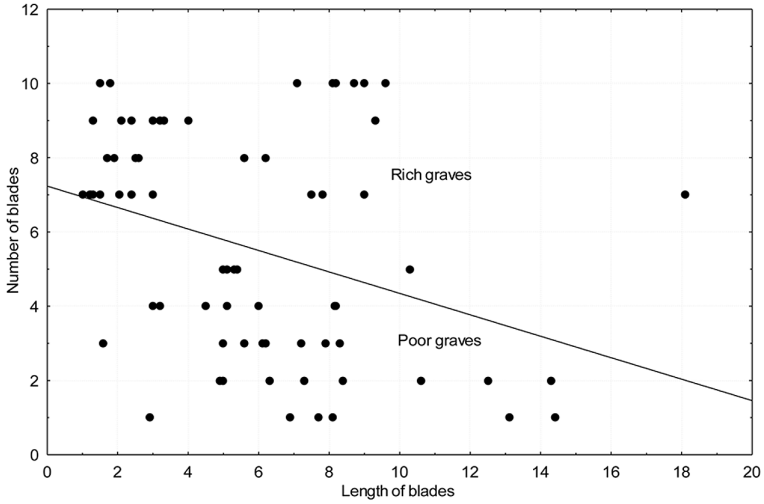


Fig. 2. Scatter diagram showing the relationship between numbers of blades and blades length in Tiszapolgár graves in the Basatanya cemetery.

mented in accordance with clear-cut rules, but based on the materials in hand, she could not determine whether they were divided into three or four fragments. Could both methods have been employed simultaneously? We know that blades of this kind were used and often refashioned, and this hinders precise observations of blade fragmentation in assemblages recovered from the settlements studied (*Zakościelna 1996*).

Dividing a long blade into four fragments appears to make more sense from the economic point of view. This can be done simply be snapping a blade in half, and then again halving the two fragments. The blade fragments thus obtained can still be used to produce substantial tools measuring 4–6cm of a kind that were universally used throughout the Younger Stone Age. In fact, most end-scrapers, a very popular implement used by Eneolithic people, were of this size. It was also possible to snap off the distal or proximal end of a blade, thus shortening it somewhat, but still leaving an implement more than 10cm long.

Eneolithic graves known from Volhynia, the region exporting flint to the Carpathian Valley, also contain fragmented blades resembling those recovered from the mentioned Tiszapolgár cemeteries in terms of structure. However, this observation needs to be elaborated on. Comparisons of inventories from the two regions clearly show differences in this respect: small blade fragments visibly predominate in Hungarian cemeteries, while larger fragments prevail in Volhynian cemeteries. There are, of course, diverse other cultural differences between the two traditions noted in the specialist literature, but both communities employed identical dimensional classes of blades – the only difference being that the respective burials of the two traditions contained these implements in reverse proportions. One cannot avoid the impression here that although the two cultures employed the same method of selecting metric parameters of blades, they performed this selection 'from different viewpoints' as it were (Fig. 3, Tab. 1).

One common feature of the two communities is the identical approach to blade fragmentation. Statistical analyses of the lengths of blade fragments recovered from cemeteries of these communities show that a division into four parts was the preferred option (*Dzbyński 2008.Fig. 44, 45*). Based on the figures in Table 1, we can assume, for example, that this dialectic approach to fragmentation could have been due to the different contexts in which the exchange of flint raw materials or other goods took place. Andrew Sherratt (*1982*) suggests that an exchange network of the centre-peripheries type functioned in the Carpathian Valley, in which sheep played an important role. This type of exchange is also apparent in the case of imports of good-quality Volhynian flint (Tab. 1).

New words and metaphors

From the observations so far, it would appear that the macrolithisation of flint tools in Eneolithic communities in Europe was the result of an increasing manipulation of blade length within important social communication contexts. While in the previous period, tools were made from blades which were small from the outset (4–6cm), later we see evidence of a widespread practice involving the proportional fragmentation of macrolithic blades on the one hand and the selection of blades according to their metric characteristics on the other. Let us now consider macrolithic blade fragmentation in the context of vocabulary, which is what we are attempting to explore in this work.

The production of macrolithic blades along with all the related issues, such as the organisation of tools and blanks production, the fragmentation and repeated refashioning thereof, and selection according to metric characteristics – all of this was no doubt reflected in linguistic communication or, strictly speaking, in what the philosopher Jürgen Habermas (*1984*) referred to as linguistic coming to understanding. In the Eneolithic vocabulary, there must have evolved words, concepts, and grammars that served processes which involved manipulations of blade tools that were much more complex than before. It is likely that there was a way of distinguishing between the macrolithic and the non-macrolithic, and we can also assume that there emerged a new linguistic system of coming to understanding that served to handle the entire process of manipulating macrolithic blades – a new vocabulary which must have introduced designates of basic division principles into the existing system of linguistic communication,

Carpathian Valley/ Tiszapolgár culture	Volhyn/Lublin-Volhynian culture
import	export
centre	periphery
small (even?) fragments	large (odd?) fragments

Tab. 1. Elements of the dialectical relationship between the Tiszapolgár and Lublin-Volhynian cultures (*Dzbyński 2008.134*).

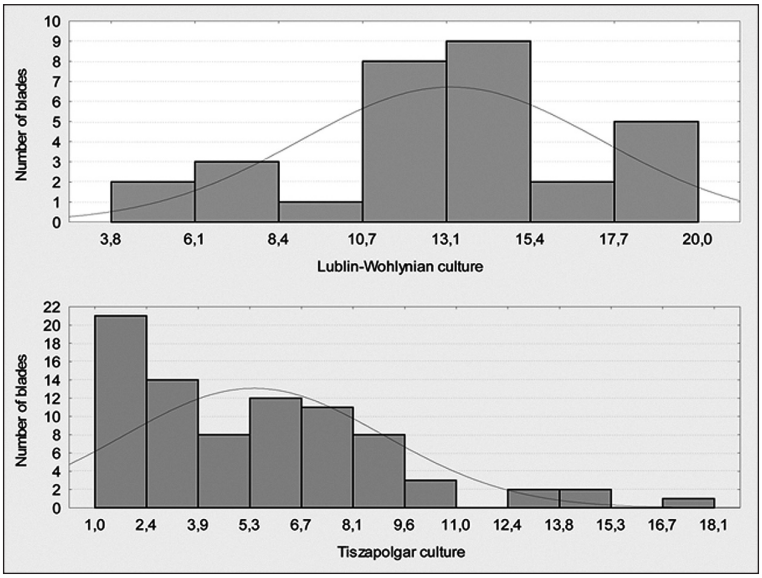


Fig. 3. Histogram comparison of blade lengths in the Lublin-Volhynian (top) and Tiszapolgár (bottom) cultures.

such as the concepts of quarter, half, three-quarters, *etc*. The archaic model of communication involving the rooting of exchange activities in ritual and narration alone ceased to suffice, and the simple comprehension of the principles of proportion, *i.e.,* the rational concept of measure, emerged as a new and extremely important plane of communication. It would therefore appear that in the Eneolithic, macrolithic blades were not just tools, but also – or perhaps first and foremost – special manifestations of precisely formulated messages serving to depart, in certain situations, from interminable verbosity, references to mythology, *etc*., by employing measures and numbers. In other words, the macrolithic technology, being an idiosyncratic product of the activity of specialists, became a vehicle for numerical and metrological messages previously unknown in this part of Europe.

The metaphor of the blade

Helena Knuttson (*2003*) noted that Paleolithic and Mesolithic blades were treated quite differently from blades dating to later periods. She proposed the following model of evolution of the blades' significance in Mesolithic and Neolithic communities in Europe. During the Palaeolithic and Mesolithic in Europe, blades which were used on an everyday basis to perform ordinary chores were deposited in graves as individual or collective property. The significance of these artefacts appears to have changed in the Neolithic, when blades came to represent the "*most important tasks"* or those (no less respected) relating to *"tasks brought by the ancestors*", namely agricultural activities. Now, if they are not found in graves, they are deposited in the ground in a special manner ensuring that the end product tends to become separated from production traces (*Knutsson 2003*). In fact, these tendencies are apparent in deposits dating from that period.

Bearing in mind the way in which blades were treated, Knutsson suggests that in the Eneolithic they were perceived and used as specialised products, manufactured in a systematic manner in a distinct socio-cultural context (in specialised settlements), which is why they served as important symbols among grave goods, representing the desires of the buried individuals and their loved ones. Knutsson develops this idea, proposing that these blades, distributed over a large area, could have served not only as tools used in agricultural production but also as a kind of 'metaphor' for the idea of agriculture. In light of what has been said so far in this study, one might also add that the blades could have simultaneously served as a metaphor for personal success.

If we were to assume that the social reception of macrolithic products was to a certain extent abstract, we would also have to see this process as indicative of an increasing rationalisation of the Eneolithic communities' universe. This model of thought may very well serve to explain the sublimation of the blades' meaning (their symbolisation due to increasingly abstract contexts of use) and the emergence of a new semantic field taken up by a certain abstract concept – a metaphor capable of communicating contents which were immanently tied to the desires of the Eneolithic people.

We must bear in mind that the first and foremost reason for the intense interest in macrolithic artefacts produced by specialists was metal. In the Eneolithic, metallurgists and flint-workers performed largely identical roles. Budziszewski (*2000*) demonstrates that in the Eneolithic, both flint production and metallurgy lost their significance as 'universal social indicators'. While specialised production centers may have operated within diverse cultures and communities at different times and in different places and home production was susceptible to different trends marked by an increasing reliance on local

raw material sources, the phenomenon of flint production traditions typical of particular societies was replaced by numerous local variants, often displaying considerable degrees of variation. This new quality in flint production organisation and in the use of flint tools which were now being repeatedly refashioned, no longer fits the traditional concept of flint industries characteristic of specific communities or cultures, and the structure of flint production organisation becomes identical with that of metal production organisation. The new organisational model also requires a new methodological approach (*Budziszewski 2000.326*).

One solution here may be the acknowledgment that Budziszewski's outline of the evolution of flint economy also reflects a social evolution involving the emergence of new area of rationalised social communication in which arguments, norms, measures and metaphors of supra-regional significance played a major role. Both the copper and macrolithic artefacts were bearers of messages of these kinds, which forced individuals wishing to participate in social life and in exchanges of valuable objects to transcend the local mythological and narrative traditions which were dominant features of hunter-gatherer communities. Now it was no longer enough to be familiar with the mythology and traditions of one's own community to take part in the exchange of goods – one also had to know how to measure, count and calculate.

That said, more time had to pass in regions where metal became a permanent feature of culture and social discourse before there developed more rational concepts, better suited to the specific properties of metal, namely abstract measures. Macrolithic flint artefacts blocked this avenue of development – since stone does not lend itself to treatment in terms of weight proportions – but they served a very useful role in the intermediate stage marked everywhere by the fragmentation of blades and other macrolithic artefacts. While there is no doubt that accompanying the blades was a wide range of concepts and emotions relating to the new technology and exclusivity, the fact that the blades could be measured in the context of social relationships meant that these artefacts acquired new, previously unknown values. One must assume that the macrolithic artefacts were also elements of the extraordinarily elaborate mythologies which did not disappear immediately with the advent of the Eneolithic, but which had ceased to be the only reference available.

Abstraction in the lives of hunter-gatherer communities took the form of analogising symbols and symbolic graphic thought. The macrolithic artefacts, however, are clear evidence of the emergence of a hitherto unknown manner of abstract thought which definitively ceased to rely on images of any kind and which underlies mathematical thought as we know it today. Macrolithic artefacts also mark the first stage of reality valuation in terms of media, *i.e.,* rationally measurable and calculable terms, a process which eventually led to the creation of money (*Dzbyński 2008.101–103*). In the initial stage of the development of metallurgy in Europe, before the emergence of the concept of abstract metal measure, these artefacts were a characteristic bridge between two manners of perception: they continued to be measurable in a tangible fashion in times when the weight of metal was still a mystery. Until rational methods of assessing the value of metal using standard-weight bars were developed, metal was subjected to intense fragmentation, especially in regions where copper artefacts were produced, which is not so much evidence of an increased intensity in ritual activities as of intensely developing discourse, which led to a more rational perception of the essence of metal towards the end of the Eneolithic period (*cf. Dzbyński 2008.238–243*). In Europe, metal bars were already in widespread use by the early stages of the Bronze Age, with macrolithic artefacts remaining as a kind of alter ego of metal.

Let us take a look at the macrolithic blade. In terms of shape, it resembles a thin strip of matter which is roughly identical when viewed from any angle. Because of the production technology involved, these blades were much simpler than blades produced using home techniques; they were not curved and their distal end resembled the butt end, since the pressure technique used did not create a distinct thickening of the latter. The form of these blades was simple, homogeneous and geometrised. The mental image of this type of artefact would be similar to that of a 'bar' (Fig. 4).

Mr. Blademan: new vocabulary – new power relationships

It seems logical to assume that the employment of metrological messages was not without effect on what these messages referred to, or on the context in which macrolithic artefacts frequently occurred. As we could see, these messages referred to, first and foremost, people and described interpersonal relationships. It seems that the production and ex-

change of macrolithic artefacts led to the development of a new vocabulary and grammar serving, among other things, to describe the social inequalities discernible in Eneolithic communities. We observe numerous changes in the social structures of the period: the already mentioned escalation of social inequalities, the disintegration of large families, the emergence of inter-group hierarchies and individualised exchange relationships, the appearance of personal property, *etc.* (*Sherratt 1997*). All of these changes may be seen as consequences of departures from the prevailing archaic worldview, in which the participation of humans and things in culture was conditional on their inclusion in the structure of a mythological-narrative order. The measures and numbers which were being implemented in socio-economic relationships with ever-increasing force were the media which disrupted the old social fabric and helped weave a new one. For instance, the macrolithic artefacts could have communicated – or indeed described in a concrete manner – the calibre and importance of their owners, which in turn could have described (literally or metaphorically) the owners' rank within Eneolithic communities. In this way, the new metaphors began to give shape to a new society. This was a system using a hierarchy of measures. In other words, bearing in mind the suggestions above, we can imagine that macrolithic blades could have introduced to society a system of concepts and metaphors relating to social inequality. A new form of expressing inequality was born.

In the early stages of Neolithisation, long-range exchanges of exclusive goods and flint artefacts were very much a part of ritual or gifts exchanges (*Chapman, Gaydarska and Slavchev 2008; Müller, Herrera and Knossalla 1996; Zimmermann 1995*). A reverse mechanism came into play in the case of the macrolithic blade technology. Even if we make the reasonable assumption that a blade of this kind was a vehicle for narrative content (in which case, one had to be familiar with the myths and rituals of a given tribe in order to use it and take part in exchanges involving it), the diverse possibilities of manipulating its length in interpersonal contacts lent it a new medial content, an added value as it were, which could have altered the contexts of its use so quickly and effectively that myths and rituals could no longer have kept up with the pace of change. This is why we observe such diverse applications of the blade fragments deposited in graves across such a wide spectrum of Eneolithic communities. Exchanges of blades were less and less often elements of ritual and gifts exchange ceremonies, and more and more often elements of transactions involving numerical calculations. Exchanges of the latter kind were conducive to individualisation, which is why we see more and more of the latter in the Eneolithic, accompanied by an increasing activity of younger individuals. Mr. Blademan – a producer, disposer and the principal figure in the exchange system – became an active and creative element of the social structure.

An interesting example in the above context are those graves of Tiszapolgár culture from Vel'ké Raškovce and Tibava which contained flint nodules (*Lichardus-Itten 1999*). These were the richest graves, containing numerous ceramic vessels, copper artefacts, and status symbols like copper axes. The flint nodules, from Vohlynia, the area of Lublin-Vohlynian culture, symbolised wealth, as well as connections to the desired raw material. In the framework of this paper, one can add that the flint nodules also represented an enormous amount of flint blades, the kind of quantity which is virtually uncountable and which in our times until quite lately functioned in the metaphorical sphere for a millionaire (*Canetti 1960*).

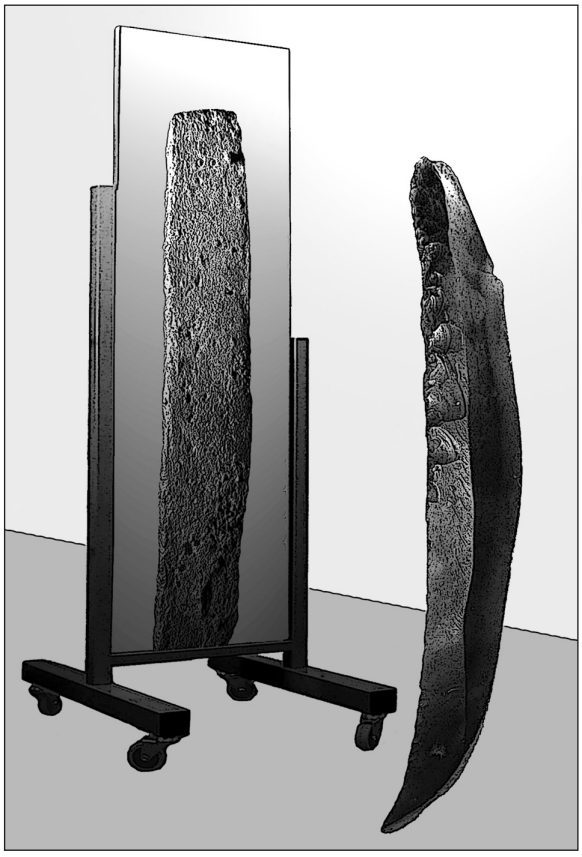


Fig. 4. Macrolithic blade could be viewed as standardised portion of valuable material, presenting thus a prototype of a metal bar.

The macrolithisation of flint tools was not restricted to Central and Southern Europe, but was a much more far-reaching phenomenon, which makes it a characteristic sign of the times. Macrolithic blades had also been produced since the beginning of the Neolithic in the Near East, where they are known as Canaanite blades, and in Greece, but little is known about them. Implements of this kind are also known from the Iberian Peninsula, Sardinia and Malta. Similar activities are also in evidence in western Europe. Today's France was inhabited in the Eneolithic by Chassey communities, which also included groups of specialised craftsmen exploiting flint in subterranean mines. Workshops producing macrolithic blades have been discovered in Grand-Pressigny in France. These produced implements which were subsequently distributed throughout the area which is today's France, Holland and Switzerland. Flint extraction using complex mining methods was a characteristic feature of this period. In places where metal was hard or even impossible to come by for reasons which are not entirely clear, people specialised exclusively in flint mining and the production of idiosyncratic objects of special significance, such as macrolithic blades or axes. To conclude, let us point out once again that in terms of impact on the development of vocabulary and metaphors, this technology represented a dead end, since at that point in time, the future already belonged to metallurgy and, later still, to machine technology. But for Eneolithic Europe, macrolithic technology was the very part of the cognitive development process – in which the material culture played a defining role – that was about to alter the ancient narrative mode of communication into a more rational one, based on number and measure.

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Different ways of using space: traces of domestic and ritual activities at a Late Neolithic settlement at Sormás-Török-földek

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ABSTRACT – *The present paper studies questions of the use of space in various ways on the basis of data obtained from a site at Sormás-Török-földek. The significance of this site lies in the fact that two enclosures were excavated here which differ in character, but which are in a close relationship physically and chronologically. They demonstrate precisely the radical change, which took place in the mode of space-use, representing two important stages of the progression as a result of which the separation of territories used for domestic and ritual activities were physically manifested.*

IZVLEČEK – *V članku predstavljamo različna vprašanja o rabi prostora na različne načine, in sicer na podlagi podatkov iz najdišča Sormás-Török-földek. Najdišče ima poseben pomen predvsem zato, ker sta bili tukaj odkriti dve ogradi, ki imata različne značilnosti, vendar sta v tesni povezavi tako fizično kot kronološko. Predstavljata natanko tisto radikalno spremembo, ki se je zgodila v načinu rabe prostora, in dve pomembni fazi napredovanja, zaradi katerega se kažejo dejanske ločitve prostorov za gospodinjske in ritualne dejavnosti.*

KEY WORDS – *roundel; Late Neolithic; domestic; ritual; archaeo-astronomy*

Introduction

The present paper studies the various uses of space in a Late Neolithic settlement based on data obtained from a site at Sormás-Török-földek, in Southwest Transdanubia (Fig. 1.1–2). We try to show, on the one hand, archaeological records related to activities connected with domestic life, and those finds and phenomena, on the other, which cannot be interpreted in secular terms, or notedly ritual, which are assumed to be religious in character. The domestic features are common to Neolithic settlements: buildings, pits and ditches with various functions and forms, such as dwellings and smaller buildings (probably of an economic character), fences, sheepfolds, refuse pits, storage pits, large pits for mining clay, fireplaces, ovens, and empty spaces between houses, *etc*...

We primarily investigate ways of using space especially in terms differences between domestic/mundane and sacred/ritual spheres. Analysing the different zones of activity on the strength of finds is not our aim, since most of the material has yet to be processed. Most of the religious features relate to enclosures. As one can see, the settlements of the Sopot and Lengyel cultures, with two round enclosures (roundels) at the Sormás-Török-földek site (Fig. 1.3–4) have yielded enough data to study this problem.

Sormás is a small village in the South-western part of Transdanubia, 6 km west of Nagykanizsa. Sormás-Török-földek (79)[1] lies on the southern side of a North-South oriented natural elevation, about 187m above sea-level. The Mántai Stream borders this elevation to the east. The archaeological site here (710)[2] is situated on the opposite bank of the stream (Fig. 1.1), on the southwestern slope of another natural elevation, with an elevation above sea-level somewhat lower (184.5m). These two sites are very

1 Identifying number of the site used in M7 motorway project conducted by the Zala County Museums.
2 See footnote No. 1.

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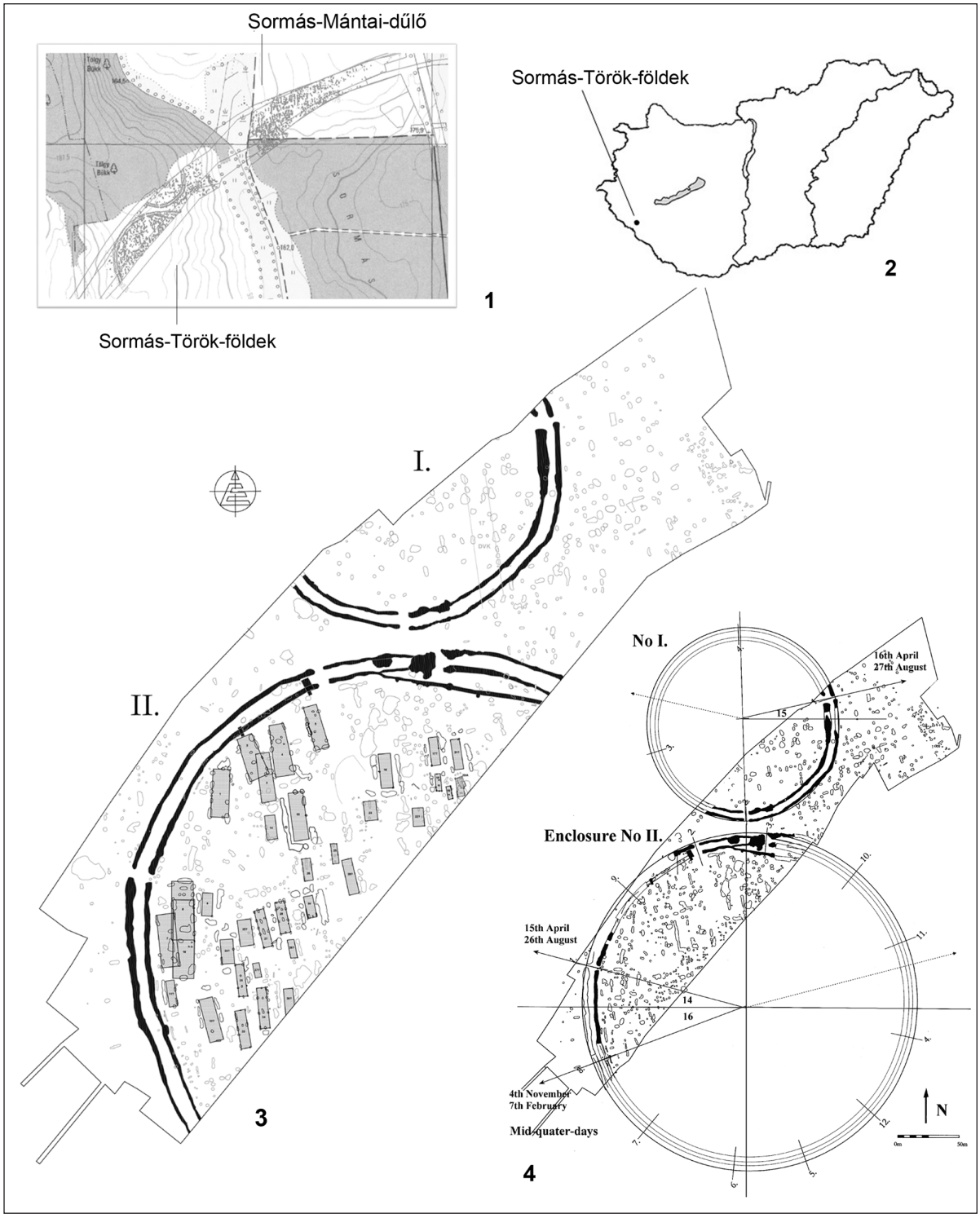


Fig. 1. 1 geographical location of the sites at Sormás-Török-földek and Sormás-Mántai-dűlő. 2 geographical location of the site at Sormás-Török-földek, South-western Transdanubia. 3 map showing all the excavated features at Sormás-Török-földek (2002–2003; 2005–2006). 4 reconstructed ground-plans of the two Neolithic Enclosures at Sormás-Török-földek (after* Barna and Pásztor 2010*).

close to each other not only physically, but also chronologically and culturally.

While the general character of the site has already been described (*Barna 2007*), we will provide a general outline here. The high point of settlement at the site came at the end of the Middle and the beginning of the Late Neolithic period, during the inhabitation of the Sopot and Lengyel cultures. Among other prehistoric cultures, Starčevo and TLPC (Trans-

danubian Linear Pottery) cultures are also represented at the site.

The history of settlement at Sormás-Török-földek

Four different habitation phases can be distinguished in the site. The earliest phase comprised Starčevo culture settlements (the first habitation phase). The Starčevo culture established two different settlements on both sides of the hill at Sormás-Török-földek (Fig. 2)[3]. The finds of both these settlements can be dated to the beginning of the late phase of the culture (early Spiraloid B phase) (*Barna 2010*).

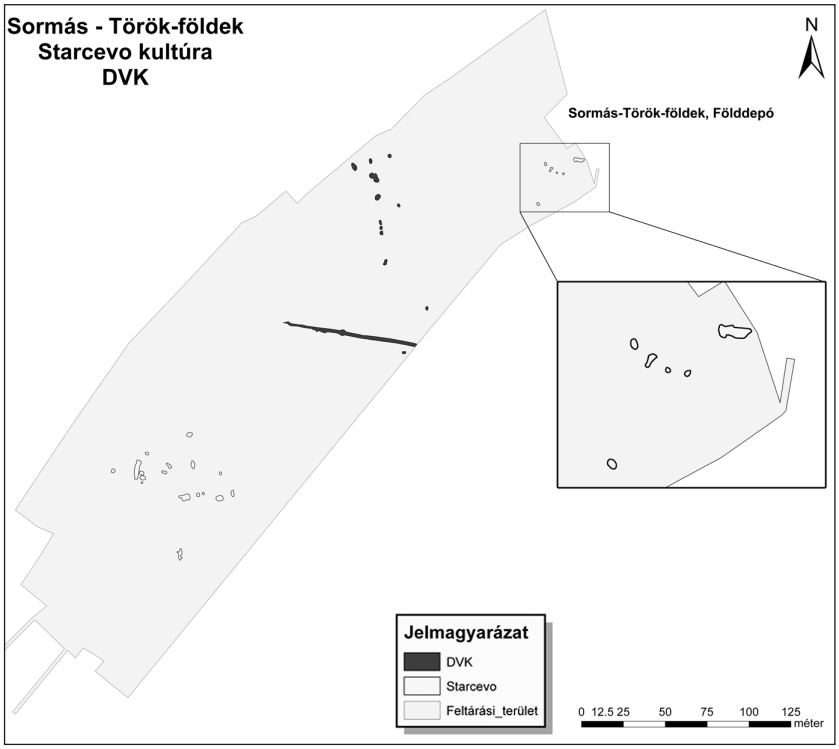


Fig. 2. The site at Sormás-Török-földek during the first and second settlement phases – Starčevo culture TLPC, respectively.

The next occupants were among the people of the Keszthely group of the Central European (Transdanubian) Linear Pottery Culture (TLPC) (the second habitation phase). Only a few settlement features of this phase could be identified – among them various kinds of pit and the site of a long house – since most of the settlement features were destroyed by building activity in later periods (Fig. 2). The location of the house was identified on the basis of the location of pits (the so-called 'Längsgrube') on both longitudinal side of the house. This isolated house stood in the southern area of the later enclosure No. I. It was probably part of a homestead. Small, scattered homesteads were also elements of the settlement network of the TLPC, like villages of various sizes (*Bánffy 2004a.10*). Using the model outlined on the settlement structure of the ALPC by László Domboróczki[4] (*Domboróczki 2009.99–103, Fig. 16; 2010*), the big TLPC settlement in the neighbouring site at Sormás-Mántai dűlő may be considered as a *mother* or *central settlement*, and the small one recovered in the site at Sormás-Török-földek may be interpreted as a *satellite* or *daughter settlement*. Being aware of the dense settlement structure of the TLPC in the vicinity of Sormás and in the southern part of Zala county, we found this model a well adaptable one. Some sections of the ditches in enclosure No. II date to this habitation phase, especially the straight section in the north-eastern area of the enclosure (Feature 38). It can be seen in the hollow-shaped cross-sections of the ditches and is also supported by the find material recovered here. The nature of the relationship between the long house and this ditch is not yet clear.

The third and the fourth habitation phases are associated with the Sopot (Fig. 3) and early Lengyel (Fig. 4) cultures. These phases were closely linked, as were the two cultures. The cultural and chronological connections between the phases are reflected in the context of the two enclosures. The find material, primarily the pottery, suggests that it is not possible to draw a categorical dividing line between them.

Relative chronology

A general chronology of the Sopot and Lengyel settlements in the site at Sormás-Török-földek has already been published (*Barna 2007.366–367*). The

3 The maps showing all the excavated archaeological features during different settlement phases were made by István Eke (Hungarian National Museum). Hereby I would like to thank him for his work!

4 He outlined a model according to which the settlement structure of the ALPC is constituted of bigger settlements called *mother* or *central settlements* and of small ones encircling the bigger ones. These latter ones are named *satellite* or *daughter settlements*. The bigger settlements are situated 2-3 kilometres from one another, and enjoy the most favourable geographical conditions.

Sopot settlement at the site (third settlement phase) is considered supposed to have been of long duration. The date of occupation partly overlaps with that of the neighboring settlement at Mántai-dűlő, the latest phase probably being somewhat younger. There were at least two Sopot culture inhabitation phases at the Mántai-dűlő site, and three at the Török-földek site (settlement phases 3a1, 3a2 and 3b) (*Barna 2010*). The chronological difference between the two sites can be seen in the general characteristics of the pottery, primarily in the frequency of red and yellow painted ornamentation. The high number of finds considered to be of ritual character (Fig. 5)[5] – especially in the Mántai-dűlő – compared to the Slavonian and Croatian Sopot sites, could have been due to a characteristic of the late phase of Sopot culture, and is typical in South-western Transdanubia (see also Petrivente and Sormás-Török-földek). Most of the Sopot figurines are in a seated posture, although at least two standing figurines[6] (Fig. 5.8a–d) (*Barna 2009a*) have been identified. At both sites at Sormás, most of the Sopot material finds are of Brezovljani type. The radiocarbon dates for the Sopot features of the site can be found in Table 1.



Fig. 3. The site at Sormás-Török-földek during the third settlement phase – Sopot culture.

At the Török-földek site, the longer Sopot occupation may be attested by the relatively greater diversity of house types. Occupation was concentrated within enclosure No. II; the houses of the third settlement phase did not extend over the ditches of the enclosure in any sub-phase. During the heyday of the Sopot settlement, not only single places of houses could be determined, but some household clusters consisting of the unity of a dwelling and a smaller, accompanying building of probably economic function (*Barna 2010.Fig. 6.1*).

During the lifetime of the settlement of the early Lengyel culture found at Sormás-Török-földek (fourth settlement phase) at least two sub-phases (sub phase 4a and 4b) can be distinguished. The earlier subphase (sub phase 4a) can be identified both chronologically and culturally as the 'Sé horizon of the Lengyel culture' after the eponymous site of Sé, Western-Transdanubia (*Barna 2010.98–100*). Recently, Nándor Kalicz described this period as the formative phase of Lengyel culture or Lengyel 1a (*Kalicz 2007.35–36*). In this sub-phase, we found among the most characteristic finds a number of Sé-type anthropomorphic figurines (Fig. 7. 5–6, 8–15) and a torso of a Sé-type miniature anthropomorphic vessel (Fig. 7.7a–b). Enclosure No. I was constructed at that time and was used only in this settlement phase. The dwelling-houses of this phase were still being built inside Enclosure No. II.

5 Photos were taken by József Bicskei (Hungarian National Museum). Hereby I would like to thank him for his work!
6 The other piece of find is yet unpublished.

Radiocarbon dates callibrated by the OxCal 4.1 programme and IntCal 09 curve:							
Name of the site	**Code**	**BP**	**Callibrated ages (cal BC)**		**Sample**	**Archaeological feature**	**Bibliography**
			1 σ	**2 σ**			
			(68,2 %)	**(95,4%)**			
Esztergályhorváti	OxA–6274	5730±80	4690–4490	4780–4370	human bone	common grave, Lengyel, formative phase	*Bronk Ramsey 1999.202*
Esztergályhorváti	OxA–6208	5900±75	4900–4680	4960–4550	human bone	common grave, Lengyel, formative phase	*Bronk Ramsey 1999.202*
Esztergályhorváti	OxA–6273	5925±65	4900–4710	5000–4610	human bone	common grave, Lengyel, formative phase	*Bronk Ramsey 1999.202*
Esztergályhorváti	OxA–6271	5970±90	4960–4720	5210–4610	human bone	common grave, Lengyel, formative phase	*Bronk Ramsey 1999.202*
Esztergályhorváti	OxA–6275	5970±70	4950–4770	5050–4700	human bone	common grave, Lengyel, formative phase	*Bronk Ramsey 1999.202*
Esztergályhorváti	OxA–6367	6040±55	5010–4840	5210–4780	human bone	common grave, Lengyel, formative phase	*Bronk Ramsey 1999.202*
Esztergályhorváti	OxA–6272	5990±80	4990–4790	5210–4690	human bone	common grave, Lengyel, formative phase	*Bronk Ramsey 1999.202*
Sormás–Török-földek	VERA–3538	5855±35	4780–4690	4830–4610	animal bone	Feat. 93 (Lengyel), pit	*Barna 2007.367*
Sormás–Török-földek	VERA–3539	5865±40	4790–4700	4840–4610	animal bone	Feat. 376 (Sopot), pit	*Barna 2007.367*
Sormás–Török-földek	VERA–3098	5970±35	4910–4790	4950–4720	animal bone	Feat. 376 (Sopot), pit	*Barna 2007.367*
Sormás–Török-földek	VERA–3097	5950±35	4900–4780	4940–4720	animal bone	Feat. 259 (Sopot), pit	*Barna 2007.367*
Sormás–Török-földek	VERA–3535	6065±45	5050–4850	5210–4830	animal bone	Feat. 259 (Sopot), pit	*Barna 2007.367*
Sormás–Mántai-dűlő	VERA–3101	5985±35	4940–4800	4990–4780	animal bone	Feat. 202 (Sopot), pit	*Barna 2007.367*
Sormás–Mántai-dűlő	VERA–3103	6045±50	5010–4840	5200–4790	animal bone	Feat. 369 (Sopot, House 7), pit	*Barna 2007.367*
Sormás–Mántai-dűlő	VERA–3102	6115±35	5210–4980	5210–4940	animal bone	Feat. 316 (Sopot, House 4), pit	*Barna 2007.367*
Sormás–Mántai-dűlő	VERA–3099	6200±35	5220–5070	5300–5040	animal bone	Feat. 53 (TLPC, Keszthely group), pit	unpublished
Sormás–Mántai-dűlő	VERA–3100	6325±40	5360–5220	5470–5210	animal bone	Feat. 108 (TLPC, older phase), pit	unpublished

Tab. 1. Radiocarbon dates from the sites at Sormás-Mántai-dűlő, Sormás-Török-földek and Esztergályhorváti, Southwestern Transdanubia. Dark grey refers to the TLPC, grey to the Sopot culture, and light grey to the formative phase of Lengyel culture.

The early Lengyel culture settlement is supposed to have been long lasting, and it may be presumed that it survived the initial phase of the culture (sub-phase 4b). This means that the youngest features of the settlement may be dated to the transition between phases Ia and Ib (or even to the beginning of Lengyel Ib) (Fig. 8). It is mainly the features in the territory enclosed by the northern roundel and the features in superposition with the roundel that represent this period. The typical finds of this time horizon – among others – are Olad-type anthropomorphic figurines. Olad-type find material is named after a site at Szombathely-Oladi-plató, Vas County, which is considered to be chronologically the immediate continuation of the Sé site. It is called the 2nd stage of the formative phase (*Kalicz 2006; 2007. 37–39; 2009*). The find material from this site is still similar to that of the Sé horizon, but there are some significant differences. An outstanding find of this cultural phase is a fragment of a large, mushroom-shaped vessel, richly painted in red and yellow (Fig. 9.9a–d). This vessel is of outstanding importance, since it bears a symbol comprising multiple concentric circles painted in yellow (Fig. 9, 9b); and concentric circles are often interpreted as cosmic or sun symbols.

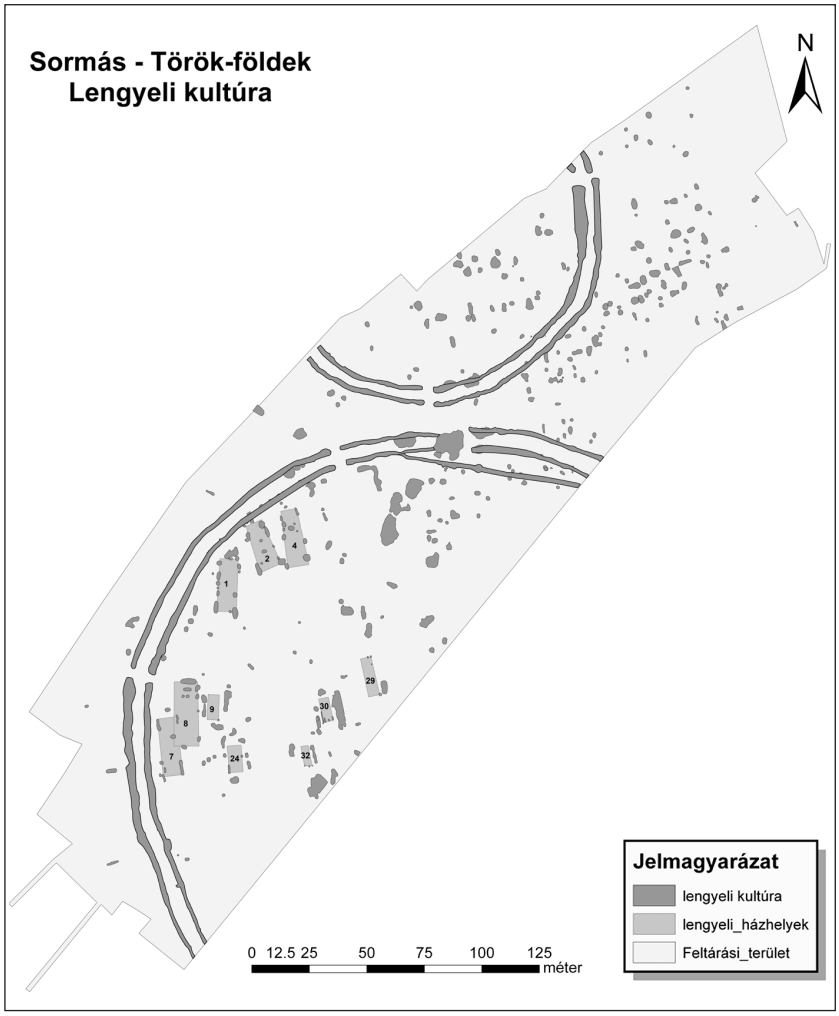


Fig. 4. The site at Sormás-Török-földek during the fourth settlement phase – formative and early phases of Lengyel culture.

Absolute chronology. Radiocarbon dates

The radiocarbon dates obtained from the sites at Sormás–Mántai-dűlő and Sormás–Török-földek are collected in Table 1[7]. Some refer to Sopot, and some to the formative phase of Lengyel culture, and two dates refer to the TLPC. The dates of the TLPC (both that of the elder phase and of the Keszthely-group) clearly diverge from the others and are in fit well with data concerning the TLPC published recently by Bánffy and Oross (*Bánffy, Oross 2009.234–235*). As can be seen also in the chart (Fig. 10), the dates referring to the Sopot and the Lengyel cultures are very close to each other; some of the Sopot dates cover those of Lengyel culture. This problem has also been noted at other sites in South-western Transdanubia (*Kalicz* et al. *2007.44*). Of the dates that overlap, only the earliest dates of the Transdanubian Sopot culture, which go back to the end of the 6th millenium BC do not fit – as emphasised by N. Kalicz. As for comparative dates referring to the formative phase of Lengyel culture, we use the dates of a unique find assemblage from Esztergályhorváti, in Zala county (*Bronk Ramsey 1999.202–203*), which is a common grave of the same period (*Barna 1996*), from which a sequence of seven dates can be constructed (*Stadler, Ruttkay 2007.Fig. 1*). The early Lengyel cultural context of the common grave was identified on the basis of the ceramic finds in the assemblage (Fig. 11).

7 Hereby I wish to thank Krisztián Oross (Archaeological Institute, HAS) for his useful help.

Archaeological features of domestic character

The archaeological features of domestic character at the Sormás-Török-földek site can be considered typical of a Late Neolithic settlement in Transdanubia, for except the concentric, double round ditch-system (Enclosure No. II) encircling the Sopot settlement. It is not the erection of a ditch-system itself that is exceptional, but its completely regular, circular ground-plan, and the gates which are oriented in astronomically determined directions (*Barna 2007.369–370; Pásztor, Barna 2009.1, kép 1; Barna, Pásztor 2010*). These characteristics – among others – suggest that Enclosure No. II might be interpreted not only as a



Fig. 5. Characteristic Sopot finds considered to be of ritual significance. 1–9 Sormás-Mántai-dűlő. 10 Sormás-Török-földek.

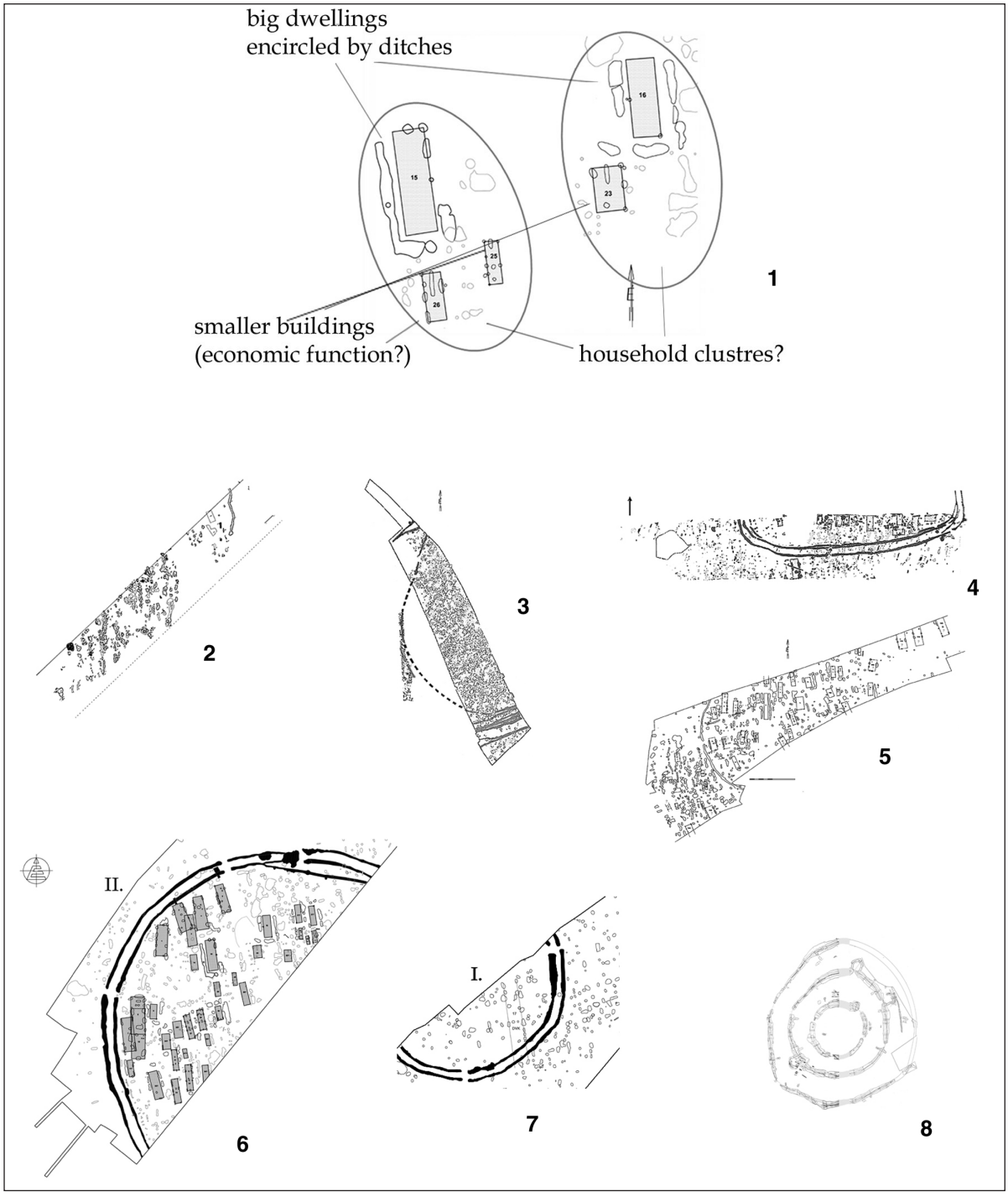


Fig. 6. 1 Hypothetical household clusters at Sormás-Török-földek. Sopot culture (after* Barna 2010.Fig. 10.1*). 2–8 maps showing all excavated features at Middle and Late Neolihic sites, South-western Transdanubia, representing certain stages of the 'process of demarcation'. Numbers refer to Table 2.

ditch-system enclosing the settlement (see details below).

Dwellings (Fig. 1.3)

Several types of dwelling houses can be differentiated, some of Sopot and some of Lengyel origin. The exact dating of every house is not yet possible, since the finds are still being processed. It is not our aim to analyse all the excavated house plans, nor their types, since this work was already done in two other studies; one dealt with the houses of the neighboring Sopot settlement at Sormás-Mántai dűlő (*Barna 2009*), the other concerning the house types found at Sormás-Török-földek (*Barna 2011*). All the houses were above-ground, wattle-and-daub structures, with piles of different sizes, with an oblong or slight-

ly trapezoid ground plan. The burned building clay with imprints that were found all over the site are indicative of plastered walls. Any burnt remains of houses were found in their original location, only in secondary position, thrown into refuse pits. The floors of the buildings could not be excavated. Houses could be identified on the basis of diverse structural elements dug into the subsoil (post-holes and foundation trenches). The bigger houses were about 20–25 metres long and 6–9 metres wide. The small buildings were less than 12 metres long and 6 metres wide.

Everyday life focused on the settlement. Regarding its structure, the enclosure, houses and paths through the gates were decisive. It is mainly the path running through gate No. 2 which is important and, unlike the paths running through gates No. 1 and 8, it seems that it remained in use throughout the whole life of the settlement (Fig. 12.3). Each of the other gates (and consequently the paths) probably functioned only in one particular sub-phase. As noted above, all the houses of the Sopot settlement were erected within Enclosure No. II. Furthermore, all the houses of the Lengyel culture were also situated inside the ditches. It is clear from the map showing all the excavated features of the site that the function of Enclosure No. II., at least at first, was to mark the boundary of the Sopot settlement (Fig. 1.3), although with no concrete defensive role – thus it still can be considered as being of domestic character.

Comparing the orientation of the houses of both cultures, different principles can be detected. While the houses erected during the third phase were all oriented North or very close to it, the most frequent orientation is 352°, it seems that the arrangement of the houses built during the 4th phase was ruled by a different principle, alignment with the enclosure. Setting the dwellings in a North-South direction[8] is not favorable regarding the environmental conditions in the Carpathian Basin; nevertheless, it had a long tradition from the Early and Middle Neolithic (*Bánffy 2004.66–69; Pavúk 1994.68*). When such a conservative principle, or rather the building practice based upon it, alters radically, further changes might be supposed in the background (*e.g.,* changes in world-view, cultural or ethnic changes). The Lengyel dwellings' alignment with the enclosure, with its circular ground-plan, might indicate the growing importance of an idea that the circular enclosures (roundels) represent. The arrangement of the Lengyel dwellings in Sormás-Török-földek shows clear and unambiguous signs of attention to the enclosure's layout, but no further rules can be detected, *e.g.*: radial arrangement, like somewhat later in Svodín (*Nemejcová-Pavúková 1995.Beilage 1*) or Polgár-Csőszhalom (*Raczky* et al. *2009.Fig. 8*). At the same time, it cannot be excluded that in the Lengyel settlement at Sormás-Török-földek, a very early governing principle has been detected.

The extremely large pits used for clay mining are worth noting, since they show a certain relation to the gates of the enclosures. Three examples have been excavated at the site (Features 23, 909 and 970); they are situated in front of the gates of the enclosures. Two are inside Enclosure No. II, while the third is in Enclosure No. I. They are elliptical or rather irregular in outline. It is assumed that their establishment was in connection with the building activity of the gates or the fortification. As for the fortification, there are no concrete data. In principle, the existence of a fortification cannot be excluded, because the territory between the ditches of the double roundel was empty, or at least there were no contemporaneous features found there.

Differences appeared even in the modes of using the paths in each culture. Whereas during phase 3a1–a2, the path running through gate No. 2 was in use, and during phase 3b another path, the one running through gate No. 1 was used, in the Lengyel period (settlement phases 4a and 4b) no alignments with gates or paths can be detected.

Beside the houses, other types of buildings, probably with economic functions were also recovered. On the one hand, a small structure built up from small, round post-holes, with an incomplete ground-plan should be mentioned here. It may have functioned as a fence or an open sheepfold, which might relate to the keeping of animals in the settlement. On the other hand, traces of steadings may be supposed by the southern end of the big building sites encircled by ditches and pits: they are smaller buildings built up from postholes. A dwelling house, ditches and pits around it, and a steading at its southern end is assumed to have built up together the household clusters. That date to the Sopot culture. The household units provide good examples of the differentiated use of space. The principles underlying the differentiation are economic and practical: the separation of steadings from dwelling-houses in-

8 The orientation of the presumed long house in the territory of Enclosure No. I. is also very close to the North (351°).

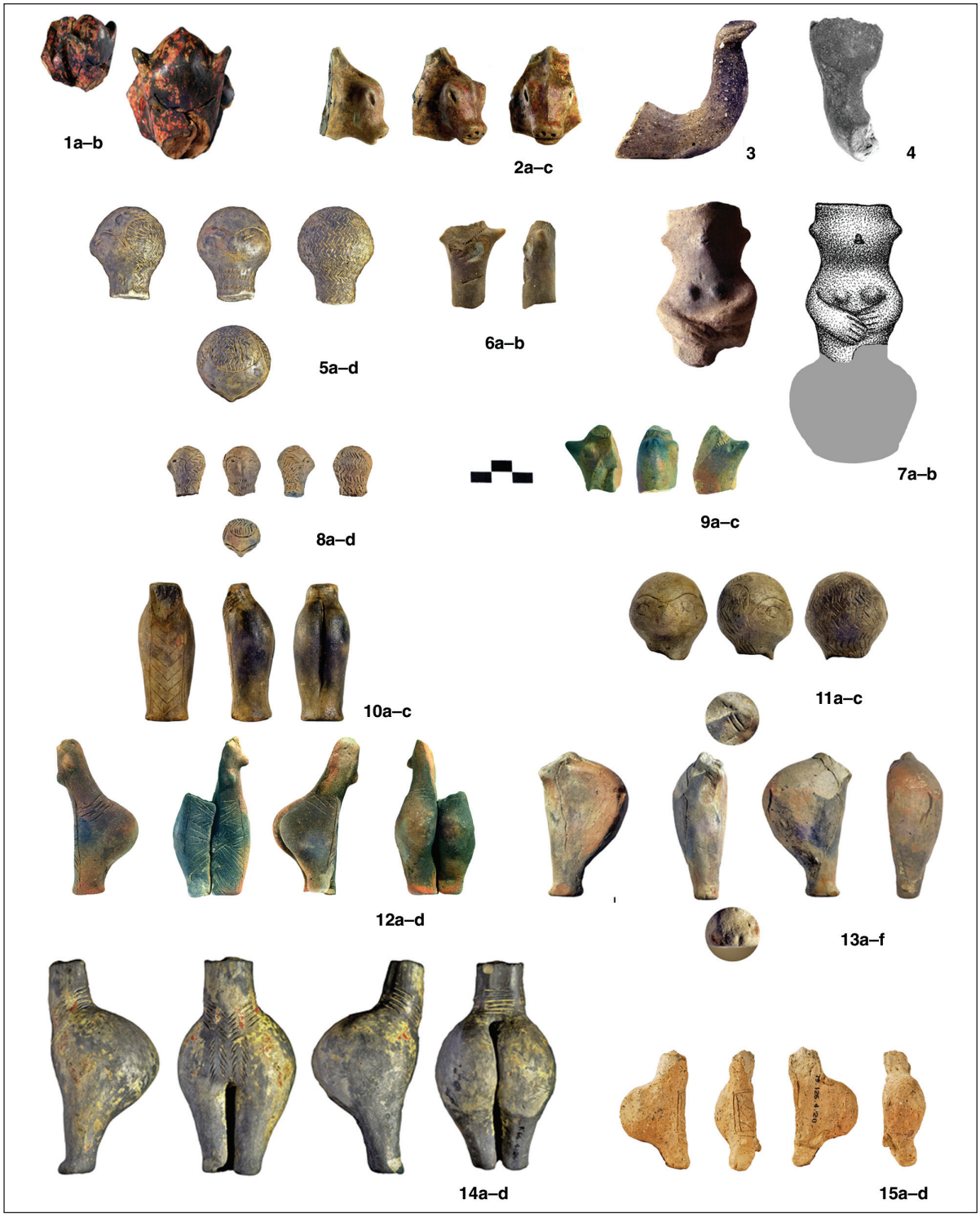


Fig. 7. Characteristic finds considered to be of ritual significance of settlement phase 4a from Sormás-Török-földek. 1–2 applied zoomorphic representations. 3–4 fragments of Svodín type anthropomorphic vessels (after* Barna 2009b.Abb. 2, 1–2*). 5–6, 8–15 fragments of Sé type figurines. 7a–b fragment and reconstruction of a Sé type anthropomorphic vessel (after* Barna in press*).

dicates some kind of activity which could not be done inside a house.

A single example of classic storage pits was found in the settlement, north of Enclosure No. II. The conspicuous absence of storage pits may be explained by the custom of storing food inside houses. Food was probably stored inside the buildings, either in big dwelling houses or smaller buildings (steading). In particular, two specific locations may have been used

in this way: after the examples of the Late Neolithic of the Great Hungarian Plain, the rear of houses was used for this purpose (*Anders 2009.129*). Another potential area of the house is the cellar. In some cases, we may suppose the existence of two-storey houses at Sormás-Török-földek. Two-storey houses are known from Veszprém-Jutasi út (*Regenye 2007*), Polgár-Csőszhalom (*Raczky, Anders 2010.149–150*), and Budmerice, Slovakei (*Pavúk 2003*) of the Lengyel culture. One of the best preserved examples of this house type from the Late Neolithic was excavated at Herpály-Csőszhalom, in Eastern Hungary (*Kalicz and Rackzy 1984*).

Naturally, features of unknown function were excavated at the site, such as small ditches, groups of triple post-holes, pits containing nothing but a little charcoal, *etc*. These remind us that there remain always some questions without answers. One of these questions relates to the problem of burials. It is not surprising that no cemetery or graves were found at the site, as this is usual in the western territorial group of the Lengyel culture (*Kalicz 1998.56*). No graves of the Sopot culture were detected. It seems that the settlement was reserved only for the living. Human skeletal remains were excavated in the ditches of the Enclosure No. I. (Features 56 and 31/A1, for particulars see below)[9].

Archaeological features of possible ritual character

Having reviewed the main elements of the everyday domain, we now discuss the archaeological finds of supposedly ritual character. Most are connected to the enclosures, with two possible exceptions (Features 93 and 638), but they could not be identified with full certainty as sacrificial pits (botroi). Both are Lengyel and are situated in the inner space of the enclosures, and both were situated by paths running through the gates of the enclosures. They share several common characteristics: relatively large dimensions; traces of fire and stratified filling in; rich find material with a lot of painted ware, including exotic or unique finds (bucranium, a whole vessel turned upside down, and so on). A definite interpretation of these features needs further investigations.

The question of the Late Neolithic enclosures (roundels) is complex, principally regarding their function, and it is always subject of heated discussion among scholars. Notwithstanding the numerous hypotheses, none can be fully confirmed. The possible interpretations have been reviewed several times (*Trnka 1991; 2005; Petrasch 1990; Daim, Neubauer 2005; Podborský and Kovárník 2006; Parkinson, Duffy 2007; Raczky, Anders 2010*). One possible way to arrive closer to the main point of the discussion is to study the relation between the enclosures and settlement.

We have already seen the close and functional relation between the houses of the settlement and Enclosure No. II. In spite of this, there were no identified remains of buildings in the inner space of Enclosure No. I – discounting a presumed site of a long house dated to the Keszthely-group of the TLPC, which is not contemporaneous with the enclosure.

As Pál Raczky and Alexandra Anders state in some of their latest work (*Raczky, Anders 2007.37–38; 2010.145–146*), there are visible signs of a special trend at the turn of the Middle and Late Neolithic both in the Eastern and Western areas of the Carpathian Basin, during which different phenomena relating to symbolic-sacred activities appeared in line with ditch-systems or enclosures around the bigger settlements. The site at Polgár-Csőszhalom is an outstanding example of this trend, which the authors call a 'process of demarcation', where an area previously separated physically from a settlement by a ditch became distinguished in a more definitive way. Within this isolated area, clear traces of new activities following new rules could be identified. At the beginning of this process, the areas used for domestic and ritual activities were not separated. The classic Lengyel roundels as places of social-ritual activities appeared by the end of this evolutionary progression already separated from territories used for domestic activities. This progression can be well documented in the Middle and Late Neolithic sites excavated in the last decade in Zala county (Fig. 6. 2–8) and exactly in the site at Sormás-Török-földek.

A schematic chart can be seen in Table 2 in which the main characteristics of the Middle and Late Neolithic enclosures recovered in South-western Transdanubia (Zala county) are summarised (*Barna 2010*). At the earliest site, in the settlements of the TLPC – *e.g.,* in Becsehely (I)-Bükkaljai-dűlő (*Kalicz et. al. 2007*) or Becsehely (II)-Homokos (*Barna 2004*) – ditches of irregular ground-plans around the settle-

9 A complete skeleton of a young woman lied prone on the bottom of one of the extreme big sized pits (Feature 23) (*Tőth 2009*). It probably dates to the Middle Copper Age and represents the Balaton-Lasinja culture.

ments could be found[10]. The cross-sections of these ditches are mostly hollow, and their main function was to enclose the area of the settlement. The earliest ditch excavated in Sormás-Török-földek might have been similar.

At the Sopot culture sites, at the turn of the Middle and Late Neolithic, we can observe a change both in the shape of the ground-plan, and in the cross-section and function of the ditches around the settlements. The ground-plan of the ditch-system of the site at Petrivente-Újkúti-dűlő (*Horváth, Kalicz 2003. Fig. 1.2; Kalicz* et al. *2007*) is still irregular, but the cross-sections of the ditches are already V-shaped. The next stage of this evolutionary progression can be recognised in the ditch around the settlement at the Sopot site at Sormás-Mántai-dűlő (*Barna 2009. 18–19, Fig. 1.1*), which has already some characteristics in common with the roundels of the Lengyel culture: the regular round shape of the ground-plan, the V-shaped cross-section, and the astronomically orientated gate. It cannot be accidental that the orientation of this gate is almost the same as that of gate No. 8 of Enclosure No. II at Sormás-Török-földek (that are set at 13 and 16 degrees) (*Pásztor, Barna 2009.206, Fig. 1.1; Fig. 2.2*). In Enclosure No. II at Sormás-Török-földek, three different building phases can be identified: in the earliest phase (settlement phase 3a1) the ground plan is irregular, but the cross-sections of the ditches are already V-shaped[11]. But in the 2nd building phase (3a2), the shape of the ground-plan was corrected into a regular round form: the two ditches of the enclosure are concentric and both have V-shaped cross-sections. In the light of all these facts, the 2nd building phase of Enclosure No. II. at Sormás-Török-földek can be considered one of the most important stages in the evolutionary progression of the ditches around settlements.

Enclosure No. I illustrates another very important stage. In considering the time of the establishment of the enclosures, it is assumed that only a very short period elapsed between the constructions of the two enclosures, and that Enclosure No. I is the younger of them. This assumption is further supported by the material culture of the two enclosures and some stratigraphic data. It must be emphasised that Enclosure No. I is a typical Lengyel roundel: an isolated space used for special, social-ritual purposes, which is separated from the mundane sphere. As was already mentioned above, there were no *contemporary* house remains found here.

As a final stage in the progression of Neolithic enclosures in South-western Transdanubia, the triple enclosure excavated at Nagykanizsa-Palin serves as a good example, since it is completely separated from the inhabited area (*Tokai 2008; 2010*). The separation is so definite, that the settlement in this enclosure is situated on a neighbouring hill-top.

Archaeo-astronomical and geometrical investigation of the roundels

The orientation

Although the orientations of some roundels are assumed to be aligned to the orbit of the moon (Svodín 2(?), Cifer-Pác, Rosenburg (*Pavúk and Karlovský 2004*), or constellations of bright stars (Immendorf: *Gervautz, Neubauer 2005*; Steinabrunn: *Zotti 2005*), the general comparative investigation of the Lengyel roundels supports solar orientation (*Pásztor* et al. *2008; Barna, Pásztor 2010*).

The investigation of the relation between the gates and the sun at the site at Sormás-Török-Földek has revealed some interesting features. The orientations of gate No. 1 of the northern roundel (Enclosure No. I) and gate No. 1 of the southern roundel (Enclosure No. II) signal a standard solar day whereby sunrise (15° NE) and sunset (15° NW) are aligned to these gates. This intentional orientation is also supported by the single gate excavated in the roundel at Sé site, which has the same orientation (15° NE). All these enclosures adhere to the same directional system (*Barna, Pásztor 2010*) and thus harmonise with the result of the general investigation (*Pásztor* et al. *2008*).

The orientation of gate No. 8 of the southern roundel (Enclosure No. II) is also towards sunset on a special day – the *mid-quarter day* – which might relate an old annual division according to which the turning points and equinoxes of the sun signalled the middle of the seasons, but not their beginning as is the case now. The expressions *Mittersommer* or *midsummer*, for example, are relics of such an old division (*Zotti 2005.Abb 3.6*).

The only excavated gate of the ditch at the site at Sormás-Mántai-dűlő is aligned in almost the same di-

10 Radiocarbon dates obtained from that site can be seen in Table 1.

11 As we have already seen, there were an earlier phase of the ditch with a hollow cross section, but it belonged to the TLPC (settlement phase 2 in the site at Sormás-Török-földek).

Period	Culture	Cross-section	Ground-plan	Orientation of the gates	Function	Examples (numbers refer to Fig. 6.)
Middle Neolithic	TLPC	hollow	irregular	no rules	domestic; the settlement border	(1) Becsehely (II)- Homokos (*Barna 2004*) (2) Becsehely (I)- Bükkaljai-dűlő (*Kalicz* et al. *2007*)
Middle / Late Neolithic	Sopot	V-form	irregular	no rules	domestic/ritual; the settlement border	(2) Becsehely (I)- Bükkaljai-dűlő (*Kalicz* et al. *2007*) (3) Petrivente – Újkúti-dűlő (*Kalicz* et al. *2007*)
	Sopot	V-form	Regular (circular)	astronomically oriented	domestic/ritual; the settlement border	(4) Sormás – Mántai-dűlő (*Barna 2009*) (5) Sormás – Török-földek, Enclosure No. II.
Late Neolithic	Lengyel (Ia)	V-form	Regular (circular)	astronomically oriented	ritual; separated from the settlement	(6) Sormás – Török-földek, Enclosure No. I.
	Lengyel (II–III)	V-form	Regular (circular); bastions"	astronomically oriented	ritual; separated from the settlement	(7) Nagykanizsa – Palin, Anyagnyerő hely (*Tokai 2010*)

Tab. 2. Chart summarising the main characteristics of ditches and enclosures in South-western Transdanubia during the turn of Middle and Late Neolithic.

rection. Thus the orientation of these gates might signify the beginning or end of a year or a season counted in an 'alternate' way. Eighteen of the fifty-one roundels investigated (almost one third) have such a gate facing a mid-quarter-day sunrise or sunset (*Pásztor, Barna in press*).

Although early medieval Irish literature might support the existence of an ancient pan-Celtic calendar which divided the year by the mid-quarter days, the earliest evidence for such calendrical divisions comes from the mediaeval period (*Hutton 1996.408–411*).

While the geometrical features of the ground-plan of the roundels support the assumption of their calendrical function, they cannot be taken as clear evidence. These data, whereby almost one third of the investigated circular enclosures seems to align to a mid-quarter day, however, strengthen the belief that they might have served different functions.

Gate No. 2 of the northern roundel also represents an important direction – true South. All celestial bodies reach the zenith of their daily and annual rotation in the South. This direction is easy to plot, as the sun takes it every day. The significance of North-South is represented not only in the gates, but the positioning of the two roundels relative to each other. They lie on a north-south common axis and the deviation from the precise direction is only 1.6° (Fig. 1.4) (*Barna, Pásztor 2010*). All this shows how important the role of the sun might have been for this community. The general location of the Lengyel roundels also strengthens this assumption. They are mostly situated on the southern slope of a gentle hill in order to face the course of the sun through the sky.

If the orientations of the longer axis of the houses are plotted on a chart (Fig. 7.1), clear clustering can be recognised. Most items fall within the range of 345° to 360°, which might signal a preference for the North.

The reason for the small deviation from true North might be that the houses were intentionally built following, the true North, but at the same time with their long axis adjusted to the main path, which setting out of gate No. 2. (Fig. 7.3, 4) heads in the direction of the geometrical centre of the roundel and perpendicular to the direction of the diameter between gate No. 8 and virtual 11. Gate No. 2 has a deviation of about 20° from North, perhaps because of the foundation ceremony of the roundel: the diameter between the gate No. 8 and (virtual) 11 might have been the first one staked out[12] by the *actual sunrise* and then the perpendicular orientation of gate No. 2 was constructed.

All the houses of the different Sopot phases have the same preference for orientation to the North, which proves that this was intentional. However, the Len-

12 That is the East-West direction.

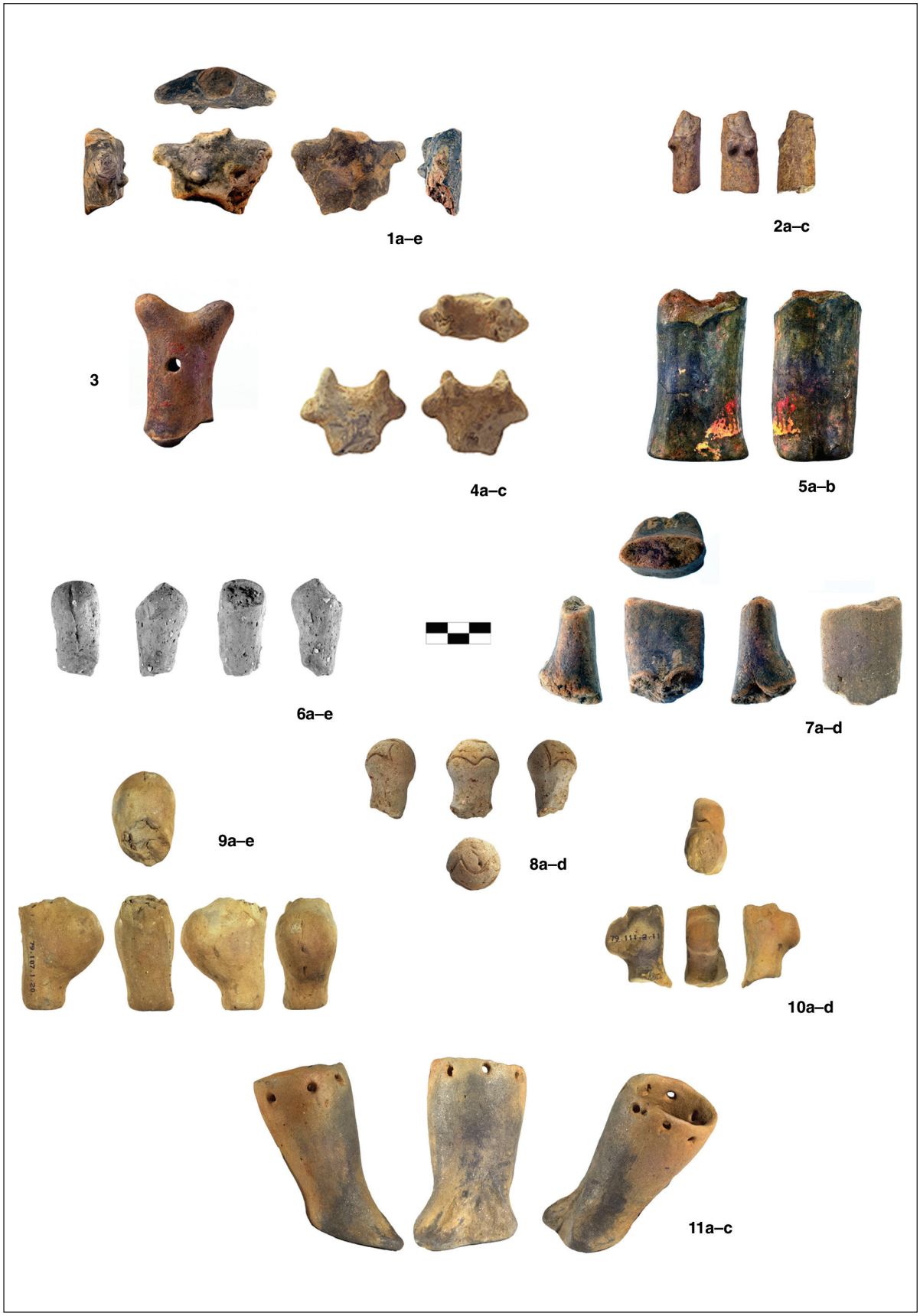


Fig. 8. Characteristic finds considered to be of ritual significance from settlement phase 4b at Sormás-Török-földek (after* Barna 2007; 2007a*). 1–2, 6–10 fragments of figurines. 3 stylised animal-headed (?) handle of a lid. 4 animal-headed lid handle. 5 leg fragment of a zoomorphic vessel.

gyel houses during settlement phase 4 were built on a slightly different orientation, which was ruled by the elements/circular layout of the roundel. However, these houses were built so as to avoid crossing the circular ditches and stay inside the circle, probably in order to be protected by its magic power.

The geometrical features of the Lengyel roundels

While the houses were rectangular, the enclosures were circular, which shows something different from the profane, and might signal intention. The circle has so many cosmic-magic-protective meanings from

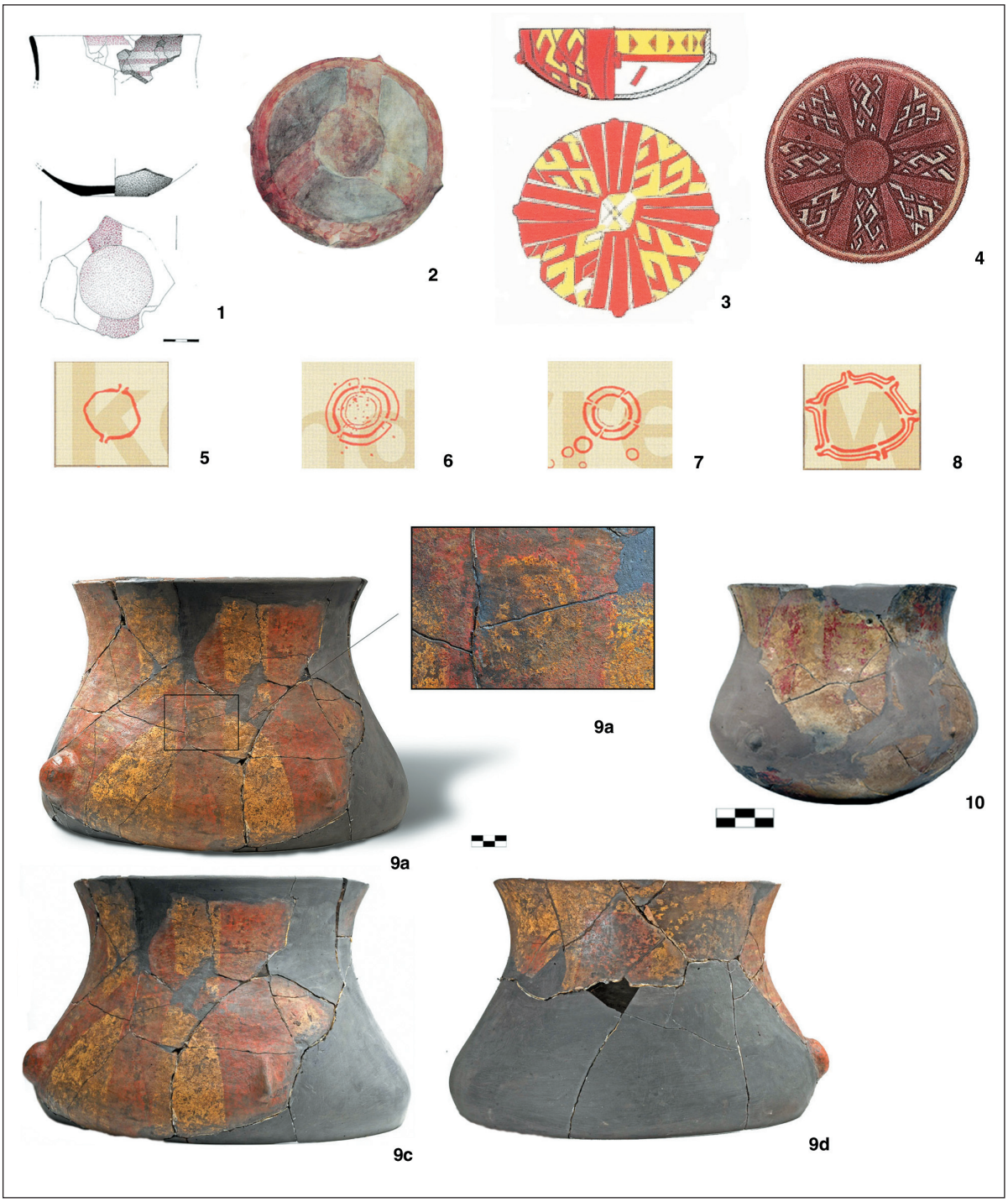


Fig. 9. Presumed symbolic representations on painted ware. 1 Sormás-Török-földek, Enclosure No. I, Feature 29. (unpublished). 2 Zengővárkony (*Dombay 1960.Fig. CXIII*). 3 Kamegg (*Stadler and Ruttkay 2007*). 4 Střelice (*Kovárník 2008*). 5–8 several variations of ground-plans of Lengyel roundels (after* Trnka 2005. Abb. 1.11*). 9a–d fragment of a mushroom-shaped vessel painted in red and yellow, Sormás-Török-földek. 10 red painted cup decorated with a ladder motif, Sormás-Török-földek Feature 40.

later records that it must have meant more than a simple spatial demarcation. The diameter of the inner space for most of the roundels falls between 45 and 70m. This means that the communities generally needed an area of 1600–3800m², which might have included 500–1200 people (*Pásztor, Barna in press*).

The proportions of the dimension of a monument can also offer some significant information. A table (Fig. 12.2) shows the ratios of the diameters, the number of roundels having the same ratio and the rate expressed in integers. The border rates – 1,1 and 1, 6/1,7 – are the most uncertain, as they do not resolve into whole numbers. There are only a few from these monuments. The earliest roundels in Hungary, two at Sormás-Török-földek and one at Sé, have an equal 1,1 rattio (see Figure 8.2, grey shaded rows), which might prove the establishment of a shared ideological principle, but in an initial phase. The chart of 58 items proves that the geometrical characteristics of the enclosures with two or more ditches seem to follow a common rule, as the proportions of the diameters have a certain clustering.

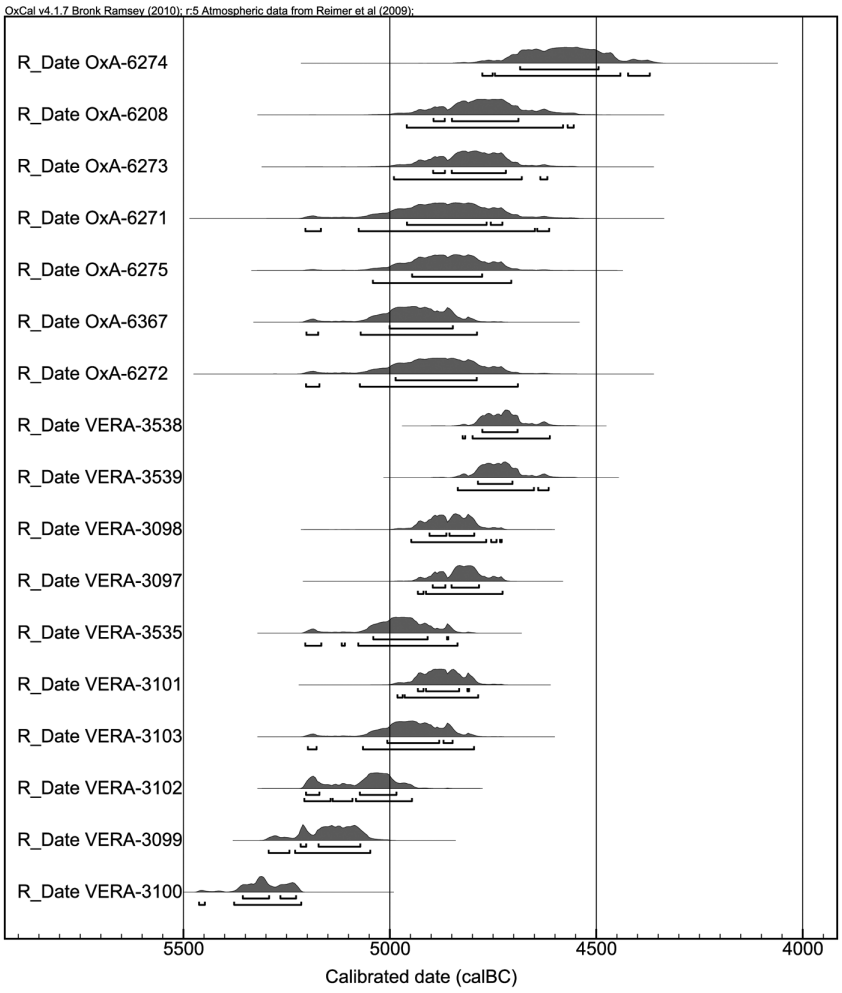


Fig. 10. Radiocarbon dates (calBC) from the sites at Sormás-Mántai-dűlő, Sormás-Török-földek and Esztergályhorváti. South-western Transdanubia.

For most of the roundels, however, the proportions of the diameters of ditches can be significantly characterised by integers. This also proves the design of the circular enclosures and an effort to raise a monument with harmonised details. In the human subconscious, beauty is strongly based on symmetry and harmonious proportions, on well-proportioned geometric divisions. The proportions for most of the roundels (close to 50%) are 5:4:3 and 7. The last three numbers form the primordial triad; the number seven has religious significance in many cultures and has some astronomical background.

Many roundels have very similar dimensions. This might signal the average population which needed the sacred area, but at the same time it may mark a common diameter, a common step-number for sacred circles. The difference in length might arise from the different step-lengths of the people marking out the ground plan (*Pásztor and Barna in press*).

Lengyel enclosures as spaces for ritual activities

As we have seen earlier, there is a close relation between the function of Late Neolithic enclosures and settlements. Behind the thought of evaluating the Lengyel roundels as social-sacred spaces separated from the mundane sphere, in addition to their physical separation from the settlements, there is also a series of archaeological arguments based on find materials of a ritual character. The site at Sormás-Török-földek, has yielded a lot of data of this type (*Barna 2007.Pl. 5, 6; 2007a; 2009; 2009b; in press*).

The Late Neolithic enclosures, notably the roundels of the early Lengyel cultures, which show a striking similarity in their layout, share a complex symbo-



Fig. 11. Find assemblage of the common grave at Esztergályhorváti, South-western Transdanubia.

lism which is also reflected in their architecture. As was previously proposed also by other scholars (*Raczky* et al. *2005*) the roundels can be interpreted as cosmic symbols. The same can be said of roundel No. I at Sormás-Török-földek. Our interpretation, on the one hand, proceeds from a religion-historical approach and, on the other hand, from archaeological considerations. The religion-historical approach of the enclosures' evaluation is a complex matter, and thus it needs a longer, specific study which we are preparing. Hereinafter, we focus on the archaeological considerations.

It is an often quoted ascertainment that in the areas of the roundels a high concentration of finds can be observed, which are considered to be of ritual character, *e.g.* small anthropomorphic figurines (*Podborský 1985.210; Kalicz 1998.69, 74*). The appearance of different phenomena relating to symbolic-sacred activities at larged settlements at the turn of the Middle and Late Neolithic is ascribed to a special trend ('process of demarcation') (*Raczky, Anders 2007.37–38; 2010.145*). The high concentration of figurines documented in the site at Sormás-Török-földek may also be connected to the same trend (*Barna 2004; 2007.371; 2009.Fig. 1*). The above-mentioned statements on the concentration of ritual material, notably the frequency of figurines in the vicinity of the enclosures, have in recent years been questioned by scholars (*Bertók* et al. *2008.6*). These scholars drew their conclusions on the basis of observations made at the site at Belvárdgyula, in South-Eastern Transdanubia, where numerous figurines were collected some distance from the enclosure, even near the boundaries of the Neolithic settlement. In our opinion, this differing archaeological context may be interpreted in two ways: first, it is the different geographical and chronological situations which cause this discrepancy. Secondly, as was later identified at Sormás-Török-földek, a distinction such as 'outside' and 'inside' the enclosure (or far/close to the enclosure) is not reasonable regarding Enclosure No. II, since the whole Sopot settlement was situated *inside* the enclosure (*Barna 2010*).

At Sormás-Török-földek and also at Sormás-Mántai-dűlő, further traces of symbolic-sacred activities may be supposed. Here we principally mean the deposition of fragmentary vessels in the outer ditch of Enclosure No. I, and some anthropological finds, such as a human skull and other human skeletal remains, again in the ditches of Enclosure No. I (*Barna 2010. 99, Fig. 8.2, 5–6*). The practice of burying a *bucranium* in the fill-in of the ditches close to the gates of the enclosures may also be interpreted as a ritual activity; we observed traces of this at both sites at Sormás, too (*Barna 2009.Fig. 6.2; 2010.Fig. 6.7*). Although enclosures generally lay close to large settlements, their inner spaces are usually empty, free of settlement features. In most cases, enclosures are also physically isolated from settlements, that is, from the mundane sphere. As we have already demonstrated, this consideration can be confirmed at

the site at Sormás-Török-földek in connection with Enclosure No. I. The symbolic context of the ditches, which are the most decisive elements of roundels, have already been mentioned. The case of Enclosure No. II in this respect is a special one (see details above). All thse reasons, in our opinion, comprise a solid *archaeological* basis for evaluating the roundels at the site at Sormás-Török-földek (espe-

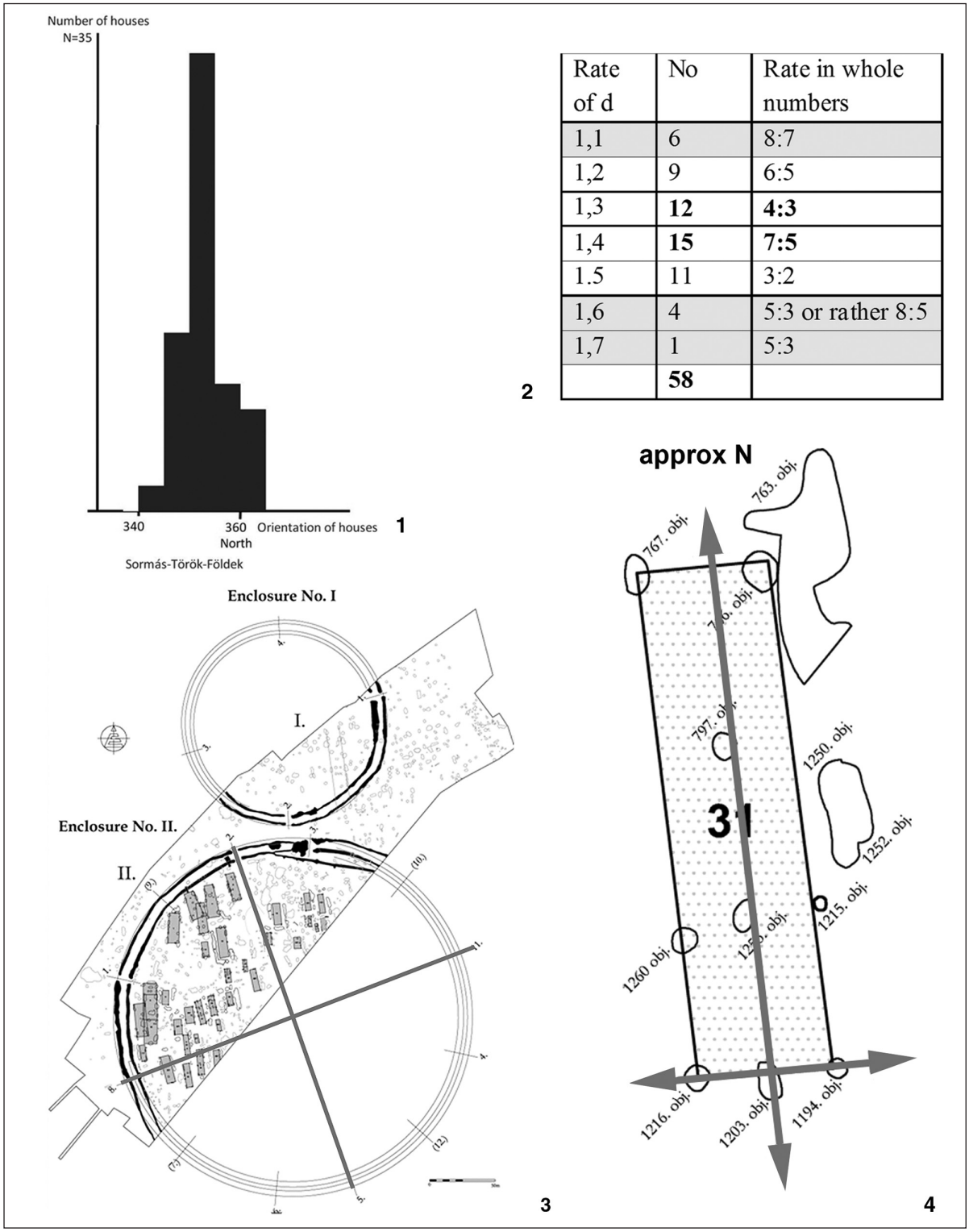


Fig. 12. 1 orientation of the longer axis of the houses excavated at Sormás-Török-földek. 2 ratios of the diameters, the number of the roundels having the same ratio and the ratio expressed in integers. 3 diameters of Enclosure No. II. at Sormás-Török-földek comprising the paths running through gates No. 2 and 8. 4 orientation of the longer axis of houses representing the cardinal (cosmic) points.

cially Enclosure No. I) as enclosed spatial units with a religious character having a strong symbolism.

To summarise the main thoughts of this paper, we can state that we found clear evidence of spatial differentiation in the Late Neolithic settlement at the Sormás-Török-földek site. What is important for the moment is that these phenomena have been chronologically determined: we found various kinds of differentiation by the end of the Middle Neolithic (at the Sopot settlement) and then by the beginning of the Late Neolithic (that is, in the Lengyel settlement). The use of space in different ways can be determined by several principles, among which is to separate the territories used for domestic and ritual activities.

Another principle for differentiating space is the separation of the territory of the living and the dead, which is also typical of the Late Neolithic in the Carpathian Basin. Since we found neither a cemetery, nor a single grave in the site, we must suppose that this kind of differentiation occurred at Sormás-Török-földek. The same can be said of the Sopot culture at the Mántai-dűlő settlement. The human skeletal remains excavated in the ditches of enclosure No. I can be interpreted rather as the results of some kind of ritual activity.

A concrete example of the differentiated use of space was detected in the case of the household clusters comprising dwelling, pits and a steading in the Sopot settlement.

At the same time, spaces that were definitely separated physically into the categories of 'domestic or mundane' and 'ritual or sacred' were found only during the earlier inhabitation phase of the formative Lengyel culture (settlement phase 4a), the active period of Enclosure No. I. It is a typical roundel of the Lengyel culture, with an empty space inside ditches, and was probably used for social and ritual activities. The significance of the site at Sormás-Török-földek lies precisely in the fact that two enclosures were excavated at the site which are of different character, but in a very close relationship with each other physically and chronologically. As regarding their function we can state that they demonstrate exactly the radical change which took place in the mode of use of space. They represent two important stages of the progression as a result of which the separation of territories used for domestic and ritual activities was made physically manifest. Several stages of evolutionary progress can be well illustrated by the big Middle and Late Neolithic settlements excavated in South-western Transdanubia in the last decade. Concerning this evolutionary progress, we conclude that all the changes concerning certain characteristics of the enclosures occurred during the Sopot occcupation at the turn of the Middle and Late Neolithic. Secondly, these changes took place in the form of a progression in which three stages can be differentiated. It is remarkable, that the cross-sections of the enclosures were the first characteristics to change – that is, in an unusual way, the formal changes anticipated the functional, which seems somewhat inconsistent. Finally, the perceptible changes in the ground-plans and orientation of the gates of enclosures occur together, at the same time (precisely in the same enclosure – Enclosure No. II at Sormás-Török-földek). This may support the idea that an astronomically determined orientation might be one of the main reasons for the more or less regular, circular ground-plans of the early Lengyel roundels.

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Monte d'Accoddi and the end of the Neolithic in Sardinia (Italy)

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ABSTRACT – *The Prenuragic shrine of Monte d'Accoddi is probably the most comprehensive representation of prehistory in Sardinia, both because it was continuously frequented from the Middle Neolithic to the Early Bronze Age, and because it contains the most significant elements of tradition and innovation during the passage from the Neolithic to the Eneolithic. Previous studies have defined Monte d'Accoddi as an altar, a ziggurat, a temple, or a step pyramid, and a wide debate has been generated about its hypothetical genetic relationship, reconstructive hypothesis, and significance. This paper does not analyse the above issues, but draws attention to other controversial problems, such as chronology or less studied aspects such as crafts. New radiocarbon dating from sites in the South of Sardinia and recent data that has been published about craft production relating to the shrine allow us to date the building of the first monument (4000–3650 calBC) to the Ozieri facies, with the second shrine dating to the Sub Ozieri (3500–3000 calBC) facies.*

IZVLEČEK – *Prenuragijsko svetišče na Monte d'Accodi predstavlja verjetno najbolj celovit zapis prazgodovine na Sardiniji, saj je bilo obiskovano skozi ves čas od srednjega neolitika do zgodnje bronaste dobe, in ker vsebuje najpomembnejše elemente tradicije in inovativnosti v prehodu iz neolitika v eneolitik. Prejšnje študije so Monte d'Accodi opredeljevale kot oltar, zigurat, tempelj ali kot stopničasto piramido, in ustvarile so se številne razprave glede hipotetičnega genetskega odnosa, rekonstruktivne hipoteze in pomena spomenika. V članku se ne ukvarjam z analizo zgoraj navedenih vprašanj, ampak opozarjam na druge probleme, kot so kronologija in preostali slabše raziskani vidiki, npr. obrti. Objavljeni so bili novi radiokarbonski datumi najdišč iz juga Sardinije in podatki, ki se nanašajo na povezavo obrti s svetiščem, ki nam omogočajo datacijo prvega spomenika (4000–3650 calBC) v t.i. Ozieri facies in datacijo drugega spomenika (3500–3000 calBC) v t.i. Sub-Ozieri facies.*

KEY WORDS – *Sardinia; Neolithic; Eneolithic; chronology; sanctuary*

Introduction

One of the peculiarities of Sardinian prehistory is its continuity, which characterises cultural development in the Neolithic and Eneolithic; between the VI and III millennium BC – notwithstanding its prominent position in the network of Mediterranean contacts, thanks to its insularity and to the filtered and indirect cultural contribution from elsewhere, Sardinia maintained strong traditions and a measured evolution. Only well into the Eneolithic did the impact with external cultural movements assume sufficient proportions to provoke a regression and depletion of the native facies.

Monte d'Accoddi should be considered among the most important architectural manifestations of Mediterranean prehistory. It represents an important innovative contribution and at the same time demonstrates, through craft production, the continuation of a local tradition that evolved gradually while also interacting with the outside world.

The fieldwork at Monte d'Accoddi was spread over two large research projects: the first, directed by Ercole Contu, brought to light the external architectural characteristics of the monument and the surroun-

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ding settlement (Fig. 1.1); the second, subsequently run by Santo Tiné, brought to light the existence of the older monument and led to the proposal to reconstruct the second building, which took the form of a step pyramid (Fig. 1.2).

The site has been much written about and discussed, although this has mostly been in relation to architectonic aspects and to possible genetic relationships beyond the shores of the island itself (*Tinè and Traverso 1992; Contu 1992; 2001*). The studies of craft production that have emerged over this decades-long project are yet to be completed. Recently the first comprehensive research of the phases of ceramic production from the San Ciriaco, Ozieri, and Sub- Ozieri phases, discovered during the excavations directed by Tinè (*Traverso 2005–2007*), was published.

This presentation contains several considerations on chronology, on craft production, and on elements of ritual and domestic activity, in order to demonstrate, through the data collected at Monte d'Accoddi, the process of transition from the Neolithic to the Eneolithic in Sardinia. Data from the pottery finds suggest inhabitation predating the construction of the monument; this was sporadic in the Middle Neolithic, becoming heavier in the Upper Neolithic. The shrine was constantly in use throughout the entire Copper Age and contains the more significant elements of tradition and innovation relevant to the Neolithic phase, found in aspects of architecture, culture, and craft production.

Some results from the study of finds recovered during the 1950's from the numerous excavations conducted by Ercole Contu will be presented (*Contu 2001*); these finds, together with the principal architectonic features of the monument, demonstrate the sequence of frequentation of the site from the Neolithic to the Early Bronze Age. The finds provide much information on the level of habitation and the dynamics of the use of the shrine area, offering interesting information about aspects of ritual.

New considerations on the chronology of the monument

Before the excavations by Tiné produced radiocarbon dating, Contu (*1992*) had attributed the building of the monument of Monte d'Accoddi to the Ozieri facie. Following the discovery of the two building phases, he reasserted the attribution of the earlier monument to the Ozieri, while dating the second to the Eneolithic Filigosa phase (*Contu 2001*).

While the dating of the earlier monument was contemporary with other contexts of the Ozieri facies (Fig. 2), Tinè and Traverso (*1992*) attributed the construction of the first shrine to the period immediately following the Ozieri (Sub-Ozieri). This attribution was underlined during the presentation of research on the finds (*Traverso 2005–2007*): the au-

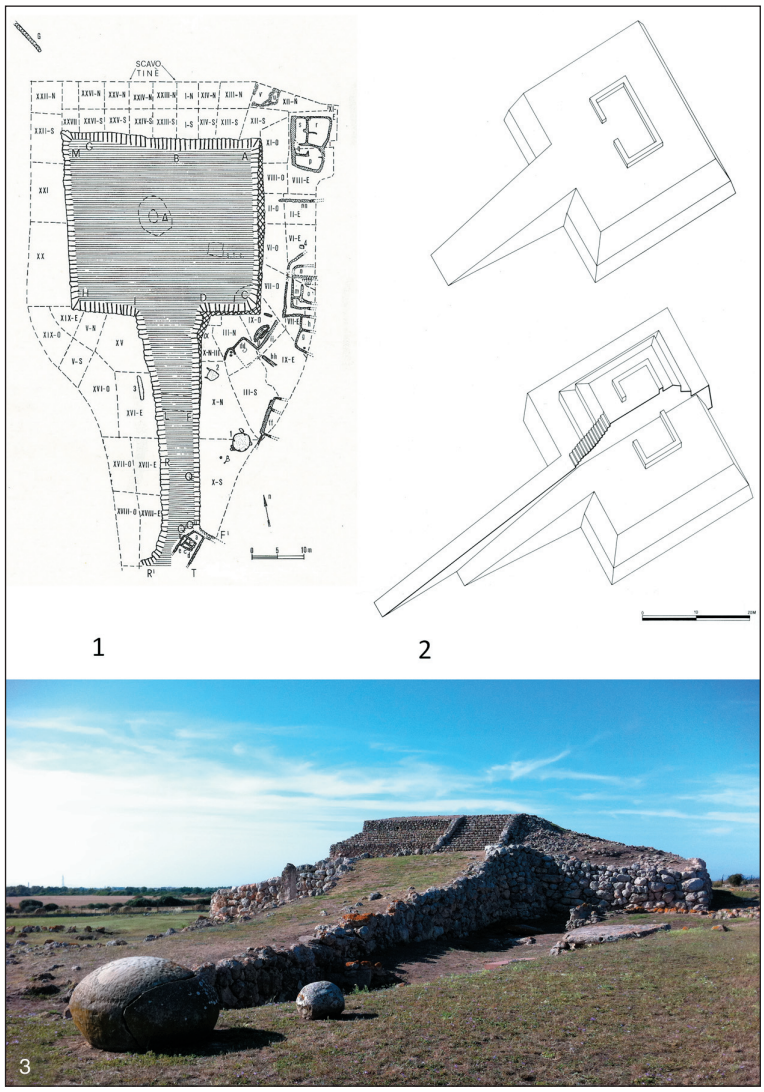


Fig. 1. Sassari, Monte d'Accoddi. 1 General plan of Contu excavations (*Contu 1992*). 2 Reconstruction of the two buildings' phases (*Tinè and Traverso 1992*). 3 The monument from the South-East.

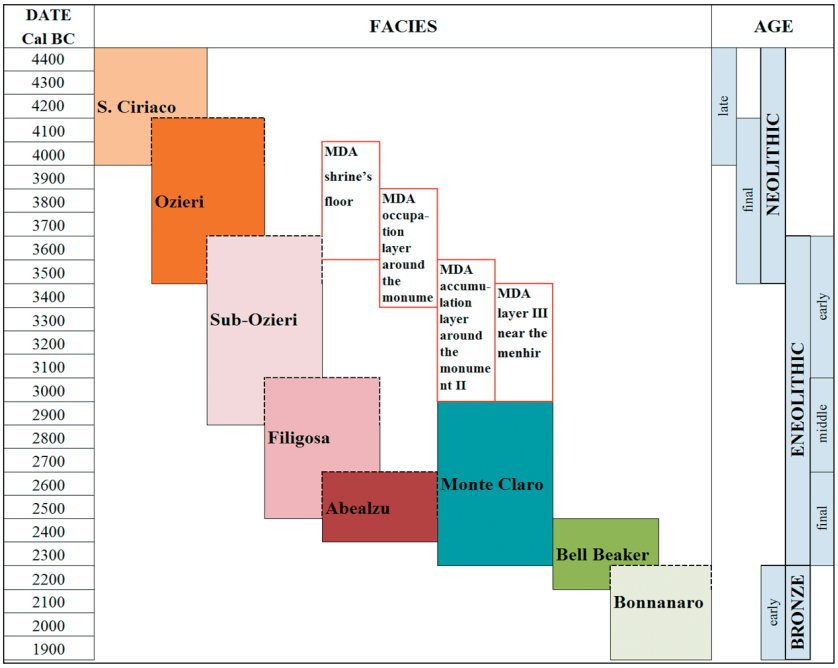


Fig. 2. Chronological and cultural frame of Sardinian Prehistory.

thor demonstrated how the deposits associated with the earlier monument, layers VI–IX of trial trench 'Delta' in particular, contained Ozieri finds, which is considered a *terminus post quem*. If this were the case, the dating of Monte d'Accoddi would force us to reconsider the chronology of the Ozieri in its later phases: indeed it would mean a precocious beginning to the sub-Ozieri phase in northern Sardinia. This early beginning is primarily recognised in habitation contexts in southern Sardinia, such as Su Coddu-Selargius and Terramaini-Pirri; among the finds relating to burial contexts, the tomb at Cannas di Sotto-Carbonia in south west Sardinia can be cited. Both Su Coddu and Cannas di Sotto were datable to the last four centuries of the IV millennium and the early III millennium calBC (*Melis 2009; Melis* et al. *2007; Lai 2009*); it should be supposed that this facies had a long lifespan, or developed late in the south of Sardinia. Tinè and Traverso also assign the second monument to the Sub-Ozieri.

At Selargius, a new important chronological element helps to define the transition from the Ozieri to the Sub-Ozieri: structure 134 in sector Canelles of the settlement at Su Coddu gave a dating (3640– 3370 calBC) more ancient than the others relating to the sub-Ozieri, associated as it was with older pottery finds. These finds had mixed morphological and technological characteristics: ceramics with forms typical of the sub-Ozieri; technical ability extraneous to this facies and more akin to that of the Ozieri was noticeable in the surface finishing and decoration. The coexistence of differing techniques referable both to the Ozieri and the Sub-Ozieri underlines the gradual passage from one phase to the other. This context is therefore probably related to a moment of transition between the Ozieri and the Sub-Ozieri, which encompasses the period between 3600 and 3400 calBC. The period extends over the late Ozieri and the initial Sub-Ozieri. In the light of all of the dating of Su Coddu, which is coherent with both the preceding Ozieri and the later phases of Filigosa and Monte Claro (Fig. 2) one could consider the Ozieri of layers VI–IX of trench 'Delta' not as a *terminus post quem*, but rather a *terminus ad quem* which dates the earliest monument: this dating perfectly fits the chronological lifespan of the Ozieri. In this way, one returns to the first hypothesis of cultural attribution, as proposed by Contu.

Similarly, the second monument could be attributed to the Sub-Ozieri, as implied by the radiocarbon dating and the presence of Sub-Ozieri finds in layers I–V of Tiné's trench 'Delta'. The second monument represents the evolution of the first, of which it retains the macroscopic characteristics (a truncated pyramid with access ramp), built on a different scale and with different construction techniques.

The phases of the shrine as illustrated by the data from the Contu excavations (1952–1959)

The lifespan of the site is traceable through the ceramic finds and radiocarbon dating: from a presumably sporadic frequentation during the Middle Neolithic and a more consistent presence in the Upper and Final Neolithic, there follows a use of the shrine through all the phases of the Eneolithic and Early Bronze Age. Occasionally, the shrine was frequented in the Nuragic and Roman periods. Presented in Figures 3–7 are a selection of finds, mostly pottery, that illustrate the various phases of the life of the shrine.

Late Neolithic

After an initial moment of confusion, originating in the still somewhat unclear cultural reference points

of San Ciriaco, today it is possible to retrace a reasonable quantity of ceramic finds to this period. These were found in various areas around the monument, mostly in the lower deposits (7 and 8), but also in the middle layers (4 and 5) of Contu's excavations. Many finds were recovered roughly 200m to the east of the monument in the 'ETFAS' trial trench. The stratigraphic position of the site at San Ciriaco is made clear by trial trench 'Delta' from the excavation by Tinè, since it was typical of the layers under the first monument, in particular layers XII and XI. Layer X contained San Ciriaco and Ozieri finds (*Traverso 2005–2007*).

Finds from the Contu excavations present several qualities typical of this facies. Among them in particular were sinuous and carenated bowls and cups, with the characteristic distinct and flared lip, pedestal based vessels, spoons, forms with decorations employing triangles and impressed points; on a technological level, the clay generally was good quality and fired at an adequate temperature, with polished surfaces (Fig. 3.1–6). However, spool handles, generally part of the formal San Ciriaco package, were not present.

As most of the finds data for San Ciriaco results from field walking, the fill of pit 377 of Cuccuru S'Arriu (*Santoni* et al. *1997*) is considered the one reliable reference point, as it represents the only certain sealed context. Once again we find triangular fields with pointing as decoration, a motif also found in Corsica at Basi (*Tramoni 1998*). The time span proposed in 2007 (*Melis* et al. *2007*) is indicated by the Contracuda-Perfugas radiocarbon dating taken from a layer containing San Ciriaco elements (4336–4246 calBC; 4336–4073 calBC). Beyond comparisons highlighted by various authors with the Diana and the Lagozza facies, the association with Corsica is also of great interest, sharing as it does with Sardinia the phenomenon of early megaliths in the western Mediterranean, characterised by coffres burials surrounded by stone circles. Within the scope of what has been defined as a cultural *koinè* – where the two islands, during the second half of the V millennium BC on the obsidian commerce route, sharing the same funerary monuments – one notes the presence of elements in the San Ciriaco style in various Corsican contexts, the radiocarbon datings of which confirm that proposed here (*Melis 2007; Tramoni* et al. *2007*).

Considering the formal aspects of ceramic production and the presence of San Ciriaco elements within the chamber tombs (domus de janas) typical of the Ozieri (*Melis 2009*), San Ciriaco could be considered a formative phase of the Ozieri.

Final Neolithic

At Monte d'Accoddi, the Ozieri ceramic finds seem to be particularly abundant, partly because they are easily recognised among small fragments, thanks to their distinctive decoration. Consequently, the statistical data may be conditioned by the easier recognition of Ozieri fragments compared to the undecorated fragments belonging to the other facies.

In chronological terms, taking into consideration the new placement of the beginning and final moments in the temporal span traditionally attributed to the Ozieri, I have recently proposed a development of the facies between the end of the V and the first half of the IV millennium BC (*Melis* et al. *2007*). This chronological placement is confirmed at its upper limit by the dating of the San Ciriaco di Contracuda layers, which represent the *terminus post quem*. For the lower limit, reliance has been given to the dating from San Benedetto di Iglesias (*Lai 2009*), which represents the only pure context of the facies.

The aesthetic quality of the 'red temple', completely covered with red wall plaster, is in keeping with its importance and with the quality shared in craft production, as well as being reflected in the symbolic-decorative use of painted plaster in the domus de janas tombs. The combination of the application of ochre with the other decorative techniques on pottery also created an attractive chromatic effect. The ceramic package of Monte d'Accoddi contained all of the classic forms of the Ozieri culture. In the same way, the field of decoration contained the motifs and ornamental principals typical of the facies (Figs. 3.7–10; 4).

Early Eneolithic

The Sub-Ozieri of Monte d'Accoddi has many analogies with similar southern manifestations, in particular those of Su Coddu, currently undergoing study by this research group (*Melis* et al. *2007*). In passing from Ozieri to Sub-Ozieri, craft production shows signs of innovation, even within a strongly traditional sphere; in particular, opportunistic characteristics emerge that lead to a technological *savoir faire* in the case of some artefacts, such as painted sub-figulina pottery; this is to be found at Monte d'Accoddi, with homogenous chromatic and morphological characteristics that can be compared to southern examples (*Melis 2006*).

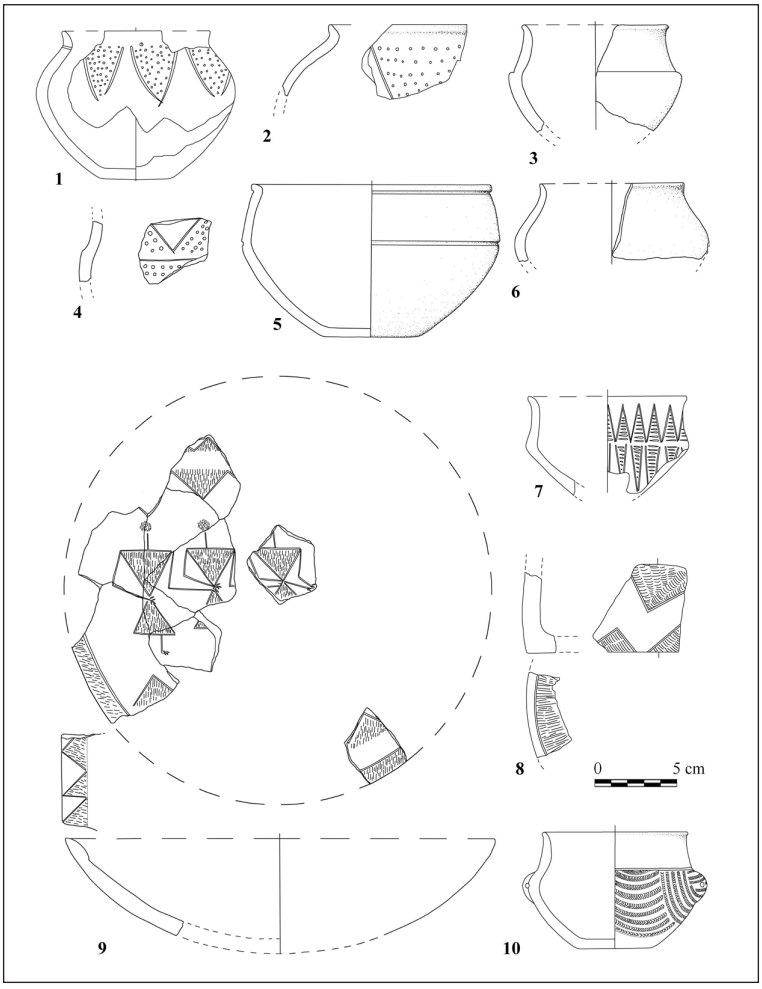


Fig. 3. Sassari, Monte d'Accoddi. 1–6 San Ciriaco. 7–10 Ozieri pottery.

Among the most interesting finds of this phase are 35 pottery fragments (Fig. 5.1–3,5) and the painted rim of a stone vase, most of which were discovered in trench X–S during the excavation by Prof. Contu, and less frequently in further trenches to the east of the monument (*Melis 2006*). The analysis of the excavation data and of the table drawn up by Contu (*Contu 1992*) show how the finds were not recovered from the lowest layers, but rather from levels 5 and 6, and more rarely from levels 4, 7, 8 and 3. It should be underlined that the number of painted finds was a tiny fraction of the enormous amount of material brought to light during the numerous stratigraphic excavations undertaken during the 1950's.

The fragments comprise of rims, sides, handles and bases. The vases were generally deep closed forms, with short or long cylindrical necks. Handles were typically subcutaneous tunnel handles with corresponding internal pouch. All the formal aspects described here fit the characteristics of the southern Sub-Ozieri, as exemplified by the rich contexts found at Terramaini and Su Coddu, and more rarely at Cuccuru Biancu. The use of red painted pottery, as illustrated by a rim fragment found in trench X–N, layer 5, at Monte d'Accoddi, can be compared to the tripod vessel from Su Cungiau de Is Fundamentas-Simaxis (OR), which has a similar chromatic quality to those of Terramaini and Su Coddu.

A peculiarity of the village in the territory of Sassari was the use of closely spaced parallel bands, sometimes discontinuous, and with rounded endings (Fig. 5.2). The use of horizontal band motifs is common on rims and the necks of vases (Fig. 5.3, 5), and is also sometimes present internally, in much the same way as the use of coloured bands or areas around the handle. Most interesting is the similarity between the serpentine and tremolo motifs of Monte d'Accoddi and those of Cagliaritano. This may be interpreted as a kind of pictoric rendition of the zigzag; this motif constitutes one of the ornamental themes that recur from the Sub-Ozieri to the Filigosa. In the case of the former, the technique used was incision, while in the latter, it was graffito. On the other hand, the zoomorphic figures to be found among the Cagliaritano pottery were not present at Monte d'Accoddi. Among the undecorated pottery, pronounced carenated forms were common, including examples with vertical perforations (Fig. 5.4).

It is important to note that the building method of the second monument, of the Sub-Ozieri phase, sacrifices some aesthetic aspects in favour of greater monumentality. The poor attention to the field of decoration is echoed in the pottery, which gradually loses the richness and ornamental complexity that distinguished the Ozieri.

Middle and Late Eneolithic

The presence at Monte d'Accoddi of both the Sub-Ozieri and the Filigosa facies, in stratigraphical sequence, removes any doubt that they may have been one and the same thing, an idea still apparently held dear by some scholars. The pottery at Monte d'Ac-

coddi presents the typical formal and decorative characteristics of the Filigosa (Fig. 5.6–10). Pottery shapes are predominately rigidly profiled carenated forms with a distinctive rim, but there are also several unusual forms, such as a square-mouthed vase (Fig. 5.7), which has its pendant in the Filigosa levels of the tomb containing tetrapod pottery of S. Pedru-Alghero (*Contu 1964*). The pottery decoration follows the repetitive standard of an incised zigzag motif, along with a few innovations, such as a grid pattern (Fig. 5.6).

During the Abealzu phase, the village developed to the east of the monument. The presence of a hut placed at the base of the ramp suggests that access to the upper part of the building was controlled and limited in this period. Curiously, Abealzu, recognised through a small number of finds which it often presents during phases of transition from the Filigosa phase, is represented at Monte d'Accoddi by particularly rich contexts, foremost being that of Hut 'p-s', dubbed by Contu 'dello stregone' or 'of the sorcerer' (Fig. 6). This hut was abandoned after being destroyed by fire. The morphological study of the ceramics (*Melis 2000*) shows an articulated pottery package, which, as in the preceding phases, contains both traditional and innovative elements. An example of this is the truncated-conical bowl, concave in section, called 'vaso a cestello' ('basket' or 'punnet' bowl), typical ware of the Ozieri, which represents a trait d'union between the Ozieri, Sub-Ozieri, Filigosa and Abealzu facies, underlining the genetic link that unites them. Among the innovative elements, the introduction of amphorae stands out, well represented in the 'capanna dello stregone'.

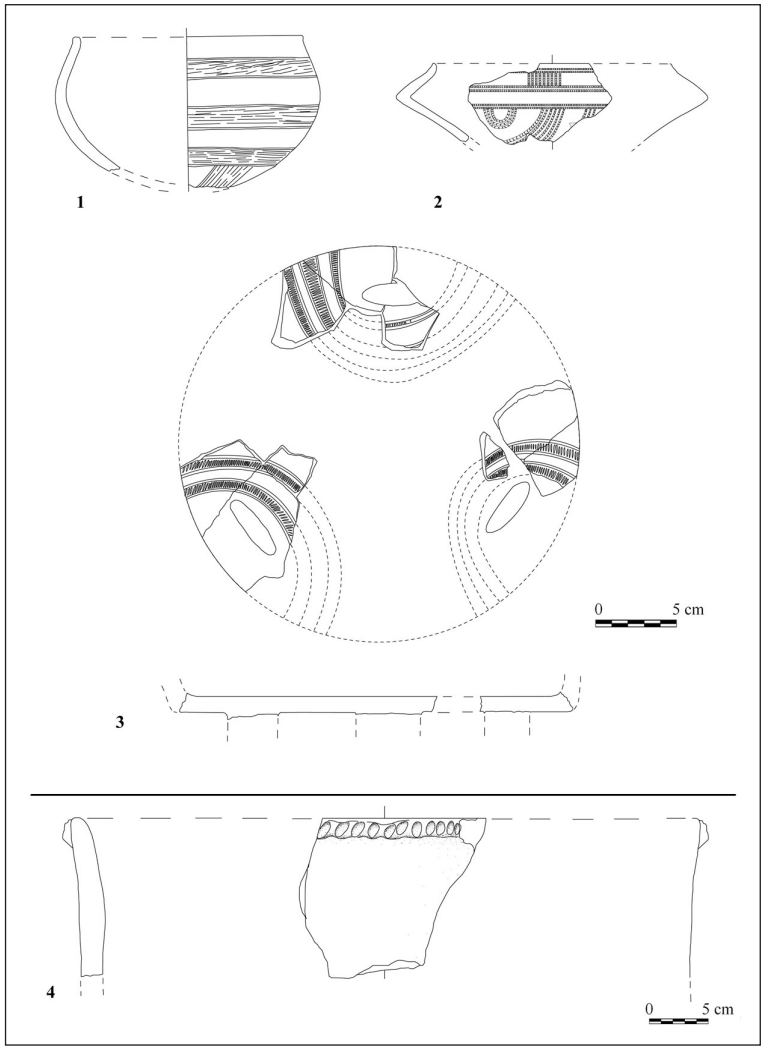


Fig. 4. Sassari, Monte d'Accoddi: pottery of the Ozieri facies.

Decoration is extremely rare: the impressed technique, found in all phases of the Eneolithic, is evident on a loom weight (Fig. 6.26). Of particular interest is the appearance of burnishing (Fig. 6.2), realised with vertical lines beneath the rim. This technique is also sporadically represented in Filigosa: at S. Giovanni Suergiu (*Atzeni 1995*) it was used on a long-necked pot to create a motif similar to that at Monte d'Accoddi.

Burnishing is a decorative technique peculiar to the facies of Monte Claro, and in particular to its southern manifestations, but it is absent from the Monte Claro finds recovered at Monte d'Accoddi. This is evidence of the sporadic nature of frequentation of the shrine during the full Eneolithic (Fig. 7.1–3). Among the extremely fragmentary pottery finds, large vessels, tripods, and bowls are present; many bear the characteristic decoration of vertical and horizontal grooves. These grooves are often wide and closely spaced, in the 'Sassari' style. Two small stone axes are also perhaps associated with the same facies (Fig. 7.1–2), decorated with branch motifs; such motifs are not typical of the 'Sassari' style; however, they are well represented in the Monte Claro pottery of the central-eastern area, such as at Biriai-Oliena (*Castaldi 1999*), in south-western and southern Sardinia.

The chronology of Monte Claro (Fig. 2) as proposed by the author in 2007, in the absence of radiomet-

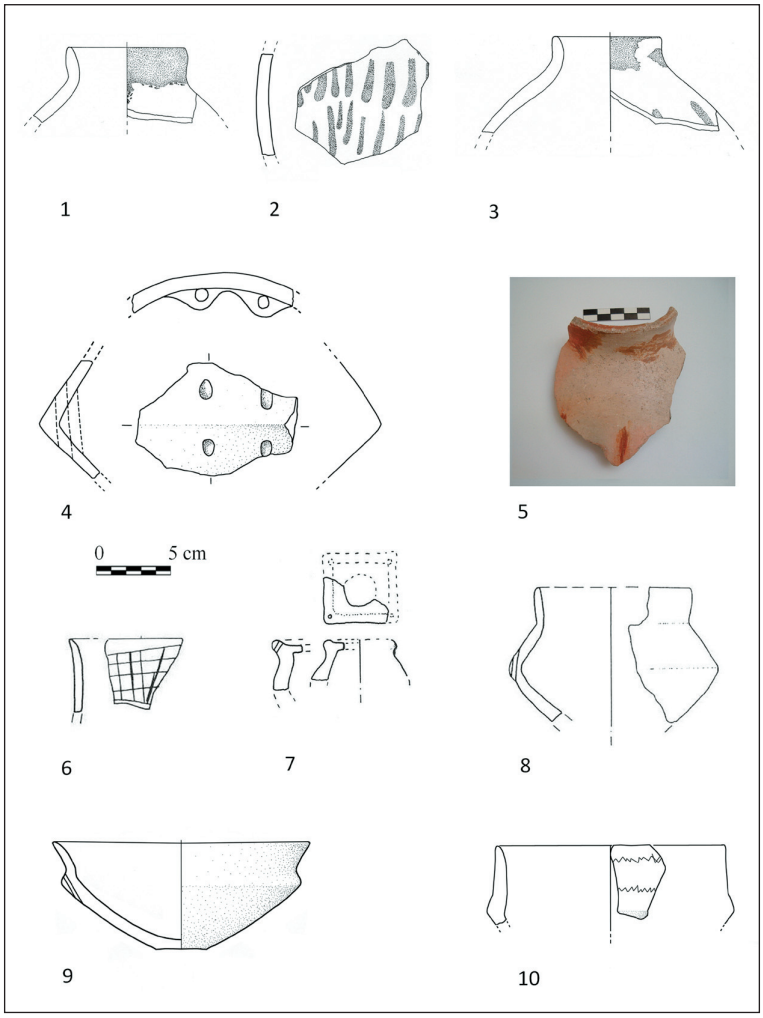


Fig. 5. Sassari, Monte d'Accoddi. 1–5 pottery of the Sub-Ozieri. 6–10 Filigosa facies.

ric dating, but based on elements of cultural analysis together with other aspects (*Melis* et al. *2007*), has been recently confirmed by a series of radiocarbon datings (*Lai 2009*).

Final Eneolithic and Early Bronze Age

The presence of Bell Beaker culture at Monte d'Accoddi must be considered at best sporadic, considering the meagre quantity of finds recovered. Finds include hemispheric bowls (Fig. 7.4), cups, tripods or tetrapods, and carenated bowls. Of the pedestal base pottery, the cylindrical form of a base can be recognised. The vessels are decorated in the pure Maritime style, as well as with more complex arrangements of triangles or zigzags. The most common decoration is comb impressing. Another example is perhaps the use of a shell as a stamp; the use of incision is less frequent. The finds come for the most part from the upper layers, later than those relative to Abealzu. The best preserved find is a hemispheric bowl (Fig. 7.4), decorated with comb impressions over almost the whole of its surface: an ornamental composition that includes zigzag and triangular motifs as well as single horizontal bands. The pattern brings to mind similar motifs such as those found at Su Crucifissu Mannu-Portotorres, Anghelu Ruju-Alghero (*Ferrarese Ceruti 1981*), but also in southern contexts such as S. Bartolomeo-Cagliari (*Atzeni 1966*) and Bingia 'e Monti-Gonnostramatza (*Atzeni 1998*).

Recently, research has shown that Beaker culture is represented in Sardinia at 72, predominantly funerary, sites (*Melis 2010b*), while much more rarely in living areas; the scarcity of available elements prevents us from being able to understand whether the monument at Monte d'Accoddi was still recognised as a site of religious significance during the Beaker period.

When the monument had probably already been abandoned at around the Early Bronze Age, during the period of the Bonnanaro facies, the burial of a young male replete with grave goods took place: the skull of the young man was placed inside a tripod with handles alongside a spherical bowl (Fig. 7.5–6). The tripod is unusual, with its hemispheric basin, due to the low position of the handle: generally with this form, the handle is placed halfway up or directly under the rim. In Sardinia, this ritual has its origins in the Beaker period: for example, in Tomb 3 at Ispiluncas, Sedilo, a skull fragment was placed inside a cup (*Melis 1998*).

Few elements attest to the use of the shrine in subsequent phases: fragments of cooking pots can be compared to those of the Middle Bronze Age; pyramidal loom weights with two right-angled perforations are ascribable to the Final Bronze Age–Early Iron Age.

Domestic activity and ritual

In the case of a site such as Monte d'Accoddi, a village containing a sacred monument, it is often difficult to clearly distinguish domestic from ritual activity.

The large quantity of grindstones point to agricultural activity and the processing of cereals. Numerous mortars and small basins (*Contu 2001*) are evidence of the processing of ochre, traces of which can often still be discerned. This substance was kept in clay containers and used to colour shells, the walls of the monument (the 'red temple'), and to decorate pottery. The widespread use of ochre in religious and funerary contexts in Sardinia is testimony to its importance in prehistoric ritual and its symbolic value (*Tanda 2003*). At the same time, numerous articles in the archaeological and ethnographic literature describe its use in the domestic sphere – for example, as an additive to help fasten tools to their handles (*Lombard, Wadley 2009*), in tanning (*Wadley 2005*) or in medicine (*Velo 1984*).

Alongside objects from the domestic world are elements of a more clearly ritual significance. Among these are symbols of the megalithic mindset, present at Monte d'Accoddi in the phases preceding the construction of the monument: menhir, stone slabs and figure decorated stele (*Contu 1992*), the latter bearing apparently exotic iconographies in comparison to the local examples.

In the sphere of artefacts of clearly symbolic significance, a little attention should be given to the marble pierced plate statuettes, which underlines a defining attribute. Eight fragments were recovered, of which 3 related to the head and part of the neck, 1 to the torso, 2 to the midriff with part of an arm and 2 to the lower extremities (*Lilliu 1999.sheets 104–110*). Their extremely fragmentary state does not seem to be accidental. If, as in one case, drilled holes might represent an attempt at restoration, in others there are evident fractures in the neck, trunk and arms; furthermore, splintering around the head seems to testify to violent intentional destruction. Contu, in his site journal, hypothesises that it was subsequently used as a pestle.

Prenuragic statues are often found in a mutilated state, lacking all or part of the head. Their significance in the sphere of cult practises makes it necessary to pose the question as to whether the fracture was intentional. Ritual fragmentation and the subtraction of the original function of objects in funerary and cult practises are little explored themes in the literature of Sardinian prehistory (*Castaldi 1965; Foschi Nieddu, Paschina 2004*), above all in relation to the analysis of the fractures and method of destruction. Moreover, distinctions are not made between finds regarding funerary rites and those of cult practises. Lilliu considered the breaking of the statuettes at Monte d'Accoddi to be intentional, which, like that in funerary rites, represented "*la divinità materna, di carattere terrestre e frugifero ed anche chtonio*" (*"the chthonic mother divinity, earthy and fruitful"*) (*Lilliu 1957*). In the opinion of the author, their destruction and dispersion were linked to fertility rites.

Burials in Sardinia often contain various types of intentionally broken objects: picks, axes, hammer heads, arrowheads, blades, pottery, and statues (*Cappai and Melis 2005–2008*). The latter are frequently broken at the neck, midriff, or arms, which tend to be the more fragile parts; therefore, in many cases the breakage could be purely accidental. In cases of intentional damage, one should ponder whether the breakage is part of a ritual in which the object maintains or changes its symbolic significance, or whether it loses its sacred value.

These considerations have led to a reconsideration of the statues of Monte d'Accoddi and to the implementation of technological and functional analysis, which is ongoing. The analysis will provide elements to help answer the following questions: were the breakages and fractures really intentional, and what, if any, were the eventual subsequent secondary uses, as hypothesised by Contu?

Spinning and textiles

Spinning and textile production had an extremely important role at Monte d'Accoddi, the first being widely documented by the presence of numerous clay spindle whorls, found for the most part in the area to the east of the site, the latter from a wide variety of loom weights, which would suggest a correlation between these activities and rituals associated with the shrine. Whorls are a common find in Prenuragic Sardinia, while loom weights have been found at 28 different sites, 67% of which were settlements. Only two sites were of a religious character, but loom weights comprised some 56% of all finds retrieved from those sites. Of these, 45% come from Monte d'Accoddi. They are associated with each of the Ozieri, Sub-Ozieri, Abealzu and Monte Claro phases. The possibility that some of the weight fragments that cannot easily be given a cultural identity could be attributed to Filigosa should not be excluded.

Such a concentration of these artefacts in a place of cult activity would suggest that textiles played a part in some way in the rituals associated with the

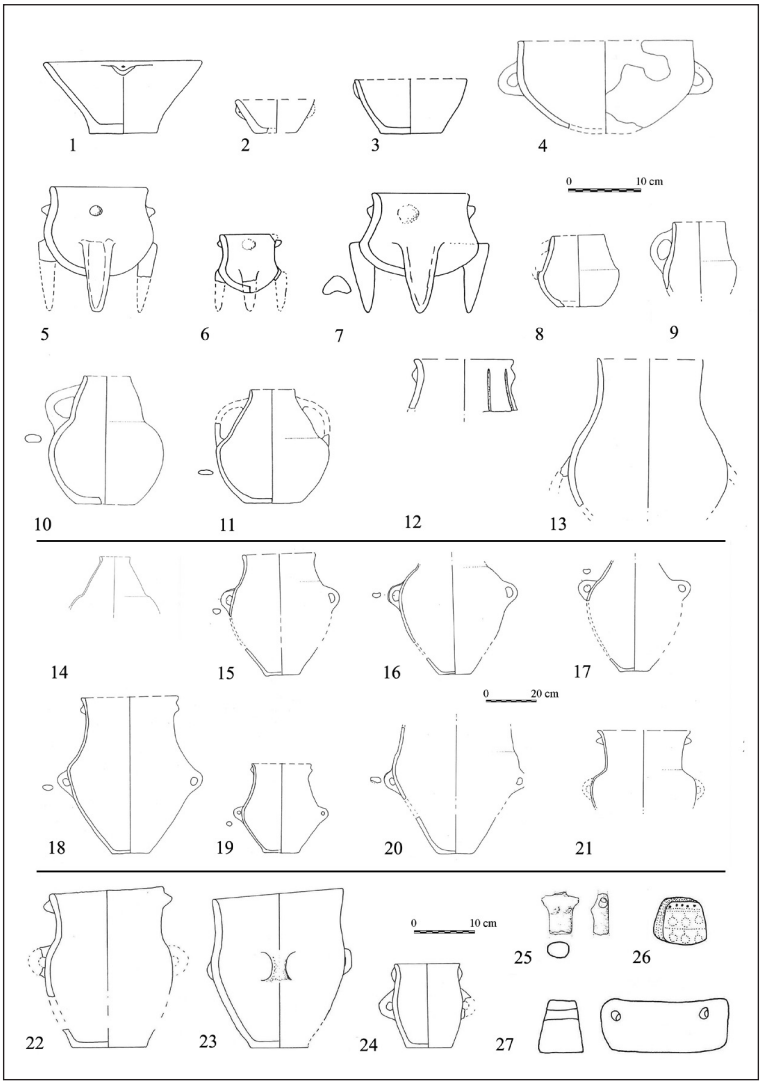


Fig. 6. Sassari, Monte d'Accoddi: pottery of the Abealzu facies from the 'sorcerers hut'.

shrine. Different typologies of loom weights are present: single hole (cones, pyramids, and truncated-pyramids), double hole (kidney-shaped, parallelepipeds; Fig. 6.27), and smaller weights with a row of holes, particular to Sardinia, often decorated with symbolic motifs (Fig. 6.26). These last, in contrast to the others, often exhibit a higher level of technical ability in the finishing and were often much smaller and sometimes impractical.

Hypothesising that this activity would be predominantly a feminine prerogative, as suggested by written and iconographic sources (*Melis 1992– 1993*), we can suppose that females were among the adepts of the cult. If, as literary sources claim, weaving was a metaphor for conjugation (*Guaitoli 2003*), in prehistoric society the weaving of the threads of the warp with those of the weft could be interpreted as symbolic of sexual union, that of the male (the weft) with that of the female (the warp). In this sense, the very act of weaving becomes a ritual activity. On another level, the presence of the weights could be related to the offering of textiles (*Mingazzini 1956*) or the creation of ceremonial dress.

The use of metal

It seems possible that there was metallurgical activity in *loco* beginning from at least the Filigosa phase, based on the stratigraphical data; perhaps this too was related in some way to ritual activity; the evidence consists of finds of various material, crucibles, hammers, grinders, what appears to be a lump of slag and *galets à cupules*. The presence of crucibles is of the utmost importance, considering the extreme rarity of such finds in Sardinia. The excavations of Prof. Contu uncovered 33 metal artefacts and fragments; they were present in the most ancient layers beneath the ramp, correlated with finds from the Ozieri phase. Given that it was possible to see at first hand only a few of the finds conserved at the Museum of Sassari, most of the details are taken from the site records. The objects were predominantly made of copper: point-making tools (45%), several small axes (12%), laminae (6%), an awl, a fishhook, a dagger, and a pendant. Added to these were a small silver disc and several fragments of lead.

Earth as a building material

Evidence on the use of earth and clay in building in Sardinia is infrequent, and there are few serious studies on the subject. The first systematic research concerned mud bricks and the fragments of wall plaster found in the settlement of Su Coddu-Canelles (*Melis 2010a*). Archaeometric analysis of the plaster fragments (*Mameli, Melis 2008*) showed similar characteristics to those sampled at Monte d'Accoddi (*Tiné, Traverso 1992*).

At the site of the shrine of Monte d'Accoddi, the plaster finds were accompanied by fragments of wattle and daub; much information is provided by the buildings of the Abealzu phase, in which the village

spread to the east of the pyramid-like monument. Of special note are the 'dello stregone' hut and hut 'l-o'.

Once again, as at Su Coddu, the use of branches of differing dimensions is apparent, although they are not from marshland plants. Ercole Contu, who directed the site in the 1950's, suggested that the wood came from Pistacia lentiscus, a shrub that grows locally. The fragments were mostly found in the eastern sector, with notable concentrations around the southeast corner of the monument. Surprisingly only a single fragment was recovered from the 'dello stregone' hut, which, destroyed as it was by fire, left a context in excellent condition which should have contained any earthen architectural elements that had been present. In that hut, and others, fireplaces were found, partly surrounded by clay (Fig. 7.7–8), and partly by vertically placed grinding tools.

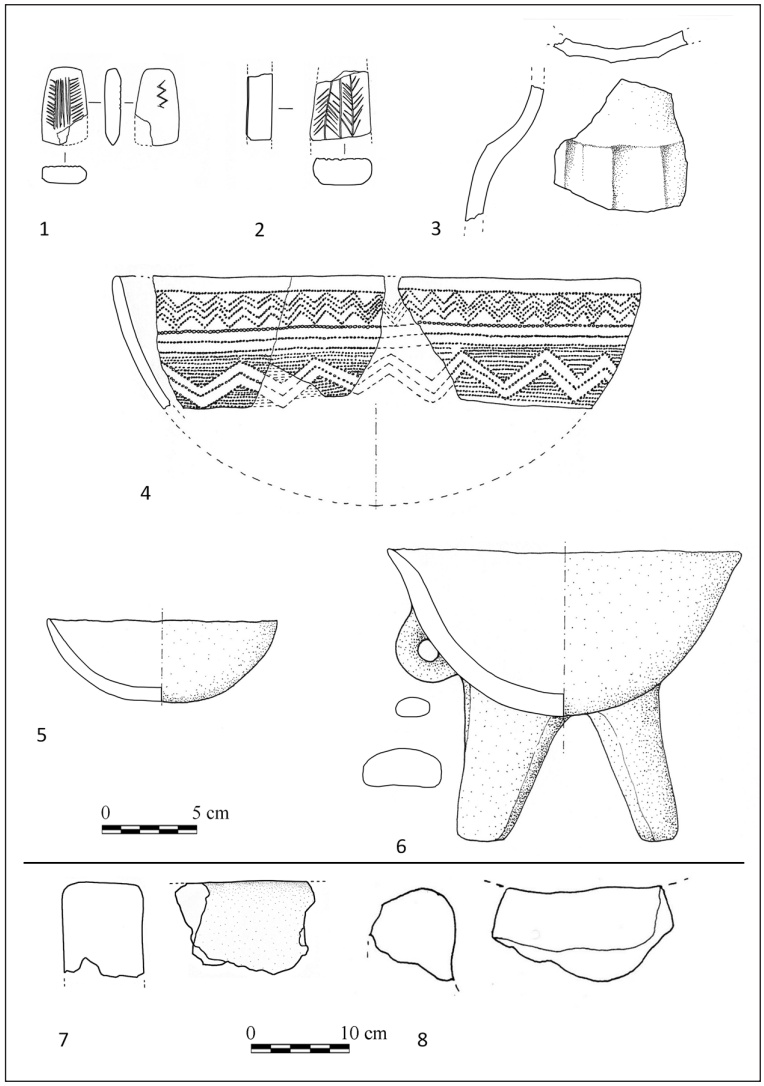


Fig. 7. Sassari, Monte d'Accoddi. 1–2 lithic axes. 3 potery of the Monte Claro facies. 5–6 Bell Beaker pottery. 7–8 fragments of clay fireplace.

Discussion

The revision of the chronology of Monte d'Accoddi introduces a number of considerations on the Ozieri facies, on the end of the Neolithic period and the significance of the monument as an element of tradition and innovation. Contu and Lilliu dated the Ozieri culture to the Late Neolithic on the basis of the radiometric dating and extra-insular parallels (*Contu 1988; Lilliu 1988*). This template has since been followed by most scholars.

The 'Sub-Ozieri', a term coined by Ugas in the presentation of the first results of the Su Coddu excavation, was recognised and well documented during the 1980's as a derivation of the Ozieri facies in the settlements of Su Coddu-Selargius and Terramaini-Pirri (*Ugas* et al. *1985; 1989; Usai 1987*). Some have considered it to be a contemporary of the Filigosa facies, or as its representation as habitation; however, recently it has been possible, thanks to new data from excavations, radiometric dating, and through typological analysis of the pottery, to place it between the classic Ozieri and the Filigosa, in a gradually evolving sequence (*Melis 2009*).

Analysing the Sardinian contexts, it becomes clear how the features associated with the Eneolithic (technological innovations such as the introduction of metal, transformations in craft production, relationship with the landscape, ritual, and changes in socio-economic relationships) appear gradually.

If one considers the period between 3700 and 3300 (calBC), in which those processes of transformation that distinguish the Eneolithic take place on a European scale (*Barfield 2002*), there is a partial correspondence in Sardinia to the development of the Ozieri (Fig. 2).

Knowledge of metal and processes of metalworking are often considered to be among the defining characteristics of the Eneolithic. However, it has been noted by many authors as the earliest metallurgical

phase in the cultural sphere of Neolithic tradition, with different timing and different procedures; this makes it difficult to find a dividing line that clearly separates the Neolithic period from the Eneolithic. The oldest metal artefacts in Sardinia are referable to the Ozieri: these consist of small copper and silver objects associated with metalworking processes still in the embryonic stages, found in equal measure in settlements, cult areas and tombs. With the Sub-Ozieri, the presence of metal artefacts grows considerably, and these come in the most part from habitation contexts. This information, while taking into consideration the limited attestation of the Sub-Ozieri in funerary contexts, could be significant and interpreted as a lack of awareness as to the value of this new raw material, still in its earliest stages of experimentation. Only in the subsequent Filigosa facies does the presence of metal artefacts among grave goods underline its value as a status symbol. The marginal part played by metal during the sub-Ozieri seems to be confirmed by the first results of the technological analysis of craft production Lot Badas at Su Coddu-Canelles, which has not revealed the use of metal in the *chaines opératoires* of hard animal and lithic materials (*Melis 2009*). It is important, however, to highlight that the first direct evidence of metal fusion in *loco* is in the sub-Ozieri, as determined by the find of a crucible at Su Coddu (*Manunza 2005*).

The technological analysis of craft production in stone, ceramics, and solid animal materials shows how during the Sub-Ozieri there is a gradual change in the organisation of production, with a reduction in working times and the application of technological *savoir faire* to limited categories of artefact (*Melis 2009*). This gradual evolution is typical of all phases of the Ozieri tradition, as demonstrated by the typological analysis of the pottery (*Melis 2000*) and the stratigraphic data from Monte d'Accoddi (*Contu 1992*).

The construction of the monument at Monte d'Accoddi during the Ozieri phase is an example of innovation: for the first time, a cult 'space' is located in a building of purely cult significance, and is distinct from a burial 'space'; its architectural characteristics make the monument unique; this is possibly evidence of social change, in as much as it is an expression of communal participation in both its construction and its use. But at the same time, it represents an element of continuity between the Neolithic and the Eneolithic, as well as between the diverse phases of the Eneolithic itself, for the identity of settlement choices, for the gradual evolution of morpho-technological aspects of craft production and for the continuation of similar rituals, among them those related to spinning and weaving, as testified from the Ozieri to the Abealzu.

In the light of this, we could propose the definition of 'Final Neolithic' for the Ozieri, to be considered as a formative phase of the Eneolithic, in the course of which metals appear, and works that imply a communal effort are undertaken; this takes place in an economic undercurrent still typical of the Neolithic, which gradually evolves towards the Eneolithic phases. Agriculture appears to develop more strongly during the Sub-Ozieri, as suggested by the evidence from Selargius and the results on paleo-nutrition derived from the carbon and nitrogen stable isotope analysis (*Lai 2009*), although thus far these results have been taken from a limited sample.

In the light of this data, it is possible to glimpse the gradual passage from the Neolithic to the Eneolithic at Monte d'Accoddi, correlated with a series of socio-economic changes in a background of strong traditions: the building of the first monument represents an element of innovation; the construction of the second, based on the same principle of the 'luogo alto', or 'exalted place' realised through the pyramid-like monument with its ramp, represents the genetic link between Neolithic and Eneolithic, between Ozieri and Sub-Ozieri.

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O-pi e-de-i: on round building as an archetypical form of sacred space in the Aegean

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ABSTRACT – *The archaeological record supports the general proposition that the simplest form of architecture, the round building type, variously persisted throughout the Aegean prehistory. This paper makes a case for the identification of round building as a distinct genre of sacred space in the Aegean Bronze Age, Mycenaean Crete in particular, combining evidence from architecture, iconography and the scripts. Certain archetypical features are thus delineated. It is argued that the historical understanding of the emerging LBA state requires a study of the architecture prior to the 2nd millennium BC as much as other relevant evidence issuing from the latest Aegean strata.*

IZVLEČEK – *Arheološki podatki podpirajo splošno predpostavko, da je najpreprostejša oblika arhitekture, stavbe okroglega tipa, vztrajala skozi vso egejsko prazgodovino. V članku predstavljam prepoznavanje okroglih stavb kot poseben žanr svetega prostora v egejski bronasti dobi, zlasti na mikenski Kreti, kjer se združujejo dokazi iz arhitekture, ikonografije in zapisov. Tako so opisane nekatere arhetipične značilnosti. V članku tudi utemeljujem, da je za zgodovinsko razumevanje nastajajoče poznobronastodobne države potrebna študija arhitekture pred 2. tisočletjem pr.n.št. kot tudi drugih pomembnih dokazov, ki izhajajo iz zadnjih egejskih plasti.*

KEY WORDS – *round building; Aegean Prehistory; iconography; sacred space; archetypical features*

The case in point

Despite the ample, yet at times ambivalent, type of evidence regarding the identification of sanctuaries in the Aegean Bronze Age, the round building has never been discussed as a particular typological genre with concrete archaeological manifestations. The generally perishable nature of the surviving evidence, along with the conservative and unimpressive remnants of an apparently rare type, has certainly contributed to its being a rather neglected body of data. Yet, the archaeology of Aegean religion itself may conceivably be a cause of underestimation, given that it is often through types of object rather than architecture, that a space is understood as religious, cultic or ceremonial, particularly during the 3rd millennium BC. In other words, the earliest instances of the sacred are discerned within deposits that are primarily funerary (as in the Cycladic cemeteries or in the Messara tholoi of Crete), or less often domestic (as in EM Myrtos), or deposits within a natural setting (*cf.* the Cretan Peak Sanctuaries), rather than by means of typical edifices or unambiguous architectural features. In the 2nd millennium BC, the relevant architectural evidence is rich, while varying greatly, both locally and chronologically, owing its standard components, hence its archaeological identification, to the formalising impetus of Creto-Mycenaean palatial cultures.

In this paper, a case will be made for the identification of round building as a distinct architectural category of sacred space in the Aegean Bronze Age, with particular reference to its cultural semantics in the Late Bronze Age.

We intend to expand on our recent findings regarding round building as an important architectural form for the prehistoric cultures of the Aegean in general. Our purpose in this paper is to establish a

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framework for discussion, whereby this distinct genre of building may, on occasion, constitute a distinct realm of the sacred.

We aim specifically to show that the domestic component of round building is paramount in defining its religious character, while being inseparable from it, or closely associated with it, in the course of time; that Palatial Crete has been a catalyst in the process of defining the round building as a standardised form of religious architecture; and that Mycenaean Crete preserves the sort of evidence which supports the notion that round building may be understood as a form of sacred space with archetypical characteristics.[1]

Aegean round building and its significance: an outline of the research

Given that the round form is a simple and elementary sort of space, one needs to discern culture-specific from fortuitous attributes in the relevant architectural evidence. This is important because the evidence in question is widespread in the East and West, including the New World, sharing a good number of common properties or qualitative features, as well as significant differences: investment in perishable structures, particularly during the horizon of sedentism, when the type first occurs, are examples of the former, whereas differences in the absolute dates of foundation or the sort of stratigraphic sequences in which these buildings are embedded pertain to the latter (*Yiannouli 2009. 90–91*). This general character is attested not only among Mediterranean cultures, such as the Aegean and Cyprus, but also within theoretically compact spheres, as in the Aegean itself. The survey we conducted towards that end reveals that the features pertinent to the Aegean cultural sequence develop as follows.

Round building in the Aegean, but also Cyprus, appears to form part of an emerging tradition related to incipient habitation that exhibits a particular tripartite manifestation. This tripartite scheme results from combined architectural and stratigraphic correlations evidenced in the stereo of sites, which are archaeologically traceable as: (i) pits/bothroi, (ii) pithouses with or without pits/bothroi, (iii) non-submerged round or elliptical buildings, often resting on a stone socle, with or without pits/bothroi (*Yiannouli 2006a.Figs 1–6*).

It is very seldom that these three form a complete sequence at the same site, as in the case of Eutresis in Boeotia. Each one, however, may appear independently as (i) or (ii) or (iii), and rarely as (i)/(iii) or (ii)/(iii). It is as yet difficult to judge whether this is due to the fragmentary nature of the archaeological evidence, to excavation and research biases, or to the existence of an ideal scheme whose cultural components match the peculiar archaeological picture as it materialises locally. This incipient settlement horizon appears to emerge with the onset of Neolithisation, thence re-emerging within incipient habitation phases throughout the Neolithic and Early Bronze Ages, regardless of the absolute dates of the respective sites. Any type of correlation that may be thus identified formulates a stratigraphic succession from stage (ii) to (iii) in a few sites, as well as a certain preponderance of stage (iii) during the course of the 4th and the 3rd millennia BC (*Yiannouli 2009. 91–95, Fig. 1–2*).

Stage (iii) or the non-submerged type of round building has so far been attested in the Middle Neolithic, continuing throughout the LN, the FN and the EB Ages in the Aegean. Features commonly shared by this body of evidence relate to the architectural structure itself (generally perishable, often resting on a stone socle), the type of deposit contained (generally domestic), inter-site characteristics (embedded in a settlement, co-occurring with mostly rectilinear houses, set individually or in a small group, occasionally in a stratigraphic succession on the same spot), and also size, varying in relation to wall width and building diameter (the Neolithic instances are generally fewer and smaller than those of the EB Age). The most recently published finds confirm and enrich the scheme outlined. Stages (i)/ (ii)/(iii) are now recorded in stratigraphic succession at an Early Neolithic site at Merenda in Attica (*Kakavoyanni* et al. *2009. 143–152*), although the precise chronology of stage (iii) needs further clarification. Similarly, two huts of the transitional FN– EBI horizon, at Merenda and Houmeza (Spata), respectively (*Petrou* et al. *2009. 129, Fig. 3; Kakavoyanni, Douni 2009.384*) add to the distribution of the relevant evidence (Fig. 1).

The most striking changes within the course of the 3rd millennium include three major transformations (*Yiannouli 2009.103–5*):

- An as yet ill-understood monumental variant emerges at a few EHII sites (Eutresis B, Tiryns, Voido-

1 Some of the points raised here were briefly presented in The European Association of Archaeologists, 16th Annual Meeting, 1st-5th September 2010, The Hague, Netherlands; Session 'Temples and Sanctuaries from PPN to Copper Age: Type, Content and Functionality'.



Fig. 1. Distribution of round huts built on ground level from Neolithic (underlined) and Early Bronze Age settlements. Early Bronze monumental buildings of round shape (black circles) and clay hut models from tombs (Tiryns, Lebena) are also indicated (black squares).

koilia), followed by EMIII–MMIA Crete (pre-palatial Phaistos, *cf.* also the 'bee-hive' Hypogaeum in Knossos).

- Models of round buildings now appear – as grave good dedications in mainland Greece (Tiryns) and Crete (the EMI–IIA model from the Lebena tholos in the Messara).
- The paucity of Neolithic and Early Bronze material from Crete, compared to sites to the north, is considerable and striking, along with the fact that the surviving EM evidence does contain both types of 3rd millennium transformations.

Palatial Crete as a cultural catalyst

The paucity of pre-palatial settlement data, although peculiar to Crete and not typical of the Aegean, seems to develop in ways that are exclusively Minoan during the 2nd millennium BC (*Yiannouli 2009.103–105*). The relevant evidence is capitulated by two major data sets, *c.* 18 MMIII– LMI talismanic seals (*Onassoglou 1985*) and *c.* 23 (18 prehistoric) LMIIIA2–LG/Orientalising, *c.* 1350–late 8th century BC, clay hut models (*Hägg 1990; Mavriyannaki 1972; Mercereau 1993*). Respective scholars contend that these bodies of data are homogenous, no two examples from either set narrowly replicating each other. Instead, they share architectural analogies and structural affinities, despite the time interval between the two groups and the unstratified context of a good number of them. Their conjoined treatment is then legitimate on account of their common form (*cf.* the discussion of the buildings on the seals as round, *Yiannouli 2006b. 41–43*), of analogous structure (perishable and conservative), and aspects of temporal expanse (long time span with gaps elapsing between). That these affinities, common to both data sets, also partake in the general character of 3rd millennium concrete edifices is a perceptible as much as significant parallel, as we intend to discuss in the final section of this paper. Conversely, talismanic seal iconography and plastic representations appear to be a localised phenomenon, peculiar to Minoan customs, cogently transcribing an iconic rendering of the natural world. The comparative analysis of the Minoan sets may then provide indirect, yet precise evidence for the survival of this type in Crete, albeit in iconography rather than actual architecture, which still awaits full assessment (*e.g.* MMII A. Photia or MMIB–MMII/IIA Myrtos-Pyrgos III).

We have already examined those architectural features that recur systematically within and between sets, reaching the conclusion that these representations convey either the reality of an existing building type or the form of a particular building (*Yiannouli 2006b.38–43; 2009.99–103*). The inferred relation between architectural representation and concrete reality accords with previous research on Neolithic and Early Bronze Age building models (*Marangou 1992*) as well as between models and architecture, or between iconography and architecture in the case of Minoan Crete (discussion in *Yiannouli 2009.103*). For the sake of argument, we shall here summarise the main features of the resulting typology, first as a distinct genre of building, then as a particular realm of the sacred.

In all cases, a demarcation of floors in the form of euthenteria is depicted. At times, this is possibly wooden, given the analogous treatment between

floor demarcation and the grooving or juncture between walls and roof, so that wood might have been easier or imperative to depict. On some seals in particular, floors may exhibit vertical strokes in the manner typical of a hut on piles.

Doors are employed in both sets, by way of a handle signal on seals, but concrete, detachable referents in models. It is then conceivable that it is imperative to depict a wall boundary, implying the existence of an opening on the seals, contrary to the models, where it is imperative to stress building permeability instead. If the wall boundary and permeable opening are the two basic constituents of all building, then the two sets stand in inverse relation to each other. This difference may be understood as two different ways of considering the same type of structure, whereby the former stands closer to the experience of the viewer, whereas the latter stands closer to the experiential reality of built space. The importance of the door as an elemental unit *per se* is highlighted by the fact that it constitutes a distinct architectural motif in other seals of the talismanic group (*Schiering 1984*). However, detaching a part from its generic context, as in abstracting a door from its building, seems reasonable with the inferred convention within the seals, contrary to that of models. In other words, the treatment of doors *in abstractio*, be they isolated or visually signaled, stands in inverse relation to the act of permeating itself, which is instead conveyed *in concretio* by the door being modeled in clay.

Walls are rendered as vertical or convex or concave in both sets, plus flaring outwards in certain models only. On seals they consist of uprights, either in groups of two or consecutively in a row, or with an interwoven lattice in between. On models, a tripartite colour code, consisting of red, black and white, is transmitted through the combined use of clays, slips or pigments; and coarse gravel inclusions.

Roofs are invariably pitched with straight or slightly convex or concave sides that at times terminate in eaves on seals, but not models (contrary to the employment of eaves in both 3rd millennium models from Tiryns and Lebena), and bear evidence of thatching (cross-hatching, concentric incisions or even wheel-marks on models). The sprawling straw end of the pitch on a few seals and the flattened disc arrangement on the pitch of some models are reminiscent of an analogous arrangement of the Linear B 123–4 hut ideograms, as well as the much earlier Lebena model, emphasising thus the conservative architecture of this type of building. However, the obtuse roof carination on seals, usually 50° –70°, and the comparatively oblique on models, usually 25°–30°, indicates a live tradition, whereby formal conservatism materialises in culture-specific ways of conveyance.

The conjoined treatment of the evidence in question reveals a distinct architectural typology of huts (for the aforementioned documentation and analysis of material structure, *cf. Yiannouli 2006b. 38–46*):

- Partly submerged huts, the latter with either vertical or outward slanting basement walls.
- Buildings at ground level.
- Pile-huts (also evidenced in Hieroglyphic, Linear A and Linear B scripts, *Evans 1909.198, no. 43; Evans 1921.Fig. 477.S52, and p. 637, n. 2*).

According to the structural material represented, these types may be subdivided in terms of superstructures made of:

- Wood and branches (in seals).
- Clay / pisé or rubble combining into a tripartite, *i.e.* red-black-white, colour code (in clay models). For the sake of argument, one should further add a particular type of vessel to the aforementioned building types, *i.e.* a vessel type that retains the form of a hut, preserving an extravagantly sized sort of handle positioned somewhere other than that expected in conventional door representation.

Note that these patterned similarities give cohesion to the data, irrespective of the wooden or clay structure of the individual examples in each set. Attributes such as the presence or absence of eaves, or roof carination and wall inclination types are cases in point. On the other hand, the very medium and corresponding techniques of manufacture, such as incision on the stone seals and the plastic rendering of clay in models, differentially convey certain intended properties, such as the abundance of construction details in the superstructure of the former and the tripartite colour code on the surfaces of the latter.

That this type of building was also employed as a particular realm for the sacred is, however, denoted not merely by way of resisting radical change in general form, shape, and appearance, but through its overt association with motifs, themes or arrangements that are typical of Minoan religion.

On a few seals, these buildings constitute the focal centre in a tripartite arrangement, laterally flanked with wooden platforms serving as stands for plants

and horns of consecration (*Onassoglou 1985.Tab. X. 9, 11; Yiannouli 2006b.45*). The association of hut, plants, and bucrania are, however, already associated in the Hieroglyphic script and Linear A (the hut ideogram, ox-head and spray, *Evans 1909.198*), thus transferring a concrete reality from a scriptural to an iconic medium of representation.

An analogous case can be made with reference to the extravagant S-shaped handles attached to certain huts on the seals, namely that they depict not real buildings, but building models instead. The association of hut and vessel is far from foreign to the Minoan idiom, as seen in the 'ritual vessel' motif, often topped with a lid in the form of a thatched roof (*Kenna 1969.Pls. 3–4*) or even in the repertory of hut vessels measuring palatial produce, as in the Linear B 123–4 hut ideograms in the G-Series (*Chadwick 1973.Fig. 10*).

The formalising impetus of Palatial Crete seems to survive the end of that era. For one may recall the basic structural affinity between two chronologically (but not geographically) distant cases, namely the hut and cups association of the model from a sanctuary context in Gortyn (Orientalising Period), having as precedence the circular basin filled with cups from Malia, House E (*Yiannouli 2006b.43–45, 48*).

But this is far from an exceptional parallelism between prehistoric and early historical Crete. The Minoan horns of consecration, one of the most typical symbols of palatial religion and cult, would be an example par excellence. This symbol sustains its basic formal attributes and ritual associations during the flourishing palatial era on the island of Crete, but also during its long aftermath from LMIII (Karphi, Kavousi, Vrokastro) to PG–G times (Vrokastro, Patsos, Syme Viannou, Dreros Aphrati?), as evidenced in the respective cult deposits (*Yiannouli 2006c. 305*). In fact, a most eloquent analogy for our purposes derives from the hut models themselves. The LMIIIC–Subminoan clay hut model from Knossos and the Protogeometric B clay hut model from Archanes (see further below) both focus on the symbolism of a goddess with upraised arms at the very centre of their interior.

The significance of the Creto-Mycenaean component in the LM III relevant evidence

The Cylindrical model from Knossos (LMIIIC–Subminoan) comes from the Spring Chamber Shrine of the Palace (*Evans 1921.128–133*), retaining overt affinities with the PGB Archanes model, allegedly from a tholos at Phythies (*Hägg, Marinatos 1991; Sakellarakis 1987*). The Knossos and the Archanes models, however, share what we believe to be a significant feature with some other examples, two of which come from the town of Chania, one possibly LMIIIB? (*Hägg 1990.96; Mercereau 1993. Cat. Nos. 3–4*) and a third from a house in the town of Kastri-Palaikastro of LMIIIB–C (*Mercereau 1993. Cat. No 6; also, Cat. Nos. 18–19*, for the Knossos and the Archanes models, respectively).

The horizon of LMIIIB emerges as a likely post-quem for all five in this particular group, which, despite some undated finds (Chania) or the stylistic dating of others (Archanes), seems to range broadly within LMIIIB?–PGB or roughly 1300?– 850/800 BC. However, certain examples of the evidence in question do date to LMIIIB–C and LMIIIC–Subminoan (Kastri-Palaikastro, Knossos), so that one may reasonably infer the continuous employment of the features under discussion. These do not so much relate to the famous goddess, nor its typical stance, nor even the combination of clay hut and the goddess with upraised arms, although the latter is evidenced in LMIII (discussion in *Yiannouli 2009.106–107*). Rather, it is the amorphous lump protruding at the centre of these models, as well as the way that the goddess herself is incorporated at the analogous spot that compare cogently with two Linear B strands of evidence from the palatial centres of Mycenaean Greece.

On the one hand, the Linear B 123–4 hut ideograms of the G-series, attested in the major palaces of Knossos, Pylos, and Mycenae, are employed in order to measure industrial produce for condiments, as in cyperus and coriander. At Mycenae, the coriander sign forms a ligature with the hut sign, whereas in Pylos it is part of the unguent production process. Consequently, the Linear B 123–4 hut ideograms of the G-series are associated with earth produce, typifying widespread ways of measuring industrial production of particular flora that falls within the interests of palatial administration.

On the other hand, the tablet An 1281 form Pylos, relates to personnel or craftsmen responsible for workshop operations for offerings to Potnia, as in

po-ti-ni-ja i-qe-ja
do-so]-mo o-pi e-de-i

the significant phrase being o-pi e-de-i and translated as 'at her shrine', but literally meaning at her seat (*Chadwick 1973.483–4, 565*). However, in our previous discussion of the word e-de-i < edos <

ἔδος (seat), we traced the evidence according to which ἔδος constitutes the basic semantic stratum of ἔδαφος (earth/ground), for ἔδαφος = ἔδος + ἁφή (ground + touch), ἔδαφος being also neutral after ἔδος. Etymologically, the fundamental semantic stratum of the word ἔδος 'seat' becomes referent, reason and impetus for formulating subsequent semantics, in the manner that 'seat' is a sort of prerequisite for 'abode or residence', *i.e.* the place of a shrine, later extending to include the foundation or base for statues in the historical period (*Yiannouli 2006b. 47–48*).

So, the analogy between 'seat → abode/residence' of a god in direct relation to the semantics of 'ground' or 'earth' stresses the fundamental role of ἔδος, which also seems to apply to the clay hut models in question. The amorphous lump at the centre (Chania, Karphi-Palaikastro) or the very goddess seated on it (Archanes) or emanating from the ground-seat of her place in a manner affixed and inseparable from it (Knossos) succinctly shape the imagery of the fundamental semantic strata briefly exposed.

This chthonic frame of reference is basic, constant and consistent with the multitude of available evidence: hut architecture (perishable structure of wood or earth), its association with particular kinds of flora or earth produce in Linear B, its overt and sustained associations with cemeteries (the Lebena and Tiryns models, the seals from Sphoungara and Platanos, the Archanes model), no less than associations with cult (*Hägg 1990*), particularly the clay hut models from LMIIIA–B Amnisos being next to an inverted cup covering a triton shell, the LMIIIC–Subminoan Spring Chamber Shrine from Knossos, and perhaps the find from contemporary Karphi (*Mercereau 1993.22, Tab. 1*).

Archetypical features in LMIII hut model architecture and the open-ended question of origins

An archetype is a mental construct that pertains to the typical character of an original formation. The term is used here quite literally, rather than in its classic psychological sense, namely as a means to bridge the span between original formations and subsequent manifestations, while assessing the degree, frequency, kind, and modes of such a typical recurrence in time.

Discerning archetypical features in architecture is thus difficult, because these are often confounded with typical formal characteristics. Whereas archetypical features need to be tangible and constant, generally on a par with the formation of typical characteristics, the latter do not invariably lead to the identification of the former. Conversely, archetypical features are impossible to discern irrespective of the recurrent emergence of specific attributes that materialise the fundamental semantics of tangible form. Throughout the Aegean Bronze Age, the common elements of the round building type, *i.e.* a rare or atypical settlement type, its generally perishable structure and its conservative form, are also typical of concrete edifices as much as of round building representations. What is commonly shared (*Yiannouli 2006a; 2006b; 2009*) is then an important prerequisite for assessing what different cultures pinpoint as archetypical in this common repertoire of characteristics.

Turning the question on its head, one may just as well propose that it is precisely the very constancy of the particularities of architectural structure, namely its being conservative, generally perishable and rare, while common to both building and building representation, that capitulate and materialise the elementary constituents of emerging archetypical attributes.

This notion is hard to contest, given that these common attributes can be traced in the relevant evidence over millennia. Indeed, a round hut with a perishable structure of wood or clay, built on the ground or as partly submerged edifice, rarely encountered and, so atypical, compared to contemporary evidence of often greater or even exceptional sophistication, capitulate the standardised character of the material in either real or representational forms. In fact, this archaeologically tenable state of things is tantamount to a corollary of our discussion so far: namely, that the general typology of round building representation after the 2nd millennium evidence echoes the general typology of actual huts in the settlements of the preceding millennia, irrespective of the means and material used in their construction, or conceivable contacts among people from the sites in question. It is, indeed, futile to suppose that people from, say, 3rd millennium settlements dictated in any way the requirements of round building manifestation in the cultures of the 2nd millennium. We have already proposed that the persistent adoption of a particular architectural form is archaeologically evidenced through the local adaptation of certain intrinsic properties: "*...that patterned elements may be diversified locally [indicating] that [an] inferred tradition, or its patterned*

imprint is not predictable or homogenous, but alive and so assimilated according to a local idiom, hence the regional differences encountered even within culturally compact spheres, such as the Aegean" (*Yiannouli 2009.107*). The inferred parallel state, whereby 2nd millennium round building representation conforms to the architectural typology of earlier settlement huts, does adhere to the basic requirements of archetypical features, while retaining the individual character of each specific case. These features, however, being common to all the evidence in question, do not sufficiently differentiate the respective cultural horizons in that sense. One should then construe what may pertain to LMIII, as currently known, in addition to the preceding exposition.

❶ There is an emphasis on the vertical axis of architecture in round hut representation.

We have indicated that the emphasis on the vertical axis of architectural structure, *i.e.* above and below ground, becomes as fundamental to incipient settlement habitation as the horizontal axis of internal and external space common to all building (*Yiannouli 2006a.30, 35–36*). This tendency is portrayed in our stages (i) pits/bothroi and (ii) pit-houses, which construe two of the three ways that an incipient habitation horizon is archaeologically manifest. In the Aegean, the relevant Neolithic and Early Bronze Age sites further record a few cases with the succeeding stage (iii) non-submerged round houses, while many more proceed to mode (iii) directly, as if by-passing (i) and (ii). According to our current knowledge, the vertical axis of building appears to be fundamental in primary architecture, but eventually dispensable with regard to the horizontal axis, which became common in built space. Consequently, the inferred representations of semi-submerged huts with vertical or sloping basement walls (models from Gortyn and Phaistos, respectively, *cf.* discussion in *Yiannouli 2006b.43*) capitulate a basic quality in the act of building in its primary sense. Similarly, the amorphous lump at the centre of models or the placement of the Minoan Goddess at this very spot, even rising from it in the case of Knossos, cogently signal the importance of the vertical axis in incipient habitation settlement.

It is then imperative for some LMIII clay hut models to resort to features (the vertical axis) that pertain to the earliest stages of a construed tripartite scheme regarding incipient habitation, even if the vertical axis is eventually rendered obsolete by the movement along the horizontal.

The vertical axis of architecture and the position of the goddess are then homologous in place, hence the archetypical adaptation of a typically Minoan symbol (the Minoan goddess) to a spatial relation that is fundamental in incipient settlement (vertical axis), as reaffirmed in a combination specific to LMIII (clay hut model and Minoan goddess).

❷ An emphasis on the original type of context, *i.e.* settlement context, is associated with LMIII clay hut models.

Our survey of the Aegean evidence leaves no doubt about the earliest associations of round huts, basement or not, with the earliest habitation sites and with generally domestic deposits. A major transformation occurs in the 3rd millennium, whereby the aforementioned state of things is modified by the erection of monumental round buildings in a few settlements and by the first appearance of clay models in graves as offerings on both the mainland and Crete. Obviously, the association of round building architecture with a funerary context might have had far greater consequences for Crete than the mainland (*Yiannouli 2009.95–97, 103–105*). However, it is from the Palatial Eras onwards that a multitude of contexts preserve the surviving evidence, as in funerary and sacral, including certain palatial sites themselves (*Yiannouli 2006b.46–47*). Palatial interest in specific types of produce appears to employ the type in vessel form and/or actual huts, further illuminating industrial aspects of the Linear B administration. It is then significant that the majority of the LMIII evidence comes from settlements, whereas the PGB models are attributed with a tomb or sanctuary provenance (*Mercereau 1993.Tab. 1*).

It may not then be inconceivable that a settlement context, being original to this type of architecture, recurs persistently, thus reaffirming an original type of relation, in the manner that the vertical axis is fundamental to the incipience of building.

❸ The semantics of ἕδος, associating the meanings of 'earth/ground' – 'abode' – 'female divinity', is significantly portrayed in the Knossos and Archanes models and, elliptically, in the group of five models discussed earlier.

The direct relation between ἕδος and ἔδαφος, ἔδαφος being formed after ἕδος, transmits that the semantics of ἕδος 'seat' is a linguistic precedent for the semantics of ἔδαφος 'ground/earth', literally resulting after the association between 'seat' and

'touch' (= ἕδος + ἁφή). In terms of the most basic semantic stratum then, 'ground/earth' is to be found where 'seat + touch' are narrowly confounded.

The basic semantics in an etymon are culturally significant, in that the etymological meaning is parallel to a sort of 'stereo' in semantic stratigraphy, after a culture-specific, hence non-arbitrary, iconic relation between language and referent (discussion in *Yiannouli 1992.Ch. 2*). It is then of consequence that material culture preserves an analogous configuration, whereby 'seat' is narrowly replicated locally as 'centre' and also as the seat of a female divinity in the closest possible connection, so that 'seat' and 'earth/ground' are inseparable. The amorphous appearance of the lump itself at the centre of floors retorts the imagery of inseparability or low level distinction between place ('earth/ground') and configuration ('seat'), shaping it after the unmediated image of common natural formation. So the coarse and technically poor rendering of the basic referents, 'seat' and 'earth/ ground', are conveyed so that they reaffirm in material culture the elementary semantics configured in language.

Associating basic semantic elements (seat-earth/ ground) with architectural principles typical of incipient settlement (round hut, vertical axis) may then materialise the archetypical features in these LMIII representations.

It is important to repeat at this point that it is the conjoined appearance of all the above features that define the LMIII intent, rather than each feature individually. For seated figures or an unmediated relation to the earth are also basic constituents of Minoan religion in general. The barefoot females in the plethora of processional scenes in Minoan frescoes and signet rings reproduce in tangible form the unmistakable, corporeal quality of such an unmediated relation. The barefoot and bare-breasted female seated on a rocky outcrop on the LMI lentoid from A. Triada (*Younger 1995.173, Cat. No. 129, Fig. LXIIIa*) or the ivory plaque from Mycenae (*Younger 1995.176, Cat. No. 141, Fig. LXIVb*) succinctly convey such precedents, along with the purport of these ideas in the repertoire of the formal arts. Conversely, the impoverished, coarse and technically basic means of conveyance, as well as a possible rustic air in imagery, are better explicable as cues towards the semantic stereo in a cultural palimpsest of custom. So that the coarseness of a representation, technically, materially or in imagery, is not, in our view, a reflection of an artistic regression, let alone license, but the intent to configure and reaffirm in form and/or execution aspects of elementary semantics. This would explain the 'natural' representation of 'seat' in Neopalatial Crete (A. Triada) or during LMIII (Mycenae plaque, the group of five hut models), despite the ability to produce and reproduce magnificent stools or thrones amidst the great variety of such items, including the scripts (*Younger 1995. 168–178, 188–194*).

Consequently, it is not the individual occurrence, but the convergence of the selected elements, namely, principles of incipient architecture (round building/vertical axis), the iconic rendering of the relation between ἕδος and ἔδαφος (seat/earth protrusion), and the goddess herself seated at, or emanating from the 'seat'- centre of floors – that conjoin to adapt the chthonic aspect of Minoan religion (the inseparability or the unmediated corporeality between Goddess and earth/ground) to the architectural and linguistic strands in question (Fig. 2).

The round building as an archetypical form of sacred space in the Aegean may then be definitely traced in the particular LMIII palimpsest, while Palatial Crete itself may currently set a conventional *post quem* for the inception of round building as a form of sacred space. For it is an analogous hut of perishable wood that repeatedly combines with motifs typical of Minoan cult, as in sprays and horns or bucrania, that we see in both talismanic iconography and in the Hieroglyphic script.

However, the question of original associations between a particular building form and a sacred space may not be answered, in our view, solely on account of standardised, hence recognisable manifestations, as those of Palatial Crete. On the one hand, standardisation in religious terms presumes a long formative period. On the other, such an important convergence may long remain latent in the perishable and conservative character of the structures in question. One then needs to delve closely and systematically into the evidence prior to that of the 2nd millennium, partly because the 3rd millennium is an (as yet) insufficiently understood turning point in the course of the round building tradition on both the mainland and Crete, and partly because the surviving or bulk of the known architectural evidence comes from pre-2nd millennium sites.

However, as yet we have studied these cases in terms of common chronological, architectural, structural, typological, stratigraphic and general contextual fea-

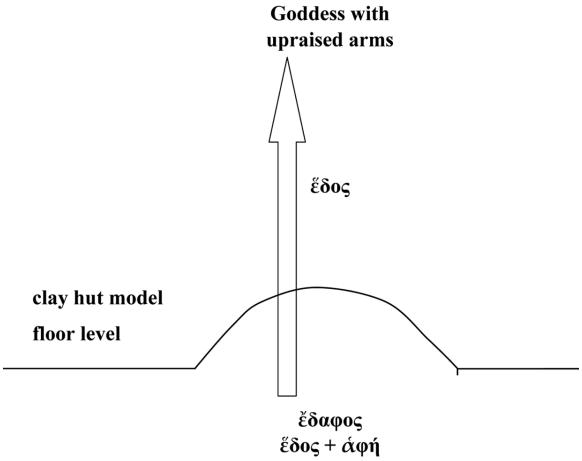


Fig. 2. Schematic association of basic semantic elements (ἔδος > ἔδαφος) with principles of incipient architecture (round hut – vertical axis), as typified in LMIII (clay hut model, the Goddess with upraised arms).

tures on a regional or area level, rather than in terms of individual characteristics, let alone of differential attributes within the respective settlements. Consequently, examining original associations between a particular building form and a sacred space within specific sites defines a distinct research topic resulting from the foregoing analysis and one of the basic objectives of our ongoing study of this genre of building in the Aegean.

Thus, in addition to the primary data, one need not simply search for a round building model in a sanctuary complex or even for a round building used as sanctuary, but for those cases whereby the 'domestic' and the 'sacred' are confounded notions in an archaeological context. For the overall character of this type, be it in concrete architecture or architectural representations, is that of an atypical and infrequent building structure that originates in settlements, persisting over a good number of centuries and resisting drastic change in general form, but not in size or specific formal characteristics. No particular example is replicated in any other in a given group, concrete or iconographic, modest or monumental, yet a limited set of regularities, along which each case seems to have been constructed, has already been set in evidence. This paper in particular concentrated on such a limited set of regularities, singled out as archetypical among the typical properties of LMIII clay hut models. Yet, even a cursory glance at the surviving pre-2nd millennium cases conveys the ample scope for such research. For instance, why do atypical buildings contain typically domestic deposits, as these assemblages are generically identified? Are all 'domestic deposits' of the same order on account of being identified as such, regardless of their being recovered within typical or atypical buildings in a settlement? Is it significant that some round buildings are found in stratigraphic succession at some sites?

Consequently, the singularity of each case and the regularities that provide the cohesion within and between different groups are complementary prerequisites for future discussion with regard to the pre-2nd millennium settlement evidence.

This dual level of reasoning, however, applies to round buildings and their position within sites as much as to architecture in general, particularly as a primary act of settlement. For an incipient habitation horizon does not set a mere marker of sedentism, but the onset of an irreversible cultural shift with a distinctive architectural component whose bearings are locally peculiar, yet potentially prevalent in culture specific ways well after this incipient change of course.

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Ein Qedem 2. A Kebaran site in Nahal Galim, Mount Carmel, Israel

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ABSTRACT – *Ein Qedem 2 (EQ2) is an open-air Kebaran site (Early Epipalaeolithic period,* ca. *22 000 –17 500 calBP) located on the slope of Mount Carmel, Israel. The site is a part of a complex of prehistoric sites situated around the perennial spring of Ein Qedem and near the outskirts of the city of Haifa. EQ2, located near affluent sources of flint, presents ample evidence for Kebaran flint knapping. The rich flint assemblage provides valuable information concerning the microlithic industry, one of the hallmarks of the Epipalaeolithic period in this region.*

IZVLEČEK – *Ein Qedem 2 (EQ2) je najdišče na prostem, ki datira v obdobje Kebaran (zgodnji epipaleolitik, ok. 22 000–17 500 calBP), in se nahaja na pobočjih gore Carmel v Izraelu. Najdišče predstavlja del kompleksa prazgodovinskih najdišč, ki se nahajajo v okolici trajnega izvira Ein Qedem in na obrobju mesta Haifa. EQ2, ki se nahaja v bližini bogatih virov kremena, nudi veliko dokazov o kebaranski tehniki obdelave kamnitih orodij. Bogat inventar kremenovih orodij nudi dragocene podatke o mikrolitski industriji, ki predstavlja enega izmed razpoznavnih znakov obdobja epipaleolitika v tej regiji.*

KEY WORDS – *Ein Qedem 2; Mount Carmel Iris; Kebaran; Epipalaeolithic*

The site and its environment

The Ein Qedem complex includes a series of prehistoric sites situated on the north-eastern bank of Nahal Galim, and on the northern bank of its tributary, Nahal Neder (Figs. 1–2). The site of Ein Qedem 2 (EQ2) is situated *c.* 200m a.s.l. near the perennial spring of Ein Qedem. It is located *c.* 700 metres north-east of Ornit Cave (*Olami 1965; 1984.46; Rosenberg, Nadel in press*) and only hundreds of metres downhill from the southern outskirts of the city of Haifa.

Nahal Galim basin, as part of the western Carmel range, is principally made up of the Main Chalk Complex of the Isfye and Khureibe/Arqan Formations (*Picard, Kashai 1958; Segev, Sass 2006*). The local formation varies laterally from soft to hard chalk or limestone, and contains abundant flint horizons interbedded within the chalk layers. The Main Chalk Complex is overlaid by a succession of reef-related limestone, dolomite, and an intermediate marl unit, comprising also the Muhraqa Formation. Locally developed volcanic rock units, mostly pyroclastic, are common as lenticular intercalations in the chalk (*Segev* et al. *2002*).

The rocks are covered by shallow soils of the *Terra Rosa* type, combining a fine-grained texture with a high content of stones, and rarely showing any profile development (*Inbar* et al. *1998*). Vegetation on the *Terra Rosa* soils is characterised by the *Quercus calliprinos-Pistacia Palaestina* maquis association (*Pollak 1984; Zohary 1962*). Today, the original vegetation is disturbed in many places, in some replaced by pine trees. Quarrying debris of flint extraction loci are found in abundance near the site, in Nahal Galim and Nahal Ornit (*Rosenberg, Nadel 2009*).

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The survey and excavations

The site was found during the prehistoric survey of Mt. Carmel conducted in the 1950s and 1960's by J. Olami, A. Ronen and their colleagues. They identified four separate prehistoric occurrences at Ein Qedem, termed Ein Qedem 1, 2, 3 and 4 (*Olami 1975; 1984.49, 52, 56–60; Olami* et al. *2003.57*). While at Ein Qedem 1, 3 and 4, Olami and Ronen identified mainly Neolithic and Chalcolithic remains "*where axes and sickle blades predominate*" (*Olami 1984. 52*), at EQ2 they also noted important Epipalaeolithic components, including bladelet cores and bladelets (*Olami 1984.52*).

The Epipalaeolithic remains were found scattered over three natural terraces of Nahal Neder (Figs. 3–4), 200m a.s.l. and approximately 60m above the Ein Qedem spring. They cover an area of *c.* 8000 square meters. The upper terrace (A) is 7m above the middle terrace and 19m above the lower terrace (C). On the terraces, shallow agglomerations or patches of sediments, usually dark heavy clay, with occasional small limestones (< 6cm), were noted between rock exposures. Historical and modern activities are evident in different parts of the site and its vicinity.

Following the survey of Olami and Ronen, a two-week excavation season took place at EQ2 in the 1970's (*Ronen 1978*). The excavation focused on the area where Epipalaeolithic finds were most common. During the excavation, four 1m² probes were excavated; two in the upper terrace and two in the middle terrace (Fig. 4). The sediments were excavated in 0.25m² units and 5cm horizontal spits. All sediments were taken to the Stekelis Museum at Haifa, and wet sieved through a 2mm screen. A thorough surface collection of 25m² was also conducted, with a grid set on the middle terrace, where the richest place of finds was observed.

In most squares, the excavation reached a maximum depth of *c.* 20cm below the present surface. However, excavation was halted only when bedrock was reached. No clear occupational layer or in situ features were found during the excavation, and it soon became clear that the site suffered from erosional processes. The excavators concluded that no clear difference, in terms of typology or technology, could be noted between the surface finds and the excavated material, and thus all remains should be regarded as belonging to a single cultural entity. In addition to the lithic assemblage, only a few basalt fragments and isolated bones were noted in the excavation. Intrusive elements include some pottery shards and a few glass pieces.

Also, several bedrock features were noted by Olami. He reported of two bedrock mortars sets (16 and 18 specimens) in proximity to EQ2, as well as other bedrock features (*Olami 1984.59*). We inspected these and found a few additional isolated examples, including a few near the spring. These are usually large in diameter (Fig. 5); however, their size and depth varies. There are round and oval specimens, and some appear as 'sets'. Their exact dating is unclear and further work is needed to determine to which site or sites of the Ein Qedem complex they should be attributed.

The lithic assemblage

Thousands of flint items were found and collected at EQ2 in 1977, both in the excavated squares and the systematic surface collection of the middle terrace. The flint artefacts were stored at the Stekelis Museum after 1977. Recently, during a project of sorting the Museum's collections, we came across the unprocessed EQ2 boxes. We randomly selected 23 units from the excavated squares and 10 units from the surface collection. These were studied in order to characterise the assemblage in terms of techno- typological components, and thus assign it to a prehistoric cultural unit or a period. As no clear or significant differences were noted between the two studied samples, the results are presented together.

A variety of raw materials are present; the dominant colours are grey, beige and white (yellow and grey patinas are common). All types of raw materials could be found in abundance on Mt. Carmel, including items made of the locally available flint of Nahal Galim. Some of these sources, on the western slopes of Mt. Carmel, were recently surveyed by Druck (*2004*), who correlated flint sources with knapped flints found in the Middle Palaeolithic and Epipalaeolithic layers in the Mt. Carmel caves.

The studied assemblage includes 6039 flint items (Tabs. 1–2). Of these, 5429 (89.9%) items are debris, mostly chips (n = 5074, 84.0%). Tools comprise 28.0% of the tool and debitage assemblage (n = 171), while cores comprise only 3.8% (n = 23). The assemblage is bladelet oriented (32.1%), and together with blades (4.1%) the laminar elements clearly outnumber the flakes (14.1%).

Category	N	%
Tools	171	28.0
Cores	23	3.8
Primary elements, blades	14	2.3
Primary elements, flakes	36	5.9
Blades	25	4.1
Bladelets	196	32.1
Flakes	86	14.1
Core trimming elements	50	8.2
Burin spalls	9	1.5
Sub-total	**610**	**100.0**
Chunks	355	
Chips	5074	
Sub-total	**5429**	
Total	**6039**	

Tab. 1. General breakdown of the flint assemblage.

Tool type	N	%
Scrapers	1	0.6
Retouched blades	19	11.1
Retouched flakes	23	13.5
Notches and denticulates	4	2.3
Retouched fragments	21	12.3
Ouchtata bladelets	2	1.2
Retouched bladelets	14	8.2
Micro points	1	0.6
Truncated backed bladelets	1	0.6
Obliquely truncated backed bladelets	3	1.7
Truncated bladelets	1	0.6
Notched bladelets	2	1.2
Retouched bladelets, fragments	49	28.6
Backed bladelets, fragments	27	15.8
Varia	3	1.7
Total	**171**	**100.0**

Tab. 2. Breakdown of tool types.

The cores (Figs. 6–9) are mainly small amorphous bladelet cores (flake scars are scarce), and most were exploited until they were exhausted (a few were used to produce bladelets only 20mm long). Most cores are 39–59mm long, and we included here two smaller specimens that may represent small carinated scrapers. A few broken cores were noted as well. Many of the cores show minimal preparation and modification. The striking platform was prepared by one or a few cortical removals, and the bladelet production side was shaped as a narrow and almost flat surface. Most cores still bear much cortex on the rest of the surface.

Several bladelet cores are thin and the production surface is located on a narrow facet of the core. In some cases, the left side of the core was hardly touched (still with cortex) while only the right side was flaked to shape and control the debitage surface. Some of the cores were clearly abandoned because of hinges damaging their front. Primary elements (8.2%, mostly flakes) and core trimming elements (8.2%, Fig. 10) indicate local core preparation and reduction. The latter include crested blades, core tablets, rejuvenation pieces, and many items classified as varia.

Most tools in the sample are made on bladelets (n = 100, 58.5%). The rest include a single scraper, retouched blades (11.1%), retouched flakes (13.5%), notches and denticulates (2.3%), retouched fragments (12.3%), and three tools classified as varia (Fig. 11). The retouched flakes and fragments are usually small.

The microliths (Fig. 12) clearly attest to an Early Epipalaeolithic affiliation. Particularly important within the identifiable specimens are one micro-point and three obliquely truncated backed bladelets. No geometric microliths were identified within the sample or in other units that we inspected. Also conspicuous are two Ouchtata bladelets and several fragments with delicate retouch. However, within the microlithic group, fragments of retouched bladelets (28.6%) and of backed bladelets (15.8%) are the most abundant objects. Some of the microliths still bear cortex. Fragments are proximal, medial or distal. Width is usually between 5 and 7mm.

Discussion

EQ2 was probably a small camp of a mobile group of hunter-gatherers, enjoying the favourable affluent conditions of Nahal Galim, with its rich environs of the woody Carmel eco-system and the open (a few kilometres wider than today) plains of the Mediterranean littoral, the perennial Ein Qedem spring and the proximity of the rich Nahal Galim and Nahal Ornit flint sources (*Rosenberg, Nadel 2009*).

The sampled assemblage and a random observation of many additional lithic materials from EQ2 clearly indicate that the site should be attributed to the Kebaran cultural complex of the Last Glacial Maximum (*e.g., Bar-Yosef 1981*). This conclusion is based on the dominance of bladelets among both tools and debitage. Moreover, most cores found are thoroughly exploited bladelet cores. Some of these bladelet cores demonstrate a typical narrow core reduction

sequence noted at other Kebaran sites (*Bar-Yosef 1991.330–331; Shimelmitz 2002.100*).

The chipped stone assemblage of EQ2 is characterised by its pronounced microlithic component. The tools show a clear preference for elongated and narrow bladelets, retouched in a variety of ways, from Ouchtata to backing. The micro-points and obliquely truncated backed bladelets are typical Kebaran, but the sample should be enlarged in order to determine to which Kebaran complex the site should be assigned. As we found neither geometric microliths nor lunates, it seems reasonable to suggest that the site was occupied by Kebaran groups during the earlier phase of the Epipalaeolithic period.

Kebaran sites are found throughout the southern Levant and were previously grouped into four clusters, their attributions based on the characteristics and frequencies of several microlithic types (*Bar-Yosef 1981; Bar-Yosef, Vogel 1987*). It is widely agreed today that the complex encompasses various facies that could be distinguished along chronological and geographical guidelines (*Bar-Yosef 1970; 1981; 1991; Bar-Yosef, Vogel 1987; Fellner 1995; Goring-Morris 1987; 1995; 2009; Goring-Morris, Belfer-Cohen 1998; Shimelmitz 2002*).

Kebaran sites are known in, and on the fringes of, the Carmel Range (including the coastal plain) at sites such as Haifa 1 and probably Haifa 2 (*Olami 1984.21–24; Yeshurun, Bar-Oz 2008*), Nahal Oren (*Bar-Yosef 1970.33–41; Noy* et al. *1973; Stekelis, Yizraely 1963*), Sefunim (*Ronen 1984*), Raqefet Cave (*Lengyel 2009; Nadel* et al. *2008*), and Kebara (*Bar-Yosef 1970; Bar-Yosef* et al. *1992; Turville-Peter 1932*), and at more distant locations such as Ma'agan Michael (*Prausnitz 1969*), the Nahal Hadera sites complex (*Godfrey-Smith* et al. *2003; Gophna* et al. *1973; Kaufman 1976; Ronen, Kaufman 1976; Ronen* et al. *1975; Saxon* et al. *1978; Shimelmitz 2002*), and other occurrences on the Mediterranean Coastal Plain and the Carmel Range (see *Bar-Yosef 1970; 1991; Olami 1984*). EQ2 is thus one of several other Kebaran occurrences in this area of the southern Levant. In fact, this part of the range is one of the richest in terms of Early Epipalaeolithic sites, and is an area where both caves and open-air sites (situated on the slopes, terraces, and coastal plain hamra hills) were occupied by Kebaran groups.

In spite of the caution necessary when dealing with assemblages retrieved from sites and contexts that underwent erosional and other post-depositional processes that may have affected the final location of the finds, it seems that the large and homogeneous EQ2 flint assemblage provides us with important insights into the Early Epipalaeolithic period in the region. However, while our preliminary analysis – which included only a small fraction of the assemblage – allows us to suggest that the site should be incorporated within the Kebaran complex, further affiliation of the site to one of the traditions characterising this complex must await additional studies that will include an enlargement of the analysed sample and further morpho-metric observations. Bearing this in mind, and although the validation of the following still needs verification, it is possible that the position of EQ2 near the rich flint sources of Nahal Galim and Nahal Ornit is not random and could further hint at some degree of control of a Kebaran group or groups over this important resource and its procurement in the early phases of the Epipalaeolithic period.

ACKNOWLEDGEMENTS

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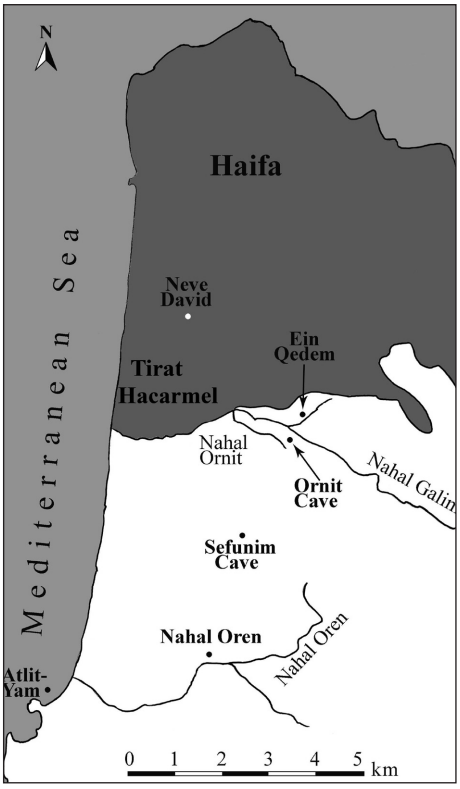


Fig. 1. Map showing the location of Ein Qedem and some of the sites mentioned in the text.

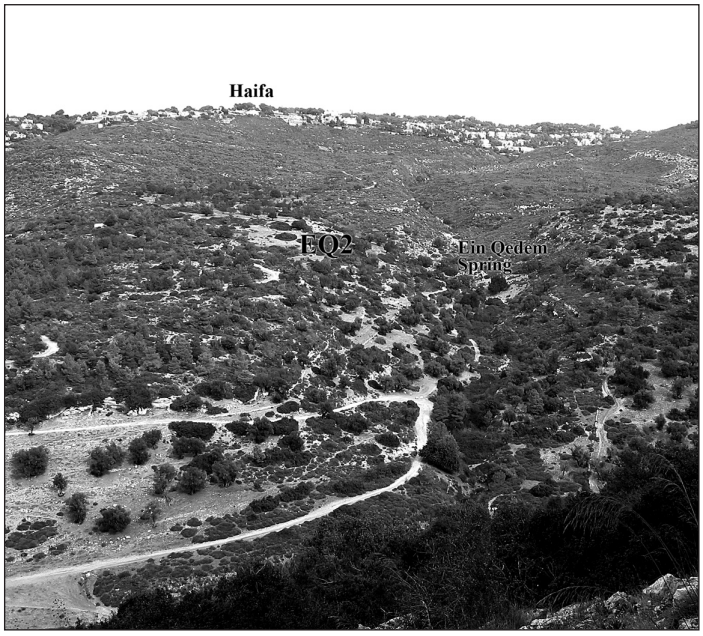


Fig. 2. A general view of Ein Qedem 2 and Nahal Neder from Ornit Cave (up on the hill are the southern outskirts slopes of the city of Haifa).

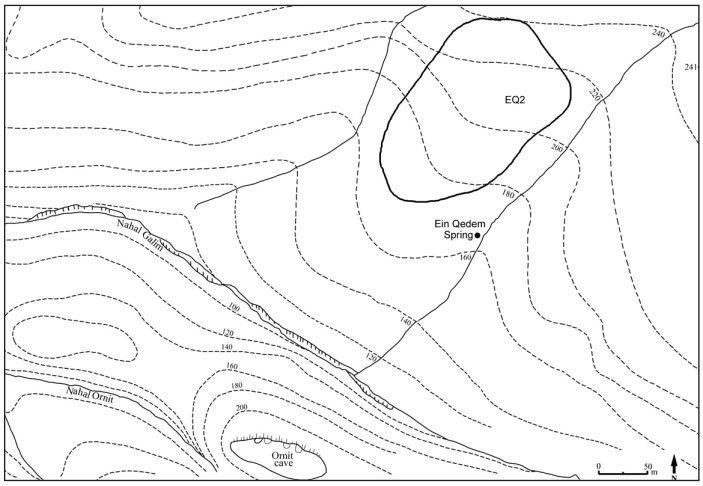


Fig. 3. A topographic map showing the location of EQ2.

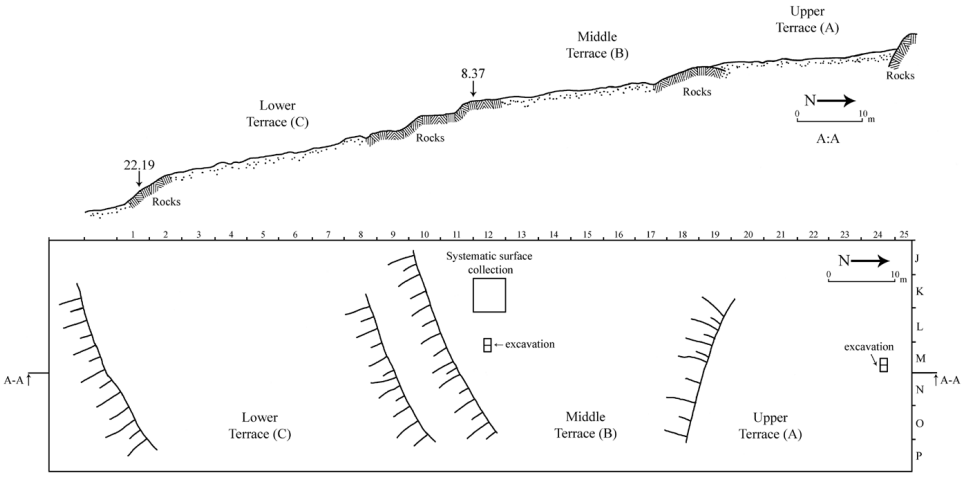
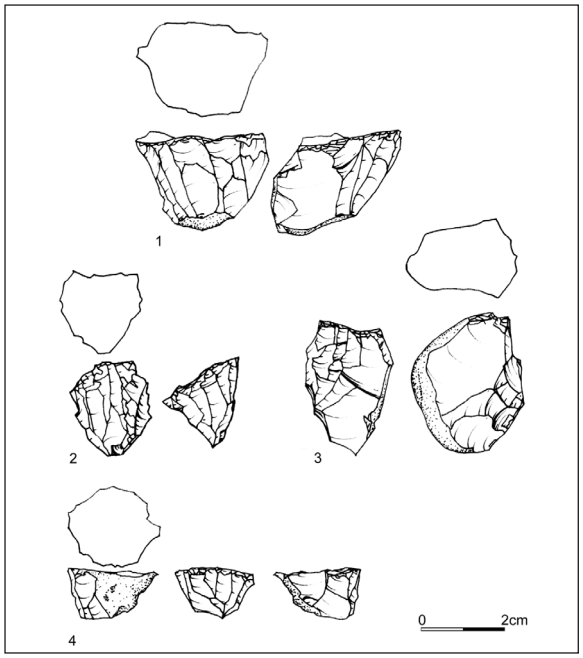


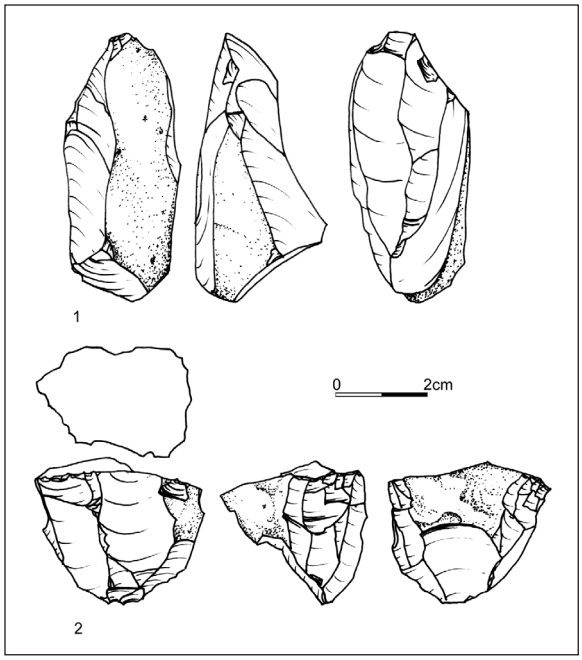
Fig. 4. Plan and section showing the location of excavation probes and the surface collection.

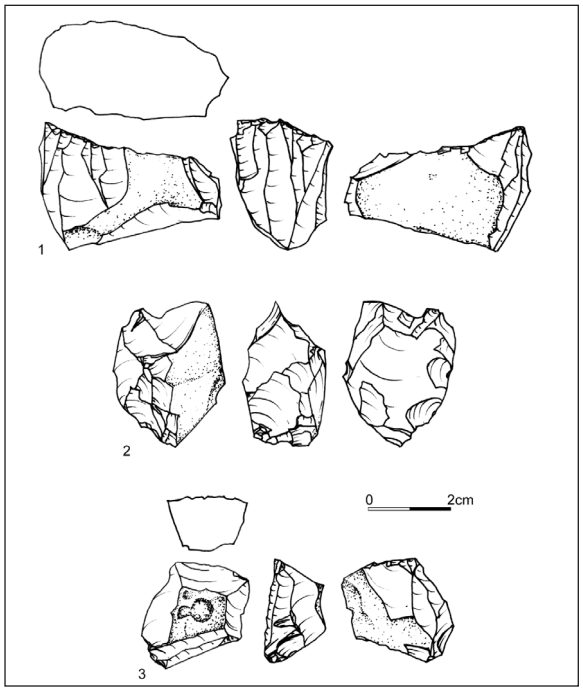
Fig. 5. Bedrock features near EQ2.



Fig. 6. (below left) EQ2. Cores.
Fig. 7. (below right) EQ2. Cores.







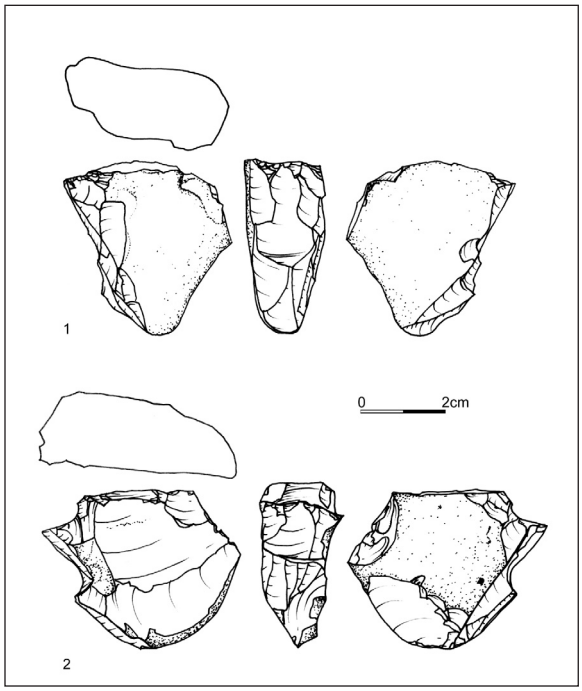


Fig. 8. EQ2. Cores.

Fig. 9. EQ2. Cores.

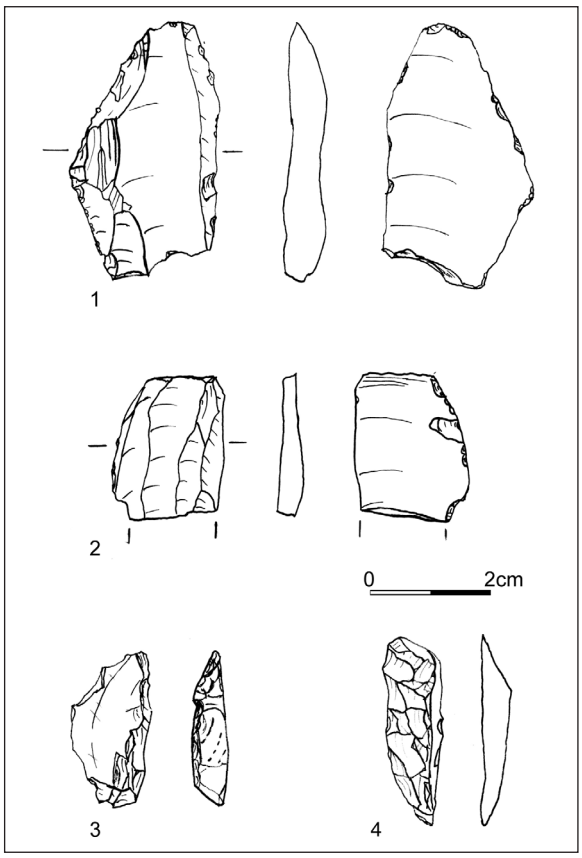


Fig. 10. EQ2. Core triming elements.

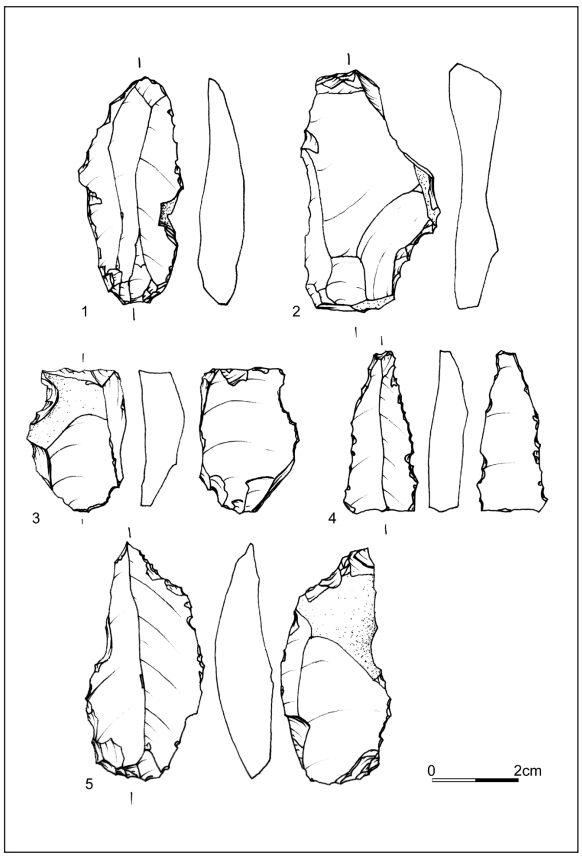


Fig. 11. EQ2. Tools.

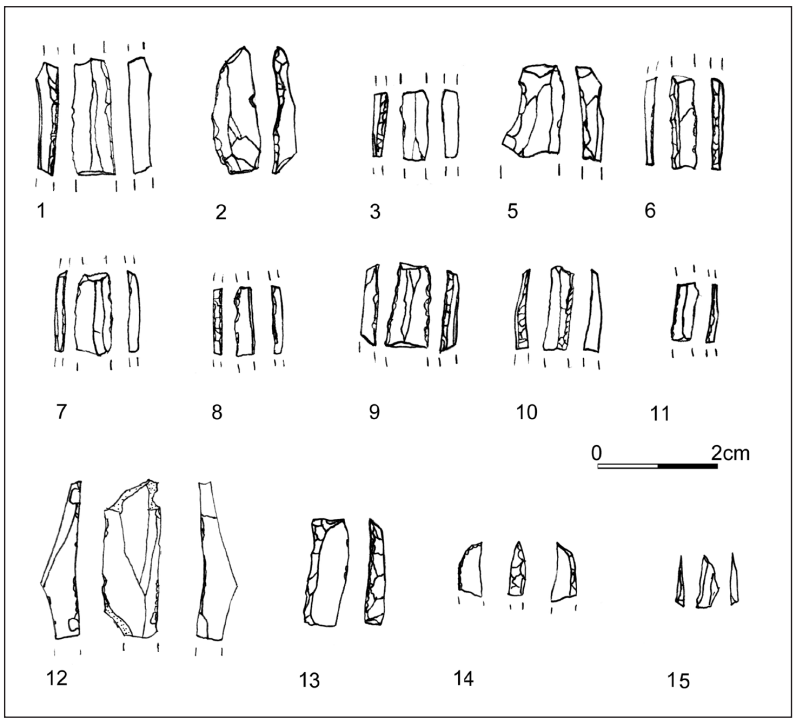


Fig. 12. EQ2. Tools (microliths).

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Karahan Tepe: a new cultural centre in the Urfa area in Turkey

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ABSTRACT – *In this study, the finds from Karahan Tepe, which have already been published as news articles, will be evaluated and compared with those from nearby PPN neighbourhoods in order to reveal their similarities. Of particular interest is a new find, a snake-shaped relief carved on a T-shaped pillar revealed by illegal excavations, and how similar reliefs are known through finds from Göbekli Tepe.*

IZVLEČEK – *V članku predstavljam najdbe iz Karahan Tepe, ki so bile že objavljene v časopisnih novicah, in jih primerjam s tistimi iz bližnjih sosesk iz obdobja predkeramičnega neolitika, da bi odkril njihove podobnosti. Posebno zanimiva je nova najdba reliefa v obliki kače na stebru v obliki črke T, ki so ga odkrili z nelegalnimi izkopavanji, in njene podobnosti z reliefi, ki so znani na najdišču Göbekli Tepe.*

KEY WORDS – *Pre-Pottery Neolithic; T-shaped pillar; Urfa; Göbekli Tepe; SeferTepe*

Introduction

Karahan Tepe settlement was first discovered in 1997, but was surveyed in 2000 and again in 2011 within the course of the Şanlıurfa City Cultural Inventory. The settlements are located within the boundaries of Şanlıurfa (ancient name Edessa), a city in southeast Turkey. The settlement lies on a plateau known as the Tektek Mountains (Tektek Dağları) 63km east of Şanlıurfa. Like Göbekli Tepe, Hamzan Tepe and Şanlıurfa Yeni Mahalle PPN (Pre-Pottery Neolithic period) settlements located around the Harran Plain in the Urfa Region, Karahan Tepe is also a PPN settlement located on a high plateau foot on the eastern side of Harran Plain.

During the surveys on Karahan Tepe in 2000, basin-like pools carved in bedrock and a considerable number of tools of flint, obsidian, river pebble, and limestone were discovered. The finds show that the settlement was in use in the Pre-Pottery Neolithic period. Furthermore, there were many T-shaped pillars, which are also familiar from Nevali Çori, Sefer Tepe, Hamzan Tepe and Göbekli Tepe. As a result of a new survey in 2011, a new snake-shaped relief was found carved on a T-shaped pillar, of which half was formerly revealed by illegal excavations.

The settlement at Karahan Tepe is located approximately 705 metres above sea level, at 39° 30' 22" East, 37° 08' 15" North. The settlement was located in a high region of the Tektek Mountains. The region constitutes the southeast end of the Urfa plateau and is a hilly region in terms of geomorphology, rather than being mountainous (Map 1). The limestone region is arid and heavily eroded. The settlement is located between two rocky hills (Map 2; Fig. 1). It extends over an area of 60 000 square metres[1]. Flint and stone limestone layers in molar shapes appear 1km east of the settlement. On the other hand, the nearest basalt source is 15km north of the site.

1 In a former news article written on Karahan Tepe, this size was incorrectly given as 325 000 m² (see *Çelik 2000b.6*).

It is understood from an examination of the limestone and architectural finds that Karahan Tepe was used as a major settlement during the Pre-Pottery Neolithic period (*Çelik 2000b.6–8*). The only settlement to compare in dimensions with this major site which lies on the eastern edge of Harran plain is Göbekli Tepe, which is three times bigger (*Beile-Bohn* et al. *1998; Schmidt 1995*). Karahan Tepe settlement was probably in a good location for setting traps and hunting, due to its proximity to Harran Plain, and having impassable valleys nearby in the Early Holocene period (Figs. 2 and 3). At the settlement, flint stone finds can be seen extensively over the whole area, numbering approximately 50 per 1m².

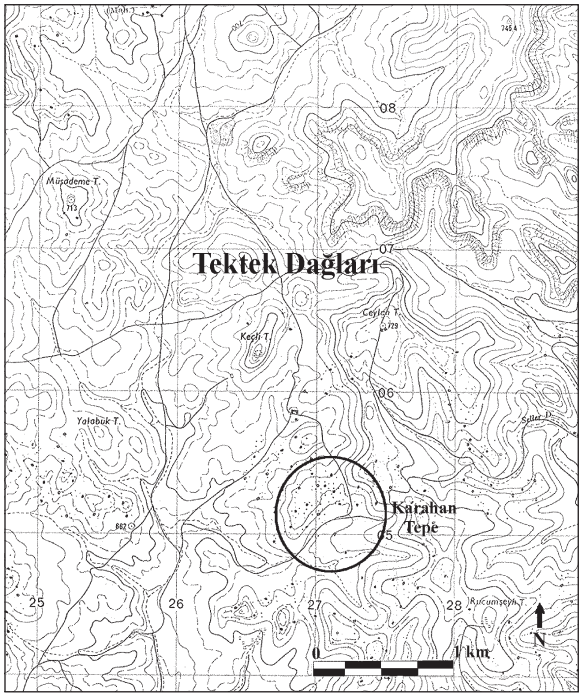
Karahan Tepe seems to have been inhabited only during the Pre-Pottery Neolithic period. Finds are categorised as architectural elements, finds with depictions and small finds. The small finds comprise tools made of flint and obsidian, chisels and adzes made of river pebble, beads, stone pot fragments, grind stones, and pestles. There are 617 small finds and 274 architectural finds; 266 of the architectural finds are in-situ T-shaped pillars (*Çelik 2000b.4*).

Pre-Pottery Neolithic assemblage in Karahan Tepe

Architectural elements

In Karahan Tepe, there is a considerable number of architectural finds, many of which have been preserved in good condition. In the east of the settlement, almost the whole area apart from what was used for agriculture and which is full of rocks, is covered with T-shaped pillars which are still in-situ, with only the top 50–60cm visible on the surface (Fig. 4). These pillars were erected in rows, and spaced 1.5–2 metres apart. Some pillars revealed by illegal excavations are between 1 and 2m high, between 20 and 25cm thick, and between 90 and 50cm wide (*Çelik 2000b.4–6*). Many have deep flutes on their sides (*Hauptmann 1991/92.28*). The upper parts of the Neolithic wall and wall corners can be seen clearly in patches. Groups of circular cavities on rock surfaces with a diameter of 30cm and a depth of 10–15cm, which are also familiar from Göbekli Tepe and Hamzan Tepe, can also be seen here as examples of the technique of pool carving (*Çelik 2010.Fig. 6; Beile-Bohn* et al. *1998.Abb. 20*) (Fig. 5).

A T-shaped rock part ready to be removed from the bedrock on the west foot of the settlement and on a 30 degree slope was found in what we think was a quarry for producing T-shaped pillars (Fig. 6). This



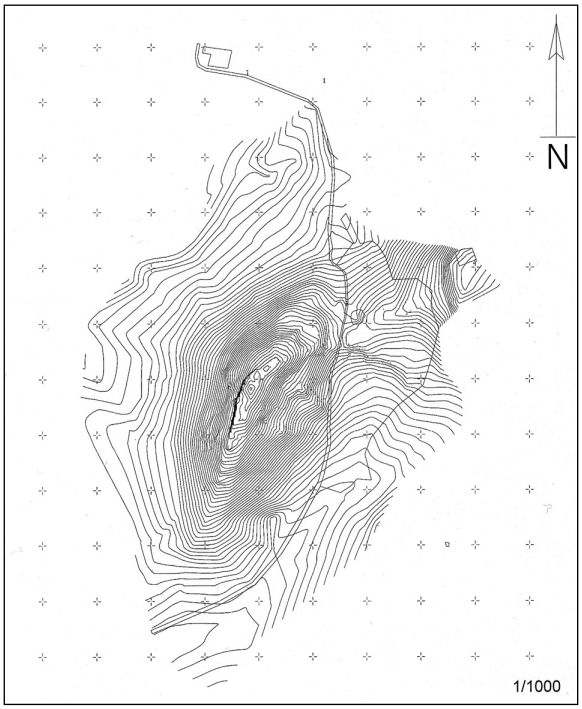
Map 1. The site at Karahan Tepe.

pillar is approximately 4.5m high, 1.5m wide and 80cm thick. A similar pillar which is ready to be removed was found in Göbekli Tepe. This pillar outline, with a height of 7m and an upper part of 3m, is twice as big as the pillar outline at Karahan Tepe (*DAI 1997.552, Fig. 1; Schmidt 1998.4*). This is a quite practical technique, with roughly chiselling on the side of the rock to produce a T shape, whilst carving the other side 40cm wide and 1m deep. The solid pillar separated from the bedrock with this technique can easily be removed from the quarry also with the help of a slope. The quarry is located immediately on the western edge of the settlement.

In the settlement, there are no pillars higher than the one in the quarry. However, such large pillars may be found at lower levels. Still, it should be noted that the pillars found at Göbekli Tepe are also not close to this height of 7 metres. This shows that the pillars in the quarry were scaled down to 1/3 proportion. There is a high possibility of finding pillars with a height of 3m during excavations. Although no terrazzo floors have been found, they are expected to be found at lower levels. However, a staircase-like remnant was found on the east side of a plain rock which is still part of the settlement.

Reliefs and sculptures

The finds with depictions on limestone from the settlement consist of two snake reliefs carved on the sides of pillars, one piece from a carved and orna-



Map 2. Map of Karahan Tepe.

mented pillar, one piece from a male statue, one bird-shaped relief, and three pieces of a stele with reliefs on which human-shaped arms can be seen.

In the east of the ruins, the farmland was also disturbed by illegal excavations. There is a pair of pillars, side by side, 1.5m apart (Fig. 7). On one side of one of these pillars, there is a 70cm snake relief (Figs. 8, 9 and 10) with a round head and curled body, which probably continued to the broken part of the pillar (*Çelik 2000b.Fig. 1*). The snake relief on the short side of the pillar is similar to those found on totem poles in Göbekli Tepe, and the snakes on grooving stones and on flat stone plaques from Jerf el Ahmar (*Stordeur* et al. *1996.Fig. 5; Schmidt & Schmidt 2010.Fig. 1b; Schmidt 2010.Fig. 18*). The dimensions of this pillar, the lower part of which is broken, are 1.28 x 75 x 21cm. Opposite the example with the snake relief is a second pillar – found in 2011 – with a barely distinguishable snake relief on one side (Fig. 11). Only the head of the snake in a triangular form is visible, as only the top part of the pillar was revealed by illegal excavations. Similar snake reliefs are known from the upper parts of pillars and statues in Göbekli Tepe and Nevali Çori settlements (*Schmidt 2004.Abb. 3, 6; Hauptmann 1999a.Fig. 10*). These two pillars are the same size as the pillars found at the 'Löwenpfeilergabäude' structure in Göbekli Tepe (*Beile-Bohn* et al. *1998*). This shows that the pillars at Karahan Tepe might well be contemporary at least with the architecture of the Göbekli Tepe II layer. Furthermore, they are already the same size as the in-situ pillars revealed at the surface level at Göbekli Tepe (*Çelik 2000b.7*).

Another group of surface finds comprises animal figures carved on a piece of a pillar (Fig. 12a, b). On the existing 40cm surface of 86cm long stone, the head and forelegs of a rabbit, the hind legs and tail of a gazelle, and the hind legs of an unidentified animal are visible (*Çelik 2000b.Fig. 2*). Another piece, part of a wide, fluted pillar, has an animal leg in relief on both sides – the only example of this type to be found in the region (Fig. 14). Due to the high relief figure of a lion on a pillar at Göbekli Tepe, found in 2006, the mystery of the pieces found at Karahan Tepe has been resolved (*Schmidt 2008.Abb. 2g*). These stones are probably fragments of reliefs made on pillars with high relief technique. Two similar stele pieces were also found with animal reliefs (Fig. 15).

Moreover, an anthropomorphic statue with a phallus, which has the same characteristics as a Yeni Mahalle sculpture, was found (Fig. 16). This new find is an interesting example in having the same features as statues found at Göbekli Tepe and Yeni Mahalle (*Çelik 2000a.4–6; 2007.Fig. 4*).

Small finds

There is a total of 617 small finds from Karahan Tepe. The flaked stone assemblage consists of flint and obsidian pieces, with 541 flint (87.7%) and 50 obsidian finds (8.1%) – a total of 591 (95.8%). Other finds are: 4 pieces of basalt pestles (0.65%); 7 pieces of flat axes made of river pebbles (1.13%); 6 pieces of stone bowls (0.97%); 7 pieces of stone beads (1.13%); 1 piece of stone object (0. 16%) and 1 piece of a bone object (0.16%).

There is also a fragment of a jar carved from limestone and familiar from Göbekli Tepe.

Technology and typology of lithics

Plenty of flint and a few obsidian finds were found at Karahan Tepe; most of these relate to the blade industry. The number of Palaeolithic finds is 591, of which 541 are flint, while 50 are obsidian (Tab. 1).

The highest proportion of the flint assemblage are blades. Some are completely preserved, their length varies between 5, 8 and 2.8cm; the width between 1.8 and 1.1cm; and the thickness between 0.5 and 0.2cm. On the other hand, the length of flakes varies between 4 and 2.1cm, while width ranges between

3.7 and 2.5cm, and thickness between 1.4 and 0.5cm.

Overall, there are 193 pieces of debitage products, consisting of blades and flakes. The flint tools are represented by 294 pieces (54.3%) in the whole group of flint finds (Tab. 1). There are also 25 pieces of manufacturing waste, 168 pieces of blades, 23 pieces of flakes, 30 pieces of cores and core renewing tools, and one piece of burnt flint among other flint finds.

The flint tools comprised 194 arrowheads, 20 perforators, 40 end scrapers, 30 sickle blades, 8 burins, one hammer, and one bifacial tool. If the flint finds at Karahan Tepe are compared to those from Göbekli Tepe, the proportions at Göbekli Tepe are 20% arrowheads, 10% perforators, 17% burins, 11.2% scraper, 15% sickle blades (*Schmidt 2001.51–52, Fig. 9; Beile-Bohn* et al. *1998.59*), while the proportions at Karahan Tepe are 66.21% arrowheads, 6.82% perforators, 2. 73% burins, 13.66% scrapers, and 10.24% sickle blades (Tab. 2).

As raw material, well-qualified flint stones were used. Surveys have revealed some flint deposits one kilometre east of the site. Only two bipolar cores have been found.

Regarding the range of colours of the flint finds, 224 are grey (41.4%); 60 are light grey (11.1%); 88 are dark grey (16.26%); 42 (7.78%) are brown; 101 (18.66%) are light brown, 18 are black (3.32%) and 8 (1.48%) are cream/beige.

At Karahan Tepe, there were five pieces of cores which are all bipolar (Fig. 17.1–2). They frequently have the form of a naviform core. The existence of some blades that are shaped out of a unipolar core, show that bipolar cores were used at the site. However, in the recent survey, no unipolar cores have been found. The blade flaking of bipolar cores varies between 1 and 1.5cm. Three pieces of five cores which have been examined are broken; only two are well-prepared.

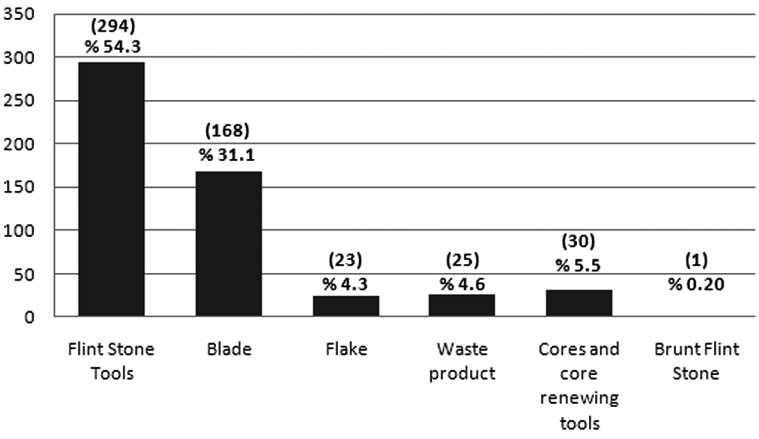
Among the blades and tools with blade handles the proportions of trapezoid cross-section blades with blade blanks is 91%, while the proportion of triangular cross-section blades is 9%.

At Karahan Tepe, the total of 30 (5.5%) cores and core rejuvenation fragments is very rare in the whole group of flint finds. Only five (16.6%) are cores. Apart from these, 9 (30%) pieces of core renewing and 16 (53.4%) strap blade fragments were found (Fig. 17.3). Most of the cores are dark brown and grey; cores of similar colour were found at both Göbekli Tepe (*Beile-Bohn* et al. *1998.54*) and Nevali Çori (*Schmidt 1988.162*).

There are 50 obsidian finds; as a tool, only one end scraper was found among them (Fig. 17.4). The other obsidian finds are blade fragments, flakes, and waste. The proportion of obsidian in the find group is 8.46% (Fig. 17.5–7).

Examining the flint tools in terms of typology, it is clear that there are tool types from the Pre-Pottery Neolithic. Arrowheads constitute the majority. The most significant of these are Byblos, Nemrik, and Aswad types. There is a total of 194 pieces of arrowheads; of this number 137 pieces are 'Byblos' type (71%); 2 are 'Aswad' type (1%); 33 are 'Nemrik' type (17%) and the remaining 22 (11%) are unidentified.

Upon examination, it is clear that there are similarities between the arrowheads dated from the late phase A to the mid-phase B of the Pre-Pottery Neolithic at the site (*Cauvin 1994.78–95*). Similar arrowheads were found at Göbekli Tepe (*Schmidt 2001a.52, Fig. 10/3, Fig. 11/5*) and Mureybet (*Cauvin 1994.79*)



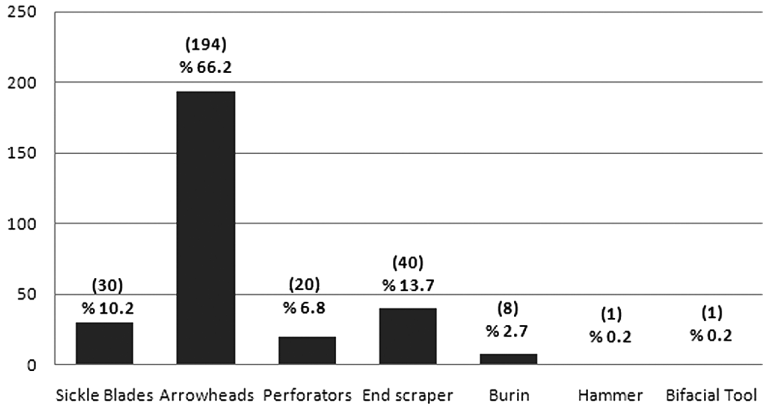
Tab. 1. Karahan Tepe flint stone finds (n = 541).

'Byblos' type arrowheads

At Karahan Tepe, 'Byblos' type arrowheads are represented by 137 items. These have been assessed according to their retouched types as falling into six groups. Blades were taken from both bipolar and unipolar cores, due to the fact that some of the directions of the arrowheads

are single track, while others are multi track.

All the arrowheads between type I and type VI (Figs. 18, 19 and 20.1–7) show similarities with those from Göbekli Tepe (*Schmidt 2001.52, Fig. 10.4, 6*), Cafer Höyük (*Cauvin 1994. Fig. 26.3*), Nevali Çori (*Schmidt 1988.171–174, Abb. 11.1–6, 12.1–3*), Chiekh Hassan (*Abbes 1993.Fig. 8. 10*) and Mureybet IVb (*Cauvin 1994. Fig. 24.1, 3*) These arrowhead are in general classified as Byblos Type, and categorised as early Pre-Pottery Neolithic (*Cauvin 1994.78–79, Fig. 24.2*).



Tab. 2. Karahan Tepe flint stone finds (n = 294).

'Nemrik' type arrowheads

At Karahan Tepe, only 33 (17%) pieces of such arrowhead types were found. While there are 23 examples of intact arrowheads among these, the other ten pieces are broken (Figs. 20.8–12, 21.1–4) There are nine on which the direction of blade flaking of the arrowhead is single-track, whereas there are 24 bi-directional arrowheads. The arrowheads in this group are classified according to their retouched types into three groups. Blades were taken from both bipolar and unipolar cores, due to the fact that some of the directions of the arrowheads are single-track, while others are multi-track. All the arrowheads between type I and type III show similarities with those from Göbekli Tepe (*Beile-Bohn* et al. *1998.Abb. 22/2–7, 10–12*), Nevali Çori (*Schmidt 1988.Abb. 14/4; 2001.52, Fig. 11.1–11*) and Çayönü's Grill planned phase (*Coşkunsu 1999.229–232, Şekil 41/d–k*), Irak-Nemrik (*Kozłowski 1999.Pls. III, XL*), Iraq-Ginnig and Iraq-Kermez Dere (*Kozłowski 1999.Pls. VI, V*).

'Aswad' type arrowheads

At Karahan Tepe, only 2 (1%) pieces of such arrowhead type were found; one is complete, while of the other one, only the lower part remains (Fig. 21.5–6).

On the preserved proximal part of the arrowhead from the dorsal side, the distal part is retouched from the ventral side. Blades were taken from both bipolar flakes, due to the fact that some of the directions of the arrowheads are single-track, while some others are multi-track. Arrowheads of such form were found at Şanlıurfa-Yeni Mahalle (*Çelik 2007. Fig. 26*), on the surface at Göbekli Tepe (*Schmidt 1998.Abb. 4.7; 2001.53*), in layer I at Nevali Çori (*Schmidt 1996.Fig. 3.8; Cauvin 1994.Fig. 27.2*), and at Aswad I Aa, I Ab and II. layers (*Cauvin M. C. 1995. Fig. 93.1, 2, 3, Fig. 95.1, 2, 7, Fig. 99.5; Cauvin 1994. Fig. 14.1, 2*).

Unidentified arrowheads

Unidentified arrowheads are represented by 22 (11%) items. Considering their blade width and thickness, they are the upper parts of either arrowheads or spearheads, apart from one spearhead and one fragment, which is considered to be part of a spear. Apart from one, nothing is known about their forms.

Perforators

There are 20 (6.8%) perforators among the finds at Karahan Tepe. Four are intact and sixteen items are broken (Fig. 21.7–13). Some are quite large. The handles of all perforators are made of blade or small bodkins. Among the other tools, the proportion of perforators found in the second layer of Göbekli Tepe is approximately 10% (*Schmidt 2001.51, Fig. 9; Beile-Bohn* et al. *1998.59*), and they show similarities with perforators found at Karahan Tepe. Also, similar small perforators to those found at Karahan Tepe were discovered in Çayönü's settings phase. The existence of perforators at Karahan Tepe, we believe, correlates with the refined bones and stone objects found at the site. Stone and bone knick-knacks made with skilled workmanship are proof of this.

Sickle blades

A total of 30 silica sickle blades were found (10.3%) (Fig. 22.1–6). The silica sickle blades from Karahan Tepe comprise 10%. Similar silica sickle blades have been found in the region at Şanlıurfa-Yeni Mahalle and Sefer Tepe (*Çelik 2007.Fig. 22; 2006.24*). The total of silica sickle blades found at Karahan Tepe is 10%, while it is 41% for those found at Şanlıurfa-Yeni Mahalle. The silica sickle blades found in the

Göbekli Tepe's second layer comprise 15% (*Schmidt 2001.Fig. 9*), and 17.6% at Gürcütepe (*Beile-Bohn* et al. *1998.43*), and 15.5% at Nevali Çori (*Schmidt 1988.169*).

Hammer
Only one hammer tool (0.3%) was discovered at Karahan Tepe; the surface is worn from use, and one side is broken. Similar tools have been found at all Neolithic settlements.

Burins
Eight burins (2.7%) were found at Karahan Tepe (Fig. 22.7–12). Similar burins were found at Nevali Çori (*Schmidt 1988.Abb. 10.2*), Göbekli Tepe, Akarçay Tepe, Çayönü, and all other Pre-Pottery Neolithic settlements. In the Pre-Pottery Neolithic B period, as at the Karahan Tepe settlement, there are usually burins used for pruning (*Schmidt 1988.171, Fig. 9.9*).

End scrapers
There was a large number of end scrapers at Karahan Tepe – a total of 40 (13.6%), 4 of which are rounded. Others were in various shapes. End scrapers and round end scrapers are of the same dimensions. Both end scrapers and round end scrapers were produced with the same technology (Fig. 23.1–10). The reason for so many finds of end scrapers could be the T-shaped pillars found in-situ at Karahan Tepe. It is believed that end scrapers were the most appropriate tools for chiselling the pillars. The scrapers at Göbekli Tepe's three openings from the second phase, also with T-shaped pillars, comprised 11.2% of all tools. (*Schmidt 2001.51, Fig. 9*); at Şanlıurfa-Yeni Mahalle it was 6%.

Bifacial tool fragment
One bifacial tool fragment (0.3%) was found at Karahan Tepe. The length of this brown flint tool is 5.2cm, while it is 4.9cm wide and 3.6cm thick; most of the top part and a piece of the bottom part are broken. Also, a small part of one face is unpeeled. This bifacial tool can be dated to the 'Acheulian' Phases (*Taşkıran 2002.53*).

Obsidian tools
There were fifty obsidian tools (8.1%). Among these, there was one end scraper (0.3%); the others are bodkins, small bodkins, chip pieces and waste from manufacturing (Fig. 17.4–7). The sizes of the obsidian bodkins vary from 3.5 to 0.9cm in length, 3 to 0.9cm in width, and 0.9 to 0.1cm in thickness. Nine are black, and 41 are made of translucent black obsidian.

Ground stone assemblage
There were 17 stone finds (2.75%) at Karahan Tepe. These include 4 pieces of pestles (Fig. 24.1), 7 pieces of adzes and cutters made of river pebble in different forms (Fig. 24.2–3), and 6 stone vessel fragments, 3 of which are limestone, and the other 3 chlorite. One of the 3 chlorite vessel fragments bears a snake relief in zigzag form (Fig. 24.7–8). Similar chlorite vessel fragments were also found at Hallan Çemi, Demirköy, Göbekli Tepe, Çayönü, and Körtik Tepe settlements (*Özkaya and San 2003.425; Çambel 1974.Fig. 14; Özdoğan* et al. *1999.Fig. 61; Rosenberg 1994.126; Rosenberg* et al. *1999.Fig. 3*).

There are also 7 (1.29%) coloured stone beads and 1 stone object in this group. Three of the stone beads are in good condition, while the others are broken (Fig. 24.5–6, 9). The stone object (Fig. 24.4) is cylindrical; similar ones were found at Ain Mallaha (*Cauvin 1972.Fig. 23.2*) and Shaar-Ha-Golan settlements (*Cauvin 1972.Fig. 5.1, 23.2*). Cauvin regarded stone objects in this form as stylised human figures deriving from a Natufian period tradition in the Levant (*Cauvin 1972.20–31*).

Concluding remarks

Karahan Tepe is a single period settlement only – that is to say, in the Pre-Pottery Neolithic period, like Göbekli Tepe. This feature protected the settlement from later ravages, so that the settlement has lasted in-situ until the present.

There are settlements contemporary with Karahan Tepe from the Pre-Pottery Neolithic at Sefer Tepe, 15km north, and Şanlıurfa-Yenimahalle, 63km west, and 40km west of Göbekli Tepe. The small finds from Karahan Tepe most closely resemble those from Hamzan Tepe, Şanlıurfa-Yeni Mahalle, and Göbekli Tepe (*Çelik 2003.37, 53; Schmidt 1998.Abb. 5.4, 6.4*). The pools and cavities carved on the bed rocks to the east and south of the settlement are also similar to the pools and cavities found at Göbekli Tepe and Hamzan Tepe (*Çelik 2000b.7; Beile-Bohn* et al. *1998.Abb. 20*).

Karahan Tepe's current appearance, with pillars in the ground, is very similar to the Göbekli Tepe II layer pillars. In the light of all the finds, it can be stated that Karahan Tepe seems to be contemporary with Göbekli Tepe's upper layers and Neval Çori's Layer III. The absence of Palmyra points and Çayönü tools leads us to date this settlement to the Early Pre-Pottery Neolithic B period (*Çelik 2000b.7*). The

pillars in-situ on the surface at Karahan Tepe have features which cannot be seen at any Neolithic settlement in the Şanlıurfa region. Fortunately, the pair of opposed pillars were thought by the local villagers to be tombs, so the villagers did not remove them or use the land for farming.

In a new visit under a survey project carried out in 2011 at the settlement, a tally-like description and a snake relief with a triangular head were also discovered (Figs. 11 and 13). This snake relief at Karahan Tepe can be compared to those found in layer III of Göbekli Tepe, so Karahan Tepe may be contemporary with Layer II of Göbekli Tepe. However, it may be possible to date this settlement back to phase A of the Pre-Pottery Neolithic after future excavations at Karahan Tepe.

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Fig. 1. Karahan Tepe from the east.



Fig. 2. Tektek Mountains and Harran Plain.



Fig. 3. Tektek Mountains.



Fig. 4. In-situ T-shaped pillars.



Fig. 5. Small chiselled holes in the bed rock, positioned side by side to form a circle.



Fig. 6. Quarry for T-shaped pillar.



Fig. 7. The pair of pillars.



Fig. 8 (left). Limestone T-shaped pillars with snake reliefs.

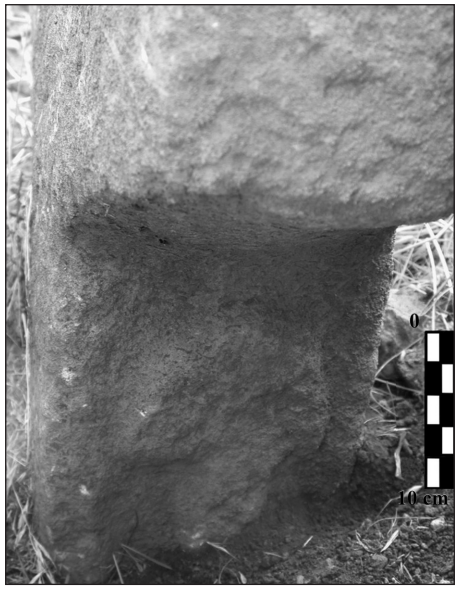


Fig. 11 (right). The newly discovered snake relief.

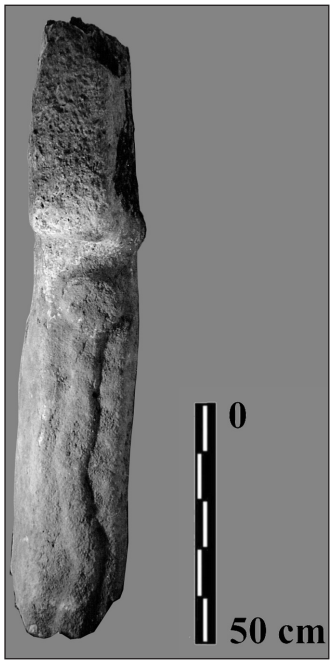


Fig. 9. Snake relief.

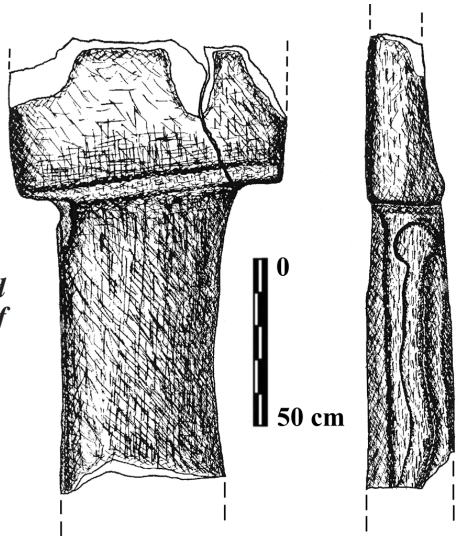


Fig. 10 (right). T-shaped pillar with snake relief (drawing B. Çelik).

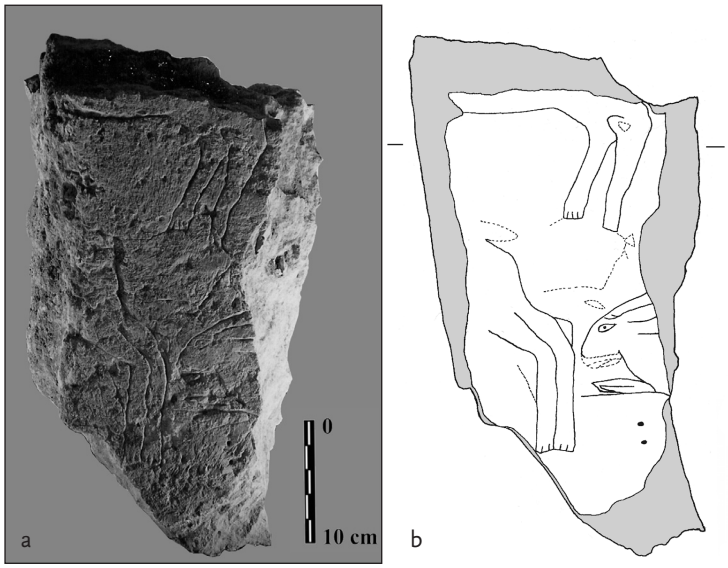


Fig. 12. Animal figures carved on a fragment of a pillar (drawing B. Çelik).

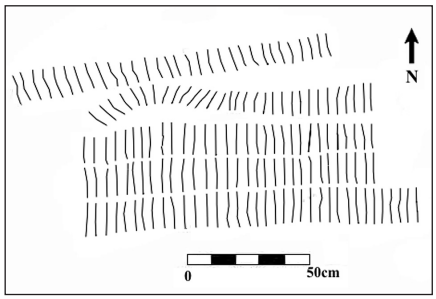


Fig. 13. Tally-like description on the limestone rock.

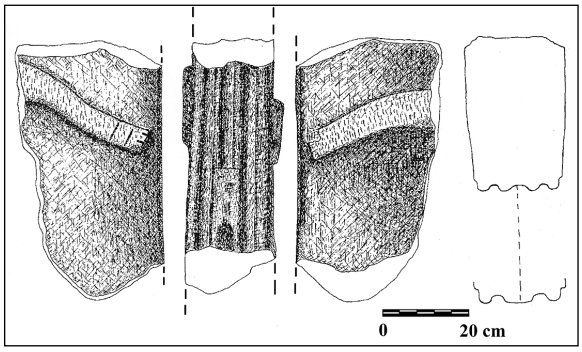


Fig. 14. Animal relief on pillar fragment.

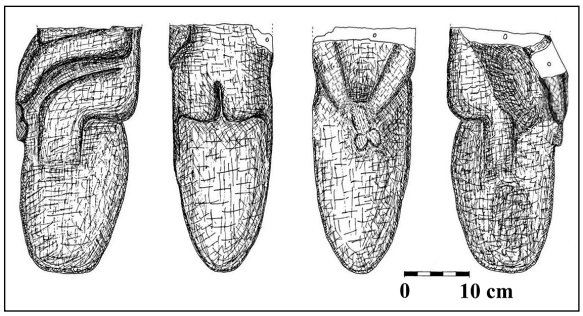


Fig. 16. An anthropomorphic statue with phallus (drawing B. Çelik).

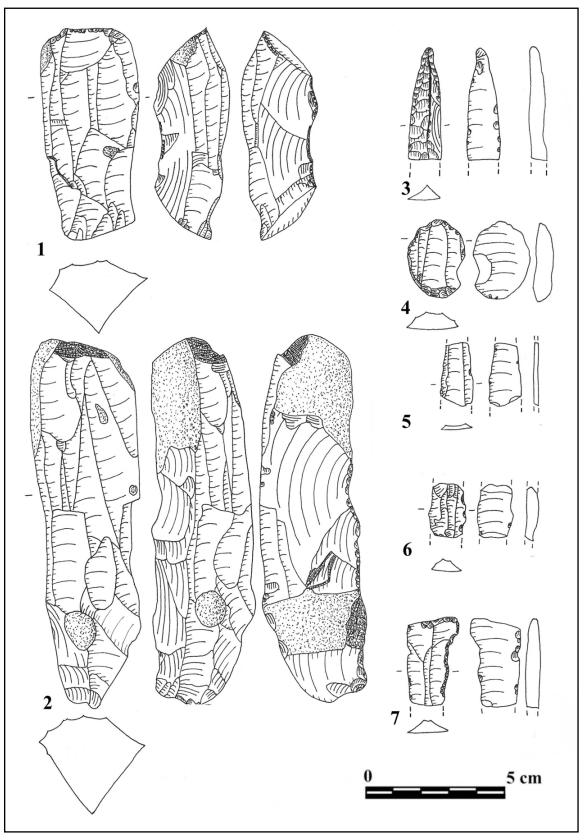


Fig. 17. 1–2 bipolar cores. 3 strap blade fragment. 4 obsidian end scraper. 5–7 obsidian blade fragments (drawing B. Çelik).



Fig. 15. Animal relief fragment.

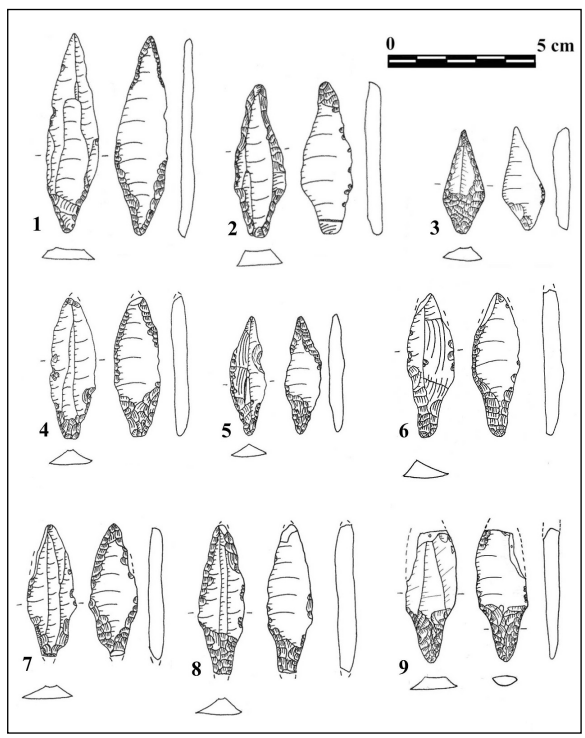


Fig. 18. 1 Byblos points type I. 2–3 type II. 4–9 type III (drawing B. Çelik).

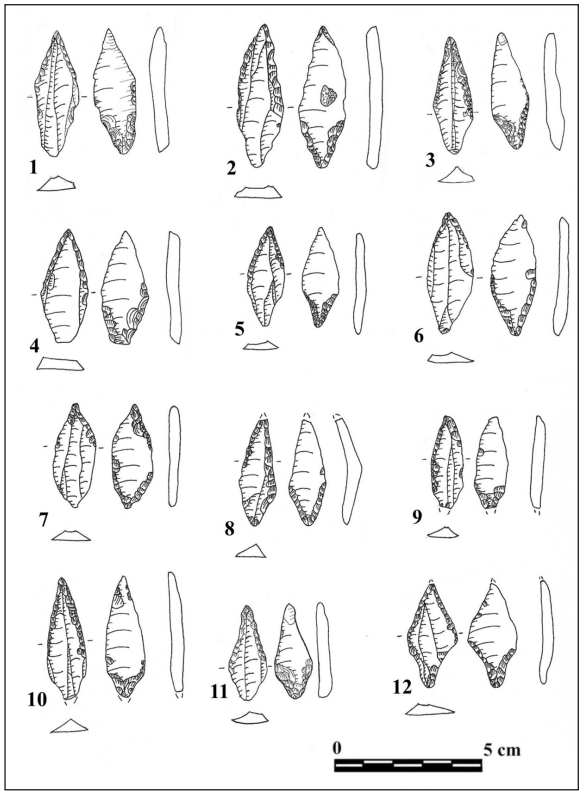


Fig. 19. 1–12 Byblos points type IV (drawing B. Çelik).

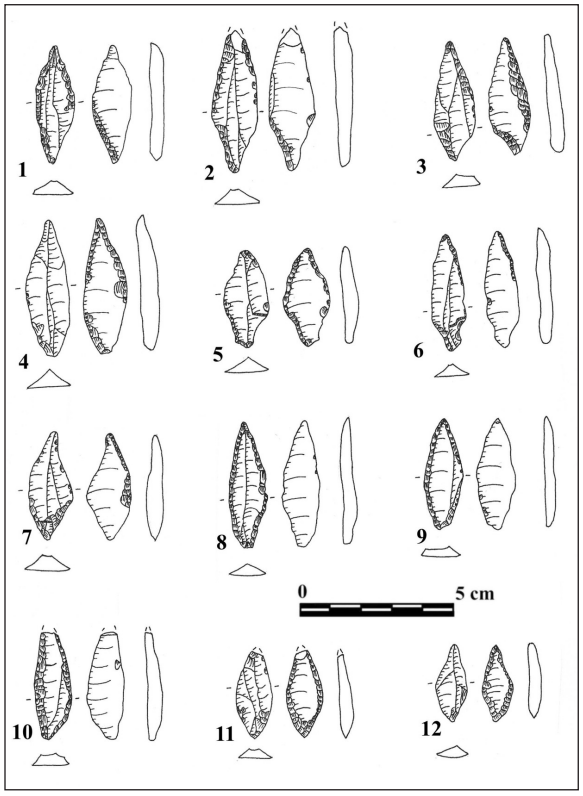


Fig. 20. 1–2 Byblos points type V. 3 type VI. 8–12 Nemrik points (drawing B. Çelik).

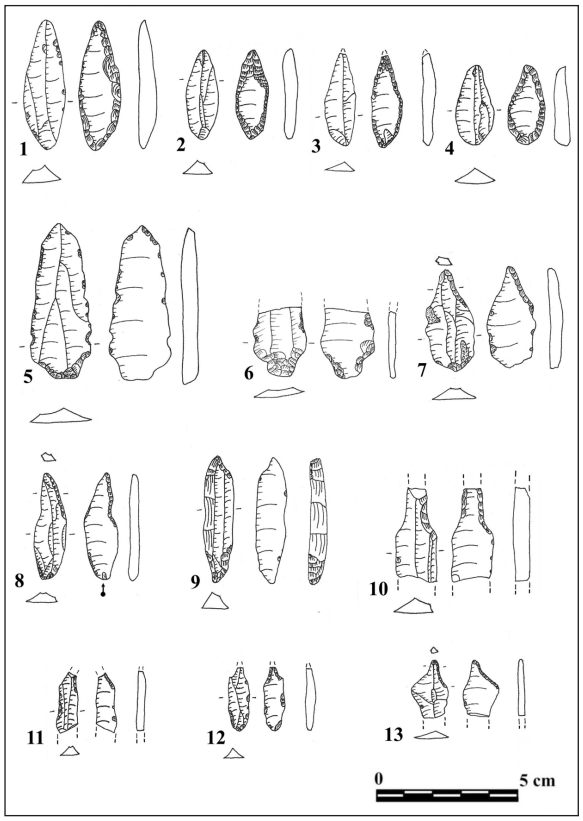


Fig. 21. 1–4 Nemrik points. 5–6 Aswad points. 7–13 perforators (drawing B. Çelik).

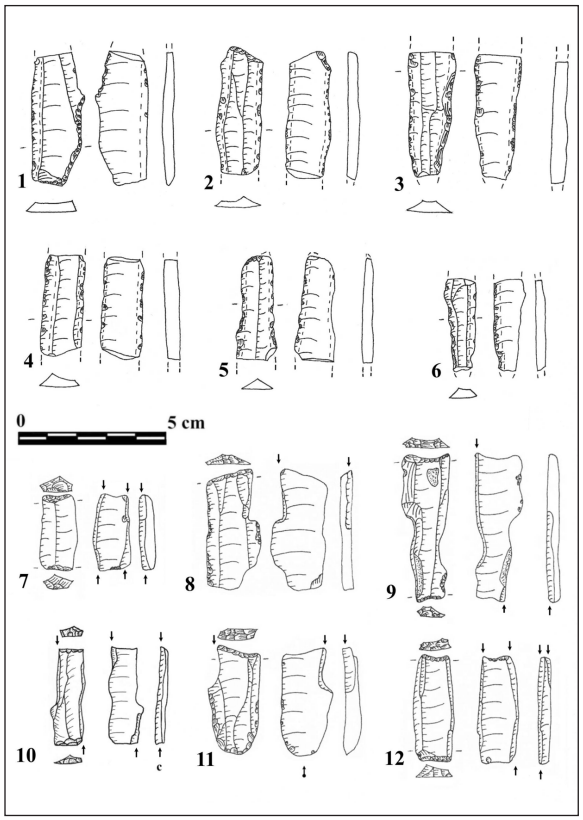


Fig. 22. 1–6 sickle blades. 7–12 burins (drawing B. Çelik).

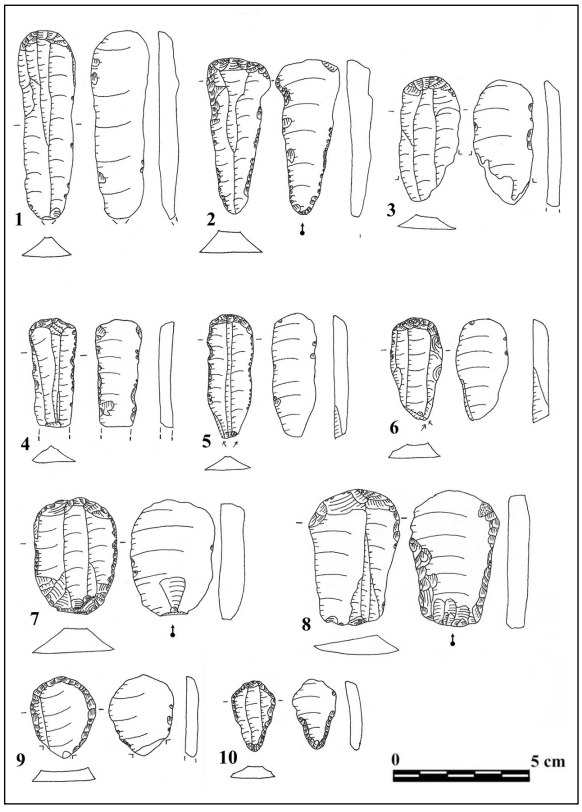


Fig. 23. 1–10 end scrapers (drawing B. Çelik).

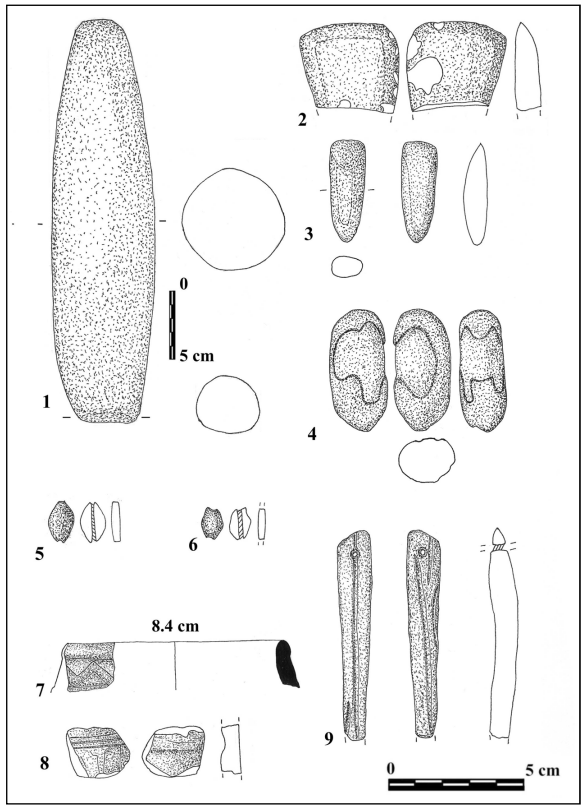


Fig. 24. 1 pestle fragments. 2–3 fragments of adzes and cutters. 4 stone object. 5–6, 9 stone beads. 7–8 stone vessel fragment (drawing B. Çelik).

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The absolute chronology of East Chia Sabz: a Pre-Pottery Neolithic site in Western Iran

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ABSTRACT – *East Chia Sabz is a PPN site located in the Seimareh Valley, western Iran. ^{14}C dating results indicated that the site was occupied from the early 9th millennium to the early 7th millennium BC. As we have very little information about early Neolithic sites in Iran in comparison with the other regions of the Near and Middle East, the site of East Chia Sabz will provide a new benchmark for investigating the Neolithisation process in Iran. It is important to note that further investigation of Chia Sabz will certainly provide more secure information about how and when the Epipaleolithic transition to the Neolithic started in the region. This paper will present the recent excavations at the site, and then, based on the ^{14}C dates, will discuss the site's importance in western Iran.*

IZVLEČEK – *Vzhodni Chia Sabz je najdišče, ki je locirano v dolini Seimareh v zahodnem Iranu in datira v obdobje predkeramičnega neolitika. Rezultati radiokarbonskih datacij so pokazali, da je bilo najdišče poseljeno od začetka 9. do začetka 7. tisočletja pr.n.št. Glede na to, da imamo le malo podatkov o zgodnjeneolitskih najdiščih v Iranu v primerjavi z drugimi regijami na Bližnjem in Srednjem vzhodu, bo najdišče Vzhodni Chia Sabz postavilo nova merila za preiskovanje procesa neolitizacije v Iranu. Opozarjamo, da bodo nadaljnje preiskave najdišča Chia Sabz ponudile bolj zanesljive podatke o tem, kako in kdaj se je začel prehod iz epipaleolitika v neolitik v tej regiji. V članku predstavljamo nedavna izkopavanja na najdišču in razpravljamo o pomenu najdišča v zahodnem Iranu na podlagi radiokarbonskih datumov.*

KEY WORDS – *neolithisation; Pre-Pottery Neolithic; East Chia Sabz; Western Iran; absolute chronology*

Introduction

The Pre-Pottery Neolithic site of East Chia Sabz or *Chia Sabz-e Shraghi* (in Persian) is situated in the Seimareh District of western Iran, on the bank of the Seimareh River, with an area of about 100 x 50m at an elevation of 362m above sea level (Fig. 1). The Seimareh River is fed by various tributaries, including the two major rivers of Gamas Ab and Qara Su in Kermanshah. The river flows towards the southeast, marking the border between the two provinces of Ilam and Lurestan.

The site is located 30m above the present river bed and has been cut by two gullies into western and eastern parts. It is important to note that the site was buried by later massive alleviation (Fig. 2). East Chia Sabz was discovered during an archaeological survey in the summer of 2007 (*Brojeni 2007*) in advance of the Seimareh Dam project. As the site is actually located within the proposed Seimareh Dam reservoir, it is expected to be submerged in the near future. As the main focus of this paper is the absolute chronology of the site, we will largely avoid a detailed description of the data, but before discussing the chronology, it is necessary to look briefly at the excavation itself and also various key data.

Excavation

Due to the time limitations on this salvage excavation, an archaeological team from the University of Tehran worked during the spring of 2009 on the site and opened two stratigraphic step trenches and two horizontal trenches (Fig. 3). Our primary aim was to understand the chronology of the site, and also to record the architectural remains, small finds and all other relevant data such as animal or plant remains. All of these were recorded both from the horizontal and vertical excavations during the first season.

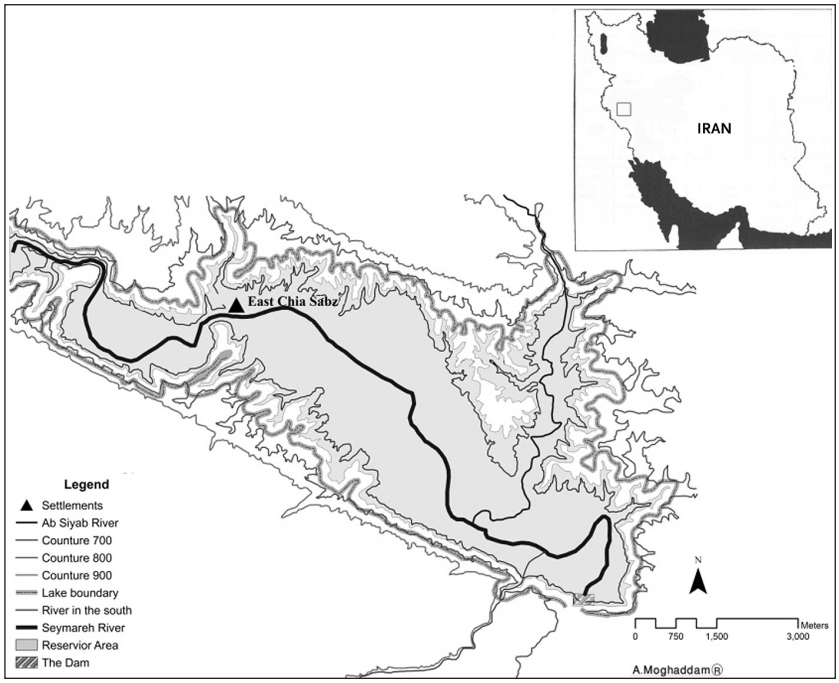


Fig. 1. Map showing the location of the site on the Seimareh river bank (modified map originally drawn by A. Moghadam).

Trench I. A step trench, 2x 2m in width, was opened on the eastern slope of the site. After removing nearly 2m of natural deposit, we continued our excavation down to 4.5m, and then stopped the work before reaching virgin soil, mainly because of the difficulty in distinguishing between the different layers of the trench. Within the trench, all layers had the same grey colour with sporadic cobbles, which seems to have been the result of post-depositional changes such as slope washing. The only architectural remains which were uncovered in the trench consisted of a stone structure with a paved floor (Fig. 4). We also found numerous chipped stones, bone artefacts, stone artefacts, ground stone, ornaments, and animal bones.

Trench II. Another step trench was opened on the southwestern slope of the site, 2m wide. Indeed, the chronology of the site is largely based on information from this trench, as we were able to distinguish seven architectural strata within 5.2m of the cultural deposit.

Trench III. A 5 x 6m trench was opened in the western part of the site close to the western gully, in order to expose the stone architecture which was visible on the surface. The excavation revealed two different architectural strata, both consisting of some rectangular stone cubicles. In the upper stratum, some rooms contained small benches along the walls. No *pise* or mud brick walls were found. The dimensions of the structures usually did not exceed approximately 1.5 x 1.5m (Fig. 5). Numerous stone vessels, ground stone, chipped stone, bone artefacts, ornaments, and animal bones were recovered from this trench.

Trench IV. A 10 x 10m trench was opened on the southern slope of the site adjacent to the trench II (Fig. 6). In the upper layers, we discovered a stone structure with a paved floor. However, the time limitations meant that we could not uncover any distinct



Fig. 2. General view of the site (from the south-west).

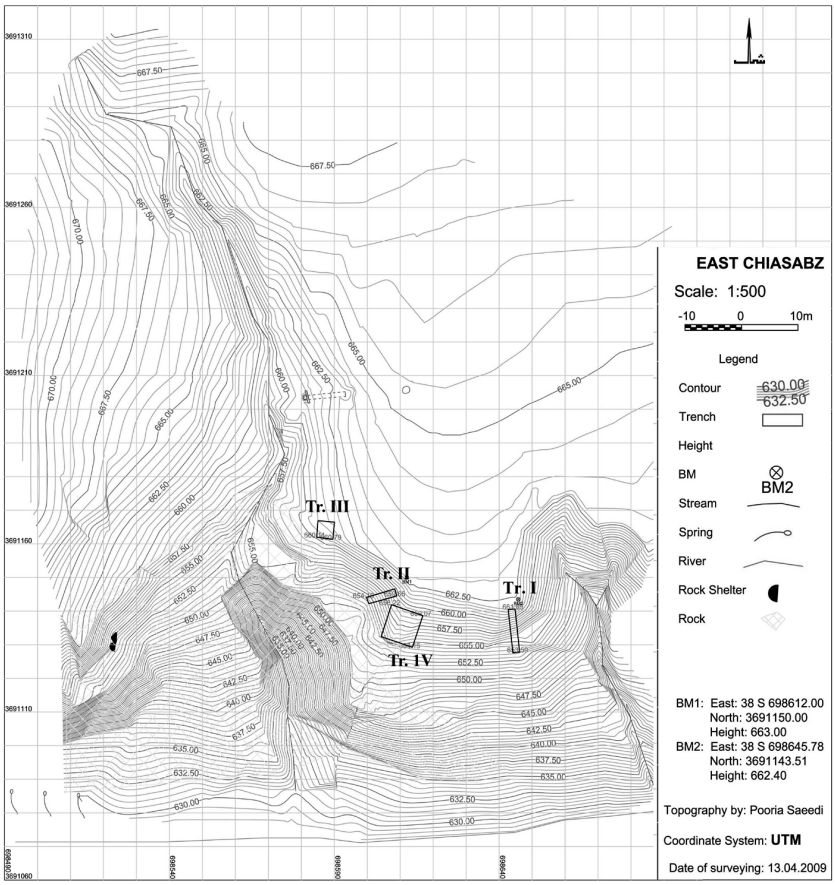


Fig. 3. Site contour map showing the location of trenches.

architectural plan, but what we did uncover showed that when people occupied the site for the first time, they appeared to have built a platform on the bedrock. Ground stone, ornaments, chipped stone, bone artefacts, and animal bones were found from this trench.

The finds

Apart from architectural remains, the other materials recovered during the excavation consisted of chipped stone, ground stone, stone vessels, bone objects, ornaments, stone objects, and animal and human remains. In the following sections, we will present an overview of these different materials, their analyses and our main interpretations.

Chipped stone

The chipped stone found at the excavation can be divided into three categories: core, tool and debitage. The core category consisted of various blade and flake cores. The blade and bladelet cores were mostly bullet-shaped, although tongue-shaped cores were also significant. Amorphous and multidirectional cores were common among the flake cores (Fig. 7). Thus far, our preliminary study has indicated that the chipped stone tools included blades, bladelets, scrapers, borers and awls (Fig. 8). Sometimes a sickle blade can be seen. Denticulate, retouched and notched blades and bladelets, as well side and double scrapers were the most numerous tools. No projectile points have yet been identified from this excavation. The debitage has been divided into flake and non-flake (or debris). Flake is distinguished by having both ventral and dorsal sides and also a striking platform.

The raw materials which were mainly used to make stone tools included a mostly red chert, greyish black flint, and dark black obsidian. The most popular was a kind of chert pebble which could be acquired from the nearby riverbed, but we have no information yet about the other raw materials. While flint might be acquired from the region, obsidian can be taken as an indicator of probable inter-regional contact, as the nearest known source of obsidian is near Lake Urmia in north western Iran. Obsidian was used only in the latest phases of the site's occupation. The preliminary analysis shows that the entire reduction process occurred on site.

Grinding stones

Stone mortars, bedrock mortars, pebble mortars, querns, pounders and pestles of limestone and sandstone were recovered from the site. The mortars usually had a deep funnel-shaped cavity and sometimes with two cavities on them. Querns had a nearly flat surface which was made by pecking and grinding. Very close to the western area of the site, some U- and V-shaped bedrock mortars were found, their interior surfaces roughly chiseled. Pebble mortars made from a pebble tended to be convex. Pestles and pounders have signs of use on one or both sides.

Stone vessels

A total of 42 stone vessel fragments were recovered from the site, mostly from the horizontal trenches, and our first analysis suggests they were mainly di-

stributed in and around the houses. The most popular forms are bowls with flat bases and semi-globular vessels (Fig. 9). Some vessels have fine walls. Sometimes the vessel has been polished. They are mostly made of limestone, but both sandstone and dolomite were also used. We should also note a single stone vessel fragment found in trench III which was made of marble.

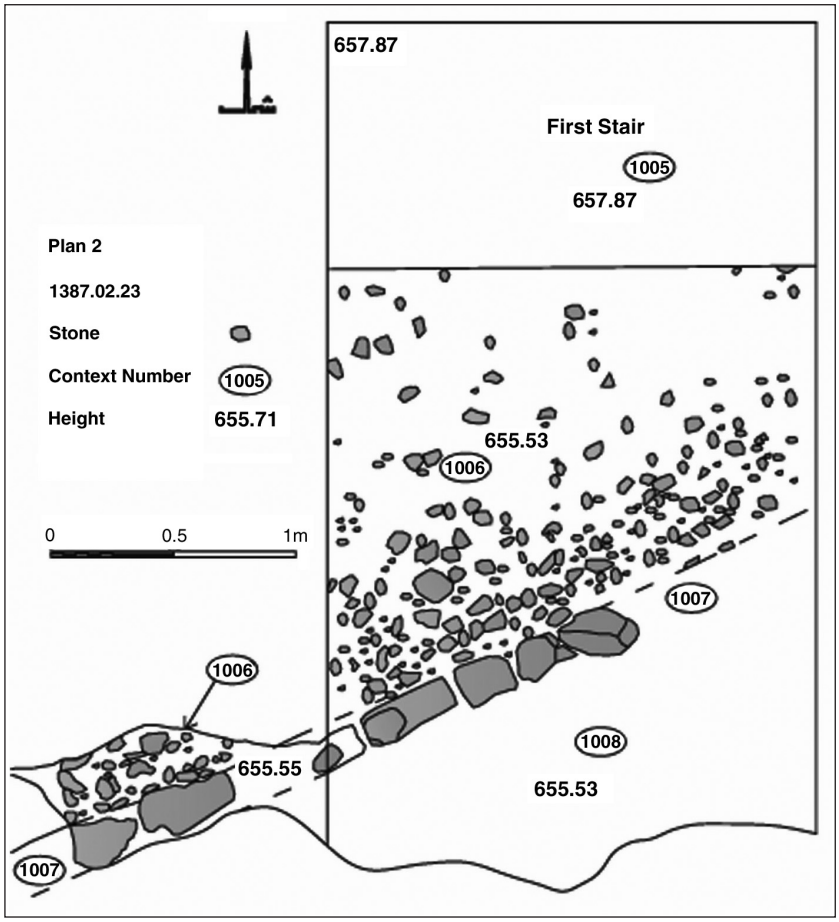


Fig. 4. Architectural remains from Trench I.

Bone objects

Awls and several unknown objects were made of bone. In addition to the bone objects considered here, some bone ornaments were found, which we consider within the 'ornaments' section below. Bone awls were recovered from all trenches and were very common. It seems that they were made by breaking a goat/ sheep metapodial and then sharpening one end with some abrasive object (Fig. 10).

Ornaments

Ornaments include a bracelet fragment (no. 4), a necklace, a bead (no. 6), and a plaque, and so on which usually have a drilled shaft. They were made of both bone and stone (Fig. 11).

Miscellaneous finds

Six samples of broken shell and three grooved pebbles were classified as miscellaneous finds.

Animal remains

In total, 11 420 bones and bone fragments were recovered, and of these, 584 or 5% could be identified to element and species. This very low percentage of identified bone can be attributed mainly to pre- and post-depositional factors. The extent of this damage is such that in the whole assemblage there were no complete limb bones – no complete metapodial, tibia, femur, ulna, radius, or humerus was recovered. Indeed, the number of single teeth recorded in the assemblage is also very low. This rather unusual body part representation and fragmentation pattern has interesting implications for butchery activities at the site and the selection of body parts, and will be explored further in future analyses. When we consider the amount of bone in each trench that showed signs of burning, the greatest proportion of burnt bone was recovered from Trench 1 (38%), then Trench 4 (35%), Trench 2 (17%), and the lowest proportion from Trench 3 (11%).

Species	Trench 1	Trench 2	Trench 3	Trench 4	Total
Antelope	2	1	2	3	8
Bird	10	5	0	0	15
Cattle	0	4	1	2	7
Canid	0	2	0	0	2
Felidae	1	1	1	0	3
Fish	2	6	1	2	11
Gazelle	0	11	0	0	11
Pig	3	9	2	2	16
Rodent	0	9	0	0	9
Tortoise	0	5	0	0	5
Caprine	15	117	33	81	246
Goat	13	53	4	7	77
Sheep	38	100	18	18	174
Total	**84**	**323**	**62**	**115**	**584**

Tab. 1. Different identified animal species.



Fig. 5. Architectural remains from Trench III.

Table 1 shows the numbers of each species identified for each trench, and also gives the overall numbers of each species for Chia Sabz. Note that 'caprine' refers to goat and sheep where it has not been possible to distinguish between the two species.

Distinguishing between wild and domesticated species with regard to the sheep, goat and pig is rather problematic, due to the absence of any complete limb bones with good morphology or potential for measurements. In future analyses, we will be using second phalanges in order to compare with published measurements in order to try to determine whether this assemblage comprises wild, domesticated, or mixed animals; however, it should be noted that the assemblage size is very small and this will certainly limit the analyses that can be carried out. Distinguishing between wild and domesticates is clearly a priority, given the interpretation of this site as Pre-Pottery Neolithic on the basis of artefactual evidence, and the expectation that the radiocarbon dates are likely to place the site early in the Neolithic sequence of Iran.

While the absence of any mandible or maxilla with teeth prevents us from using tooth wear estimates to calculate age at death estimates, a considerable number of the fragmented limb articular ends, fragmented metapodials, phalanges and vertebrae were unfused, thus providing an alternative source of information about age at death in this assemblage. In total, 129 unfused articulations or unfused limb fragments were recorded, out of a total of 584 identified bones, indicating that 22% of this assemblage was less than fully mature at the time of death. Standard fusion rates and age estimates will be used to refine this analysis and allow us to consider the significance of this apparently high slaughter of young animals.

Of the 584 bones and bone fragments that have been identified to species and element, 20% show some degree of burning. Of the 129 unfused bones and bone fragments that have been identified, 24% show some degree of burning. As younger, unfused bones may generally be considered less robust than older bones; this may well have implications for the selection and processing of young animals that we will be considering further.

Human remains

During the excavation, two burials were uncovered in Trench II, one in the first stratum and the other in the sixth stratum. The first had been completely burnt and was in a very bad state of preservation. It should be noted that this burial was adjacent to a fireplace. The second burial, although damaged, was in a much better state of preservation. In this

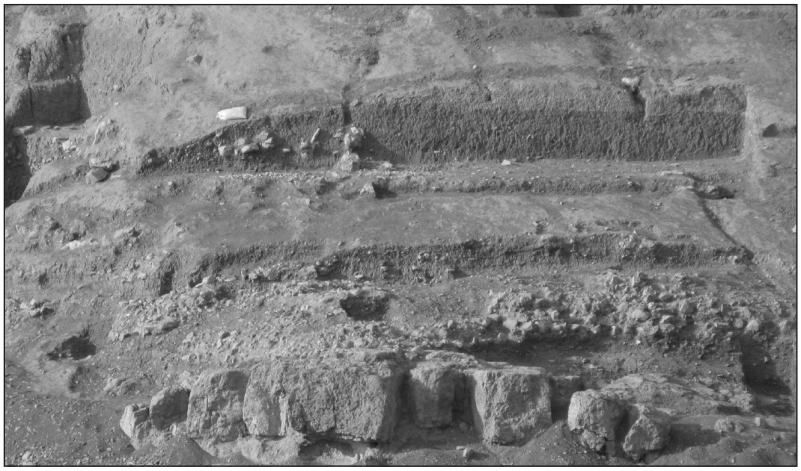


Fig. 6. The location of Trench IV with architectural remains on the bedrock.

burial, the body was buried in a flexed position, laid on its right side and oriented north-west-southeast. The body was buried within a deposition of mostly pebble stones or a stone platform (Fig. 12). Burial goods included a necklace of perforated land snail shells and a stone bead. Unfortunately, the age and sex of the burials were not determined.

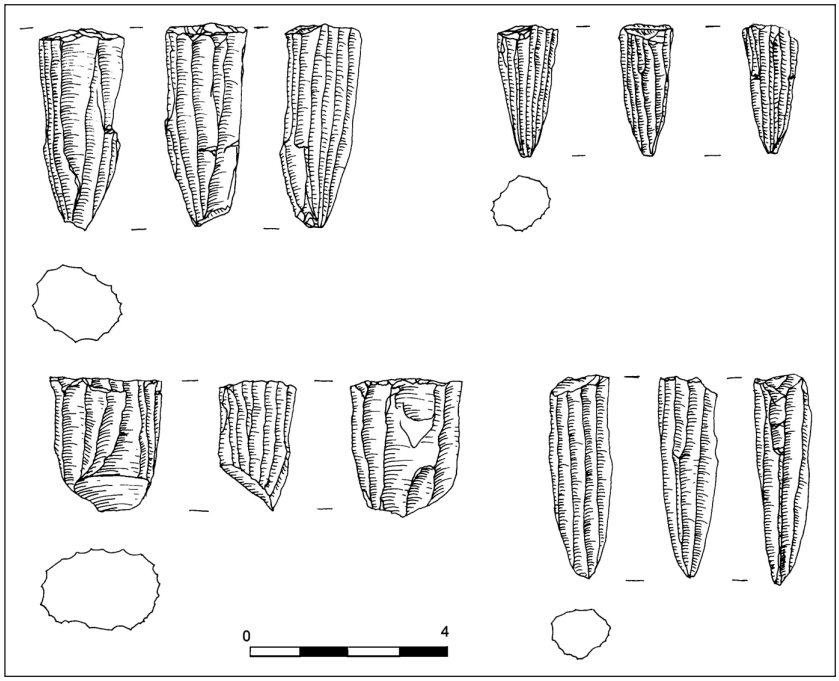


Fig. 7. Various cores.

Chronology of the site

A total of 21 samples were taken from the excavation to characterise the absolute dating of the site. Of these, only three samples derived from trench III, the others being from trench II. To date the site, we used charcoal samples, of which 11 samples unfortunately failed. Due to its temporal sequence, the radiocarbon dates came only from trench II, as the main stratigraphic trench, and are presented in Table 2.

Based on the dating results, the earliest acquired calibrated date from context 2046 (380cm below the topsoil or 140cm above virgin soil) shows a time range from 8556 to 8311 BC. As mentioned, this date does not cover the lower, most cultural deposit that was exactly over the bedrock or virgin soil. Because of the predominant ashy layer in this context, there was no suitable ^{14}C sample and thus it failed. Therefore, we have 140cm deposit in depth for the lower layers with no absolute dating. Also, the latest date which indicates the first half of the 8th millennium (7955–7611) BC comes from the context 2026 (199cm below topsoil in the trench). As a result, there are about two metres of cultural deposit in the upper layers which could not be dated. It should be noted that the trench contained 5.2m of stratified deposits vertically. The ^{14}C dating results show a time span of nearly one thousand years from *c.* 8556 to *c.* 7611 BC, attributable to some 2.0m of cultural deposit out of the total depth of 5.2m deposit. If it is considered reasonable to estimate an average deposit accumulation rate of 20cm per century, then we could extrapolate our dated sequence here to indicate the upper 2.0m of cultural deposit in

Lab. No.	Tr.	Context/ Depth	Context type	R.N.	Uncalibrated Date (BP)	Calibrated Date (BC)	Probability (95.4%)
OxA–20994	II	2026 199cm	structure	2095	8750±45	7955–7611	95.4%
OxA–21028	II	2028 194cm	deposite	2108	8830±45	8206–8035 8016–7752	33.0% 62.4%
OxA–21029	II	2037 217cm	deposite	2117	8830±45	8206–8035 8016–7752	33.0% 62.4%
OxA–21030	II	2042 295cm	structure	2144	9015±39	8299–8202 8100–8097 8037–8014	93.2% 0.2% 2.1%
OxA–21031	II	2044 342cm	burial	2151	9180±40	8485–8293 8537–8511	90.4% 5.0%
OxA–21032	II	2046 380cm	deposite	2158	9225±40	8556–8311	95.4%

Tab. 2. ^{14}C dating results from earliest (bottom) to the latest date (top) of Trench II.

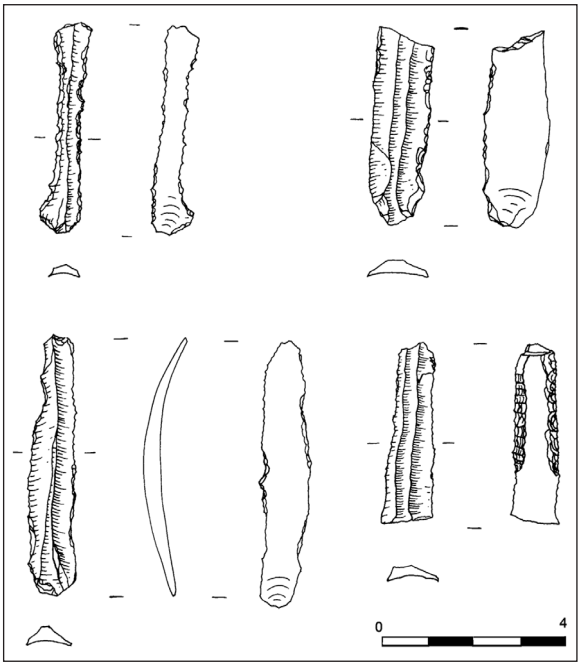


Fig. 8. Chipped stone tools.

depth with no date, which could extend the latest date some one thousand later than the latest acquired ^{14}C date. Although, the 1.4m of the lowermost deposit could extend the time span of the sequence by around 700 years earlier than the earliest ^{14}C date estimate, it seems that the determined dates might be expanded temporally to an estimate of occupation between 8800 to 6800 BC. Note that this preliminary suggested chronology needs to be seen as the broadest estimated time span during which the site could have been occupied.

Stratigraphy

As previously mentioned, two step trenches were targeted for chronological purposes; Trench I was not successful in terms of our project aims; thus Trench II was opened. In Trench II, we excavated 5.2m of cultural deposits from the topsoil to the virgin soil or bedrock and recorded 51 contexts, 21 layers and seven architectural strata (Fig. 13). Stratification is based on the architectural remains, and ^{14}C dating where available has been used to clarify the chronology.

Stratum I. The first (latest) stratum is characterised by two stone walls with an adjacent paved floor, approximately 2 x 1m and 35cm below the topsoil (contexts 2002, 2003 and 2004). Each wall was built by three stones in order; one in east- west and other in south-north direction. In the northeast corner of the trench a density of small pebbles *c.* 1–5cm in diameter were found, which could be a pavement.

Stratum II. This stratum (context 2020 and 2022) is marked by two rows of stone wall which were built on a stone platform. The second stratum was uncovered at 70cm and continued down to 120cm below the topsoil. It seems that, firstly, a platform (context no. 2020) was built as high as 40–50cm and then the wall was laid on top of this platform. Here, we again found two rows of converging stone, with a high density of variant sized pebbles and irregular stones inside them.

Stratum III. The third stratum (contexts 2024, 2025, 2026 and 2027) is indicated by a row of two boulders which was built on a stone platform such as that found in phase 2, at 188cm below the topsoil. The platform was built out of various sized pebbles as high as 44cm. Based on the ^{14}C dating, this stratum could be dated to the first half of the 8th millennium BC.

Stratum IV. Although the fourth stratum (context no. 2035) is not seen on the section sketch, it is characterised by a row of stones at 220cm below the topsoil. This stone wall was oriented in a southwest-northeast direction, approximately 170 x 50cm in size. As it is adjacent to the dated context of 2037 (which belongs to some time around 8000 BC or somewhat later), it seems reasonable to suggest both contexts are contemporary.

Stratum V. The fifth stratum (context no. 2040) is composed of a stone platform as high as 35cm and an overlaid ground mortar. This mortar indicates

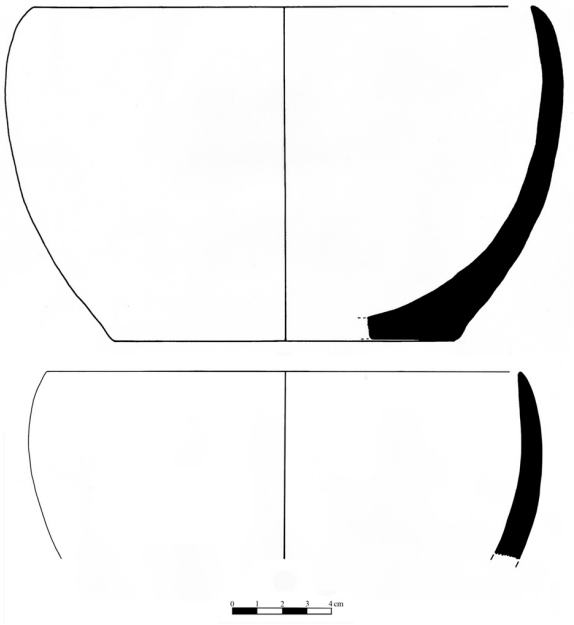


Fig. 9. Stone vessels.

that the platform could also be used as a paved floor. This stratum uncovered at 250cm in depth and could be dated to some time between late 9th and early 8th millennium BC.

Stratum VI. The sixth stratum (context 2043 and 2045) consists of a platform which is built by medium-sized pebble and boulders as high as 35–40cm, located 245cm below the topsoil of the trench. The excavation resulted in the discovery within the platform of a human burial which dated to the second half of the 9th millennium BC.

Stratum VII. Context 2046 down to the bedrock is designated as the seventh stratum and is indicated by 140cm of ashy deposit with some sporadic small stones at 380cm below the topsoil. Indeed, no solid architectural remains were found and the ^{14}C samples from this stratum unfortunately failed. However, we attribute this lowest stratum to the early 9th millennium BC. It should be noted that stratigraphy has thus far been based on the architecture and the definition of cultural phases will be carried out when the final analysis of all the various data is complete.

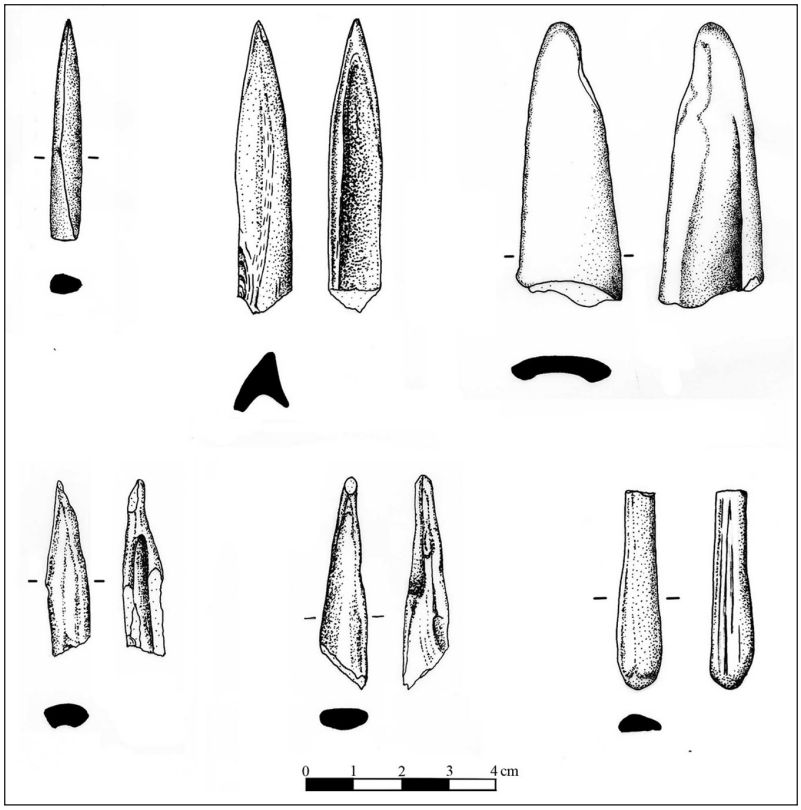


Fig. 10. Bone awls.

Concluding remarks

The excavated material and also ^{14}C dating show that East Chia Sabz can provide a new roadmap for future discussions on the Neolithisation process in western Iran. While the architectural remains differentiate it from other early Neolithic sites in the region, the other materials such as the chipped stone industry and stone vessels generally place East Chia Sabz within the Pre-Pottery cultures of western Iran. Since this paper is more focused on the absolute chronology of the site rather than giving a full preliminary report of the excavation, we now move to a short discussion of the dating results and their importance in the Neolithic archaeology of Iran (see Tab. 3).

Site name	Location	Date (BC)		Reference
		Absolute	Relative	
Sarab	Kermanshah	6200–5500	–	*McDonald 1979*
Chogha Sefid	Deh Luran Plain	6700–5500	–	*Hole 1977*
Fasil	near Mehran plain	–	6500–6000?	*Darabi & Fazeli 2009*
Guran	Hulailan	6500–5500		*Mortensen 1975*
Abdul Hosein	Nor Abad	7000–6000	7200–6500	*Pullar 1990*
Ali Kosh	Deh Luran plain	7500– 5500	7000–6000	*Hole* et al. *1969*
Choga Khulaman/Golan	Mehran plain	–	9000–7000?	*Darabi & Fazeli 2009*
Asiab	Kermanshah	8700–8500?	8000–7000	*How 1983; Zeder 2008*
Ganj Dareh	Harsin,Kermanshah	8450–6800	8000–7000	*Smith 1990*
East Chia Sabz	Seimareh	8500–7500	8800–6800	current article
Sheikhi Abad	Kermanshah	9800–7500	9500–7500	*Mathews* et al. *2010*

Tab. 3. Chronological chart showing the date of Neolithic sites in Western Iran.

Before the 1980s, some Neolithic sites in western Iran, notably Asiab and Sarab, were excavated during the Iranian Prehistoric Project by R. Braidwood near Kermanshah (*Braidwood* et al. *1961*). Other important excavated Neolithic sites in the Central Zagros such as Ganj Dareh (*Smith 1976*) and Guran (*Mortensen 1975*) have also been dated, although not yet fully published.

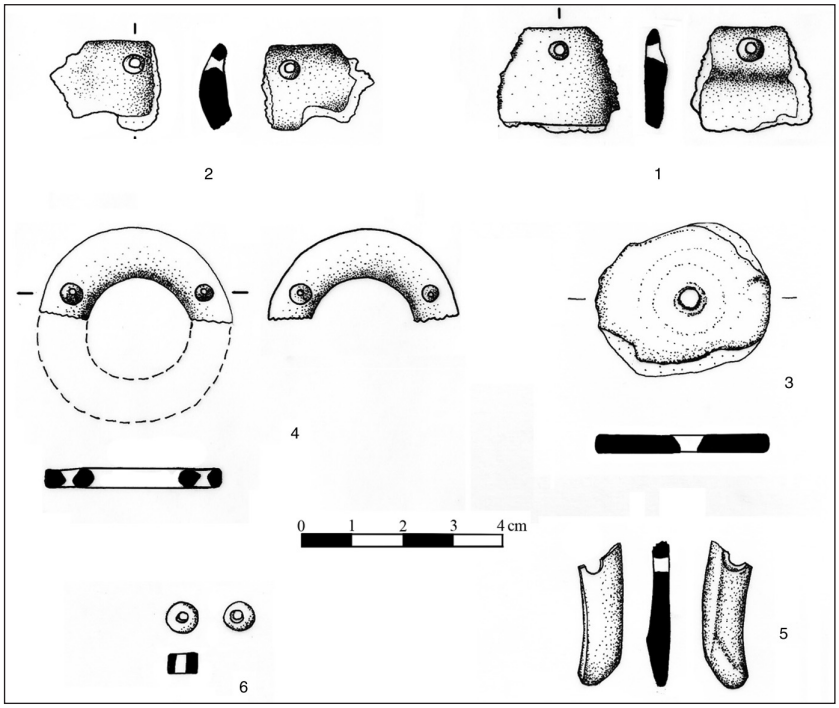


Fig. 11. Ornaments (no. 4 and 6 made of stone, the rest of bone).

The archaeological projects from the late 1970s onward have not been continued in western Iran and the focus of fieldwork shifted to western parts of the Fertile Crescent. This resulted in changing some hypotheses. For example, Hole suggested that the Neolithic occurred in Iran two thousand years later than elsewhere in the wider region (*Hole 1999. 20–22*) He also hypothesised that the earliest Neolithic sites in Iran such as Ganj Dareh were the result of an eastward movement. If the Iranian Neolithic is the result of eastward migration or diffusion, then we would ask why no similar archaeological material has been recovered from the early Neolithic sites of both regions? Note that the previous researches indicated a long gap between late Epipaleolithic and Early Neolithic in western Iran. On the one hand, the Epipaleolithic sites such as Warwasi rock shelter, Ghar-i-Khar, Mar Ruz, and Mar Gurgalan Sarab belong to the recent stage of the Zarzian industry (*Mortensen 1993.168*). It is worth noting that, based on its relative chronology, the Warwasi site may have continued until sometime around 10 000 BC (*Olszewski 1993. 214*). On the other hand, according to absolute dating, the earliest Neolithic sites including Ganj Dareh (*Smith 1990*), Asiab (*Howe 1983*) and Ali Kosh (*Hole* et al. *1969*) belong to the 9th and 8th millennia BC. It also worth mentioning that radiocarbon dating was in its infancy when the early Neolithic sites were excavated and there was considerable confusion over the chronological placement of Zagros sites across this transitional period (*Zeder 2008.246*). Therefore, it seems that new dating can shed some light on the early Neolithic of Iran. Of interest, is the newly excavated Pre-Pottery Neolithic site of Sheikhi Abad in Kermanshah, indicating an early 10th millennium BC settlement (*Matthews* et al. *2010*). Also, a reconsideration of the faunal assemblage from Asiab showed



Fig. 12. Burial in Trench II.

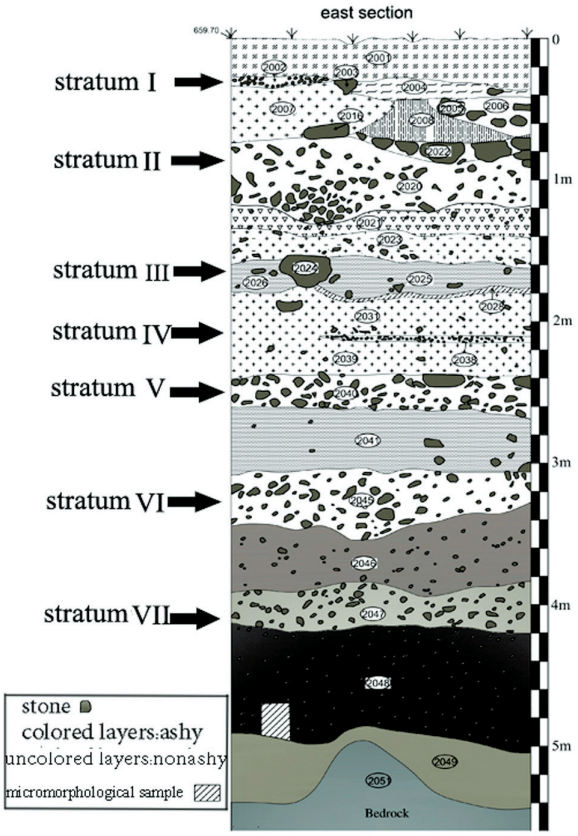


Fig. 13. Architectural strata in trench II.

that it was a campsite with no evidence of domestication, dating to the first half of the 9th millennium BC (*Zeder 2008*). Absolute dates show that the site of East Chia Sabz belongs at least to the first half of the 9th millennium BC and, considering that the lowermost deposits are exactly over the virgin soil with no absolute dating, we can even imagine an earlier date for the earliest occupation of the site. Thus it seems that the site can be very useful for understanding more about the cultural gap between the late Epipaleolithic and Early Neolithic and even assign the Neolithic of the region to an earlier date than already indicated by the previous researches. In the nearby Hulailan Valley a long settlement gap was observed by Mortensen, stretching from the Epipaleolithic period to the mid 7th millennium BC, when Tepe Guran was occupied (*Mortensen 1975. 5*). Thus it can be suggested that East Chia Sabz can bridge the gap between the Epipaleolithic settlements to the earliest site of the Hulailan Valley in this region. These absolute dates also show that the beginning of the Neolithic in Iran was not later than in other regions of the Near East as Hole had asserted, and the discovery and exploration of new sites in this region will bring crucial new data to bear on this debate.

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Time and palaeoenvironment in the Neolithisation of the Povolzhye forest-steppe

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ABSTRACT – *The paper presents the Early Neolithic Elshanka culture in Povolzhye forest-steppe. Along with the presentation of pottery assemblage the radiocarbon dates are presented and analysed. The paper addresses the question of an early pottery production in the region.*

IZVLEČEK – *Članek predstavlja zgodnjeneolitsko kulturo Elshanka v gozdni stepi Povolzhye. Predstavljeni in analizirani so keramični zbiri in radiokarbonski datumi. Članek se ukvarja tudi z vprašanjem o zgodnji produkciji keramike v regiji.*

KEY WORDS – *Middle Povolzhye; Neolithisation; pottery; ^{14}C dating*

Introduction

The area of the Middle Povolzhye forest-steppe includes the western part of the Orenburg, Samara, Ulyanovsk, and Penza Regions, and the eastern part of Mordovia. In the mid-1970-s, sites were discovered on the Samara River with unusual Neolithic ceramics with pointed bottoms and faint dash ornamentation, which the researchers compared to Early Neolithic pottery from Central Asia, the Eastern Caspian Sea region, and dated to the 6–5th millennia BP (*Vasiliev, Penin 1977; Vybornov, Penin 1979*). This type of pottery was denoted as Elshanka, from the name of the first site examined. As a result of studies in the 1980–90s, the number of locations yielding such ceramics increased (Fig. 1). This allowed for a number of hypotheses, some of which connected the appearance of Elshanka type ceramics with the infiltration of certain population groups from south-eastern regions (*Vasiliev and Vybornov 1988; Morgounova 1995*). Others showed the autochthonous nature of Elshanka cultural origins (*Mamonov 1999*). The discovery of sites with similar material in the western part of Middle Povolzhye have led some to propose Priazovsko-Prichernomorskiy (*Kotova 2002; Stavickiy 2005*) and even the Balkans (*Viskalin 2002*) as the primary centres of Elshanka culture. The problem of the Neolithisation of the Middle Povolzhye is topical, in so far as some specialists consider Elshanka culture as the most ancient Neolithic pottery culture in Europe (*Timofeev 2002*), and that it influenced the Neolithisation of other regions (*Doluhanov 2003; Nikitin 2006; Gronenborn 2009*). Other specialists doubt the special status of Early Neolithic ceramics of Elshanka type (*Lastovskiy 2006*).

One of the most controversial questions is the periodisation of the process of Neolithisation. Mamonov (*2000.158*) takes the ^{14}C dates of bivalve shells found in the occupation debris of Chekalino IV, Ilyinskaya and Lebyazhinka IV sites from *c.* 8600 to 7940 BP to show that Elshanka culture was autochthonous. He suggests that Elshanka pottery was formed in the Povolzhye forest-steppe because "*there is no chronological possibility of a substratum or cultural centre from which the ceramic tradition could be borrowed*" (*Mamonov 2006a.274*). The supporters of the Balkan origins of Elshanka type sites oppose such early dates. They point to the natural occurrence of shells in the layers (*Viskalin 2006*), and consider the Balkan-Carpathian analogies that date these sites to the 6th and the beginning of the 5th millennia BP (*Viskalin 2009.163*).

An alternative interpretation of the Chekalino IV dates of 8990±100 BP (Le–4871) and 8680±120 BP (Gin–7085) can be suggested; they date the Mesolithic layer. On the other hand, the dates of Iliinskaya 8510± 60 BP (Le–5839) and, Lebyazhinka IV 8470±140 BP (Gin–7088) should be corrected because of the 'reservoir' effect. However, the shell temper in the Neolithic pottery of the northern Caspian Sea region is dated to 7235± 45 BP (Ua 35266), and the organic matter to 6695±40 BP (Ua 35267) (*Zaytseva* et al. *2009.800*). The carbonate fraction of ceramics from Kairshak III is dated to 7870±100 BP (Ki–16401), and the organic matter from these items to 7290±190 BP (Ki–16400). The dating based on the shells from the Lebyazhinka IV and Ilyinka sites also needs to be defined more precisely. A date of 6680±80 BP was obtained from the organic temper in pottery from the first site, and from the latter, 6940±90 BP. Thus, the beginning of the Early Neolithic in the eastern part of the Middle Povolzhie forest-steppe may be dated no earlier than to the turn of the 7th and 6th millennia BP. The date of the bones from the layer with Elshanka ceramics at the Ivanovskaya site of 8020±90 BP confirm this assumption. The assumption that this date can be referred to Mesolithic remains at this site is contradicted by the date 7930±90 BP (Fig. 2), based on the organic temper in the Elshanka type pottery at the Ivanovskaya site. The correction of the lower chronological boundary of Elshanka culture from the 7th millennium BP to the turn of the 7th and 6th millennia BP raises doubts as to its origin as autochthonous. At this time, not only profiled and flat bottomed ceramics appear in the region, but also the haft type arrowhead. Similar arrowheads on plates at early Hassuna sites are dated to 8065±45 BP (MTC–04347) and 7900±120 BP (TKa–12717) (*Nishiaki, Le Miere 2005.59–66*). In complex XXXIII at Mersin and some other sites, they are dated to 7920±90 BP (Rome–467) (*Balossi 2006.15, 48–49; Kozłowski, Aurenche 2005.122*). Researchers have thus suggested sources in Asia Minor for the Early Neolithic cultures in the steppes of European Russia and Ukraine (*Danilenko 1969*).



Fig. 1. Site distribution of Elshan culture in Middle Povolzhye. 1 Dzhebel. 2 Chernikov brod. 3 Ivanovskaya. 4 II Staro-Elshanskaya. 5 Vilovatovskaya. 6 Shihan. 7 Maximovka. 8 Troitskoye. 9 Ledyazhinka IV. 10 Krasniy Jar VII. 11 Iliinskaya. 12 Nizhnyaya Orlyanka II. 13 Chekalino IV. 14 Ust-Tashelka. 15 Vyunovo Lake I. 16 Ozimyenki II.

Spore/pollen tests were obtained for this chronological cycle. A sample from the lower Neolithic layer of the Ivanovskaja site shows that the region was almost bare of trees in this period. Birch was rarely found and the main areas were grassy and suffruticose, among which wormwood predominated (*Morgunova 1995.174*). Appropriate data were obtained directly from the bottom of the Neolithic layer. There was a prevalence of herbs, among which chenopodiacious plants and wormwood predominate. Climatic conditions were unfavourable to the growth of not only woodland, but also meadow steppe formations. Sudden changes in continental climate and a reduction in precipitation have been detected (*Morgunova 1995.185*), making the period comparable to the driest interval of the first part of the Atlantic period.

Thus landscape and climatic conditions of the southern part of the Volga-Urals forest-steppe at the beginning of the Atlantic period conform substantially with southern steppe and even semi-desert conditions.

Palynological data were also obtained in areas further north in the basin of the River Sok, which is now the border between southern and northern subareas of forest-steppe. Calcium carbonate has been found in buried soils, which suggests that there was

a lack of humidity when they were formed. At Chekalino IV, the layer with an Early Neolithic complex dated by shells to 8000–7900 BP yielded spore/pollen test results which indicated grassy and suffruticose vegetation comprising wormwood and chenopodiacious plants (68%). About 15% are woody and covered the river valley. Thus this natural environment is rather similar to the picture reconstructed from the materials from the southern part of Middle Povolzhye. In other words, steppe landscapes of southern type spread up to the basin of the River Sok. Saiga bones found in the cultural layers of the Chekalino IV and Lebyazhinka IV sites (*Mamonov 2006.94*) offer further support this conclusion. Perhaps the appearance of Early Neolithic sites in this period was the result of aridisation at the end of the Boreal *c.* 8200 BP, although we should be careful with this supposition (*Budja 2007.191–201*).

The second group of Early Neolithic sites in the Middle Povolzhye forest-steppe is presented by materials from Staro-Elshanskaya II on the River Samara (Fig. 3), Ilyinskaya on the River Sok (Fig. 4), and Ozimyenka II on the River Moksha (Fig. 5). The organic temper in the ceramics date the sites to the beginning of the 5th millennium BP (*Vybornov 2008*). The ceramic technology is identical at both groups of sites. Elshanka pots were made of muddy clay, sometimes with chamotte temper (*Vasilieva 2006*), unlike Early Neolithic vessels from the northern Caspian region and northern Black Sea region cultures, which were made of silts with bivalve shell impurities. The tradition of chamotte temper is typical of the Neolithic cultures of the Central Asian interfluve and eastern Caspian Sea region (*Tsetlin 2007.205–206*). There is similarity in the shapes of vessels (profiled, biconical, pointed bottom) and elements of ornament (*Vinogradov 1968.85, 108; Vinogradov, Mamedov 1975. 88, 94, 110, 136, 157, 194, 203; Vinogradov 1981. 69*). These pottery types have been dated to the end of the 6th millennium BP (*Vinogradov 1981.132*). This date is confirmed at Ayakagytma site in the Sub-Aral area by six ^{14}C dates ranging from 7190±20 BP to 7030±90 BP (*Szymczak 2006.26*). Sudden aridisation in 7200 BP east of the northern Caspian Sea region has been detected, which compelled people to migrate north (*Spiridonova, Aleshinskaya 1999. 25*). This dynamic seems possible, as data showing that the Amu Darya fell into not the Aral but the Caspian Sea (*Timofeev* et al. *2004.19*). The arrowheads found here show that some Central Asian groups of the Kelteminarskaya culture migrated here (*Doubyagin* et al. *1982.122*). These arrowheads are also found in northern regions as far as the Middle Povol-

No.	Site	Lab. No.	Material	Uncalibrated date (BP)	Calibrated date one sigma (BC)
1.	Kairshak III	Ki 16401	shells from pottery	7870±100	7050–6500
2.	Kairshak III	Ki 16400	pottery carbon	7290±190	6500–5700
3.	Tenteksor I	Ua 35266	shells from pottery	7235±45	6250–5890
4.	Tenteksor I	Ua 35267	pottery carbon	6695±40	5730–5480
5.	Ivanovskaya	Ki 14568	pottery carbon	7930±90	7080–6590
6.	Ivanovskaya	Le 2343	bone	8020±90	7038–6718
7.	Old Elshanskay–II	Ki 14413	pottery carbon	6820±80	5880–5610
8.	Iliinskaya	Le 5839	shells	8510±60	7610–7450
9.	Iliinskaya	Ki 14096	pottery carbon	6940±90	5930–5660
10.	Ozimenki–II	Ki 12168	pottery carbon	6950±170	6250–5500
11.	Chekalino IV	Le 4781	shells	8990±100	8080–7935
12.	Chekalino IV	Gin 7085	shells	8680±120	7890–7570
13.	Chekalino IV	Ki 14704	soil	6070±90	5300–4700
14.	Chekalino IV	Ki 14705	pottery carbon	5910±90	5000–4540
15.	Chekalino IV	Ki 14687	soil	6030±100	5300–4650
16.	Chekalino IV	Ki 14686	pottery carbon	5910±90	5000–4540
17.	Chekalino IV	Ki 14706	shells	6180±90	5320–4900
18.	Chekalino IV	Ki 14689	shells	6100±140	5400–4650
19.	Lebyazhinka IV	Gin 7088	shells	8470±140	7590–7400
20.	Lebyazhinka IV	Ki 14076	pottery carbon	6680±80	5740–5470
21.	Lebyazhinka IV	Ki 16852	pottery carbon	5950±70	5040–4680
22.	Vyunovo Lake	Le 9219	soil	5790±130	4950–4350
23.	Nizhnaya Orlyanka	Ki14123	pottery carbon	5720±80	4730–4360

Tab. 1. ^{14}C dates of the Neolithic sites in the Povolzhye forest-steppe.

zhye forest-steppe (*Vinogradov 1979.5*). Typical Central Asia geometric microliths and trapezes have been discovered in the same region in Neolithic complexes (*Vybornov, Penin 1979.5; Morgunova 1980. 119*). I suggest the most probable migration route was from the northern Caspian Sea to the head of the River Ural, where the latter meets the River Samara. The Chernikov brod I site located in this area is believed to be evidence of this route. Pottery with straight walls, pointed bottom, and lacking ornamentation has been discovered here which, on the other hand, is believed to refer to Elshanka culture (*Mossin 2007.79*).

Elshanka pottery was discovered at the Chekalino IV (Fig. 6), Nizhnyaya Orlyanka II (Fig. 7), and Lebyazhinka IV (Fig. 8) sites on the River Sok, and at Vyunovo Lake on the River Soura. Excavations at Chekalino IV in 2007 (*Vybornov* et al. *2009*) provided new ^{14}C dates of 6070±90 BP (Ki–14704) and 6030± 100 BP (Ki–14687) for the soil sediment; and 5910± 90 BP (Ki–14705) and 5910±90 (Ki–14686) BP for pottery carbon; and 6100±140 BP (Ki–14689) and 6180±90 BP (Ki–14706) for shells. The pottery carbon dates at the Nizhnaya Orlyanka site are 5720± 80 BP (Ki–14123) and at Lebyazhinka IV 5970±70 BP (Ki–16852), respectively. The soil sediment dates from the Elshanka Vyunovo lake dwelling site date to 5790±130 BP (Le–9219). The materialities and the radiocarbon dates from the sites correspond well with those at the Dzhebel site in the eastern Caspian Sea Region (*Okladnikov 1956*), which is dated to 6140±80 BP (P–3081) and 6030±240 BP (Le–1).

It should be noted that only wild animal bones were found at the sites where Elshanka pottery was discovered. Therefore, I suggest not connecting the Neolithisation of the Povolzhye forest-steppe with a productive economy.

Thus the non-linear nature of the development of Early Neolithic culture in the Middle Povolzhye is clear. This conclusion is supported by processes discovered in other cultures (*Budja 2006.183– 201*).

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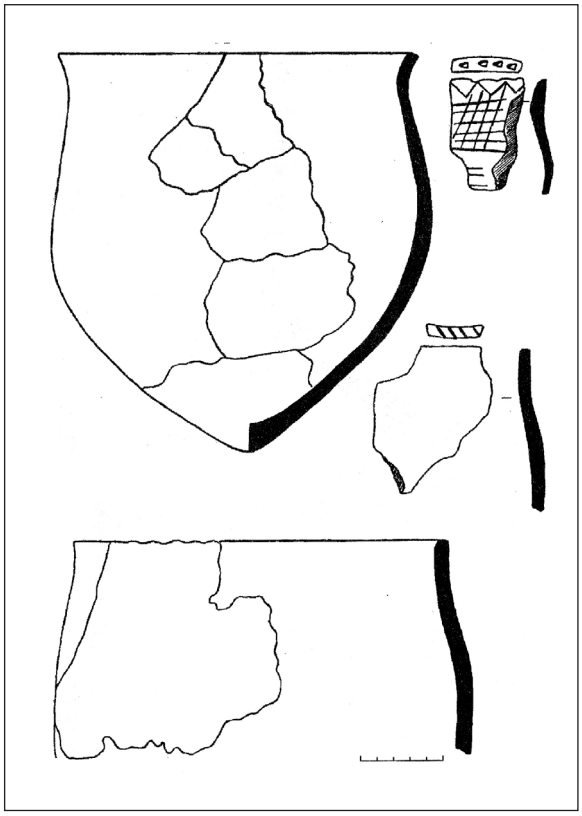


Fig. 2. Elshanian pottery. Ivanovskaya site.

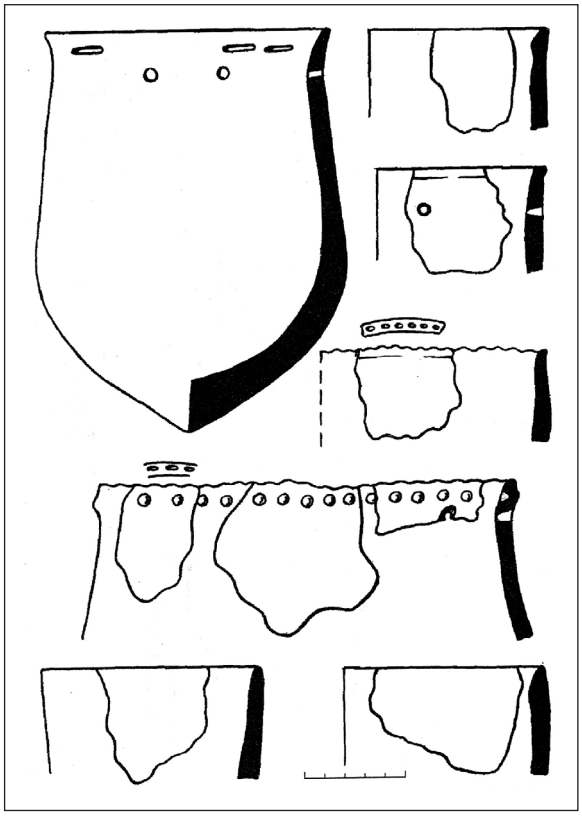


Fig. 3. Elshanian pottery. II Staro-Elshanskaya site.

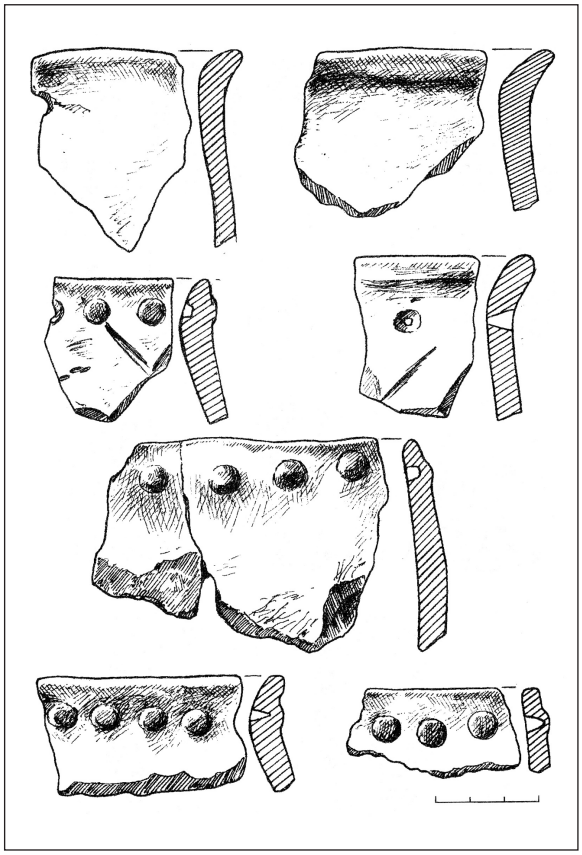


Fig. 4. Elshanian pottery. Iliinskaya site.

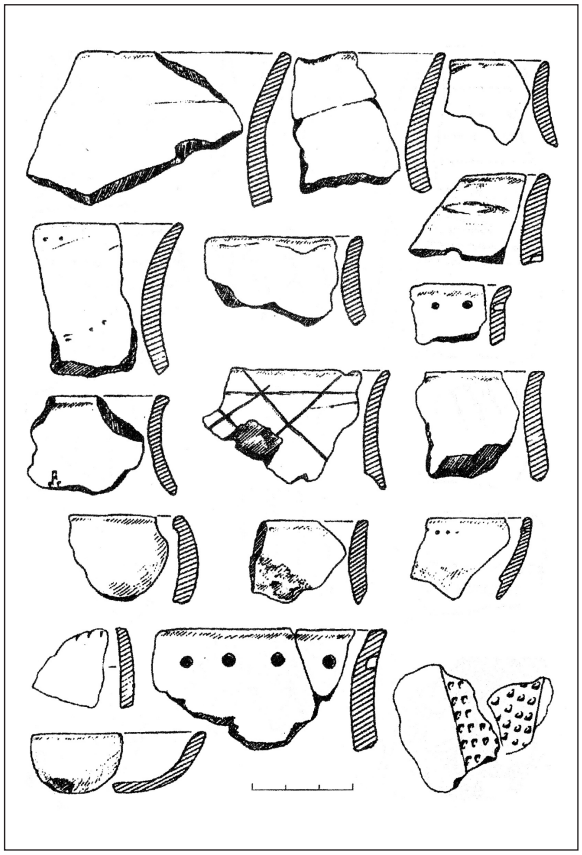


Fig. 5. Elshanian pottery. Ozimyenka II site.

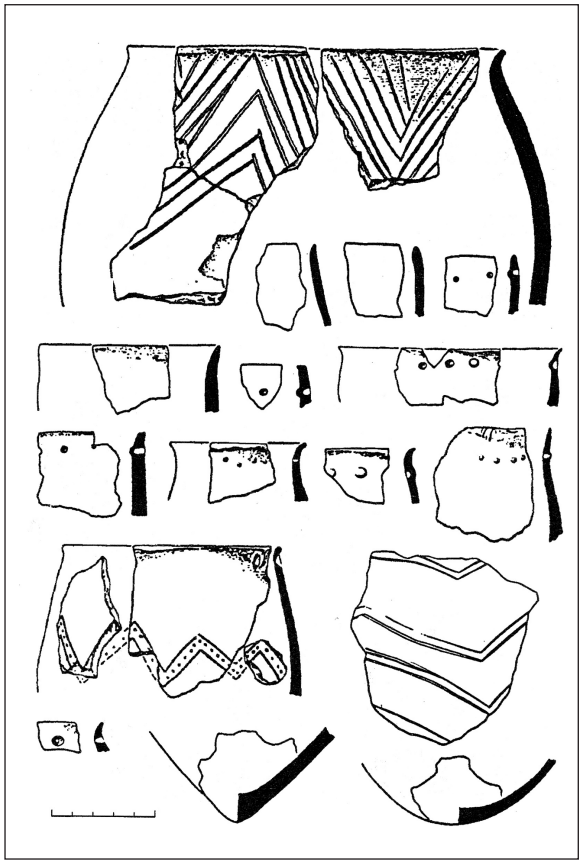


Fig. 6. Elshanian pottery. Chekalino IV site.

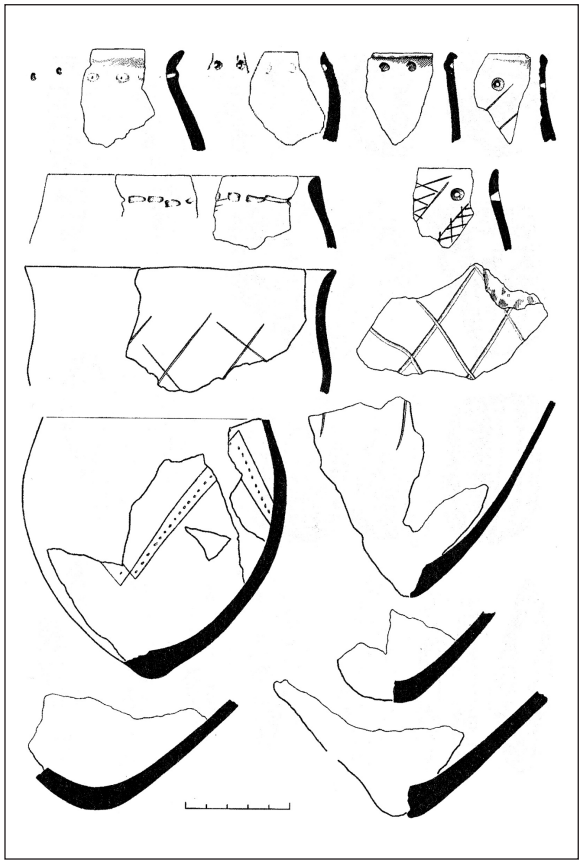


Fig. 7. Elshanian pottery.Nizhnyaya Orlyanka II site.

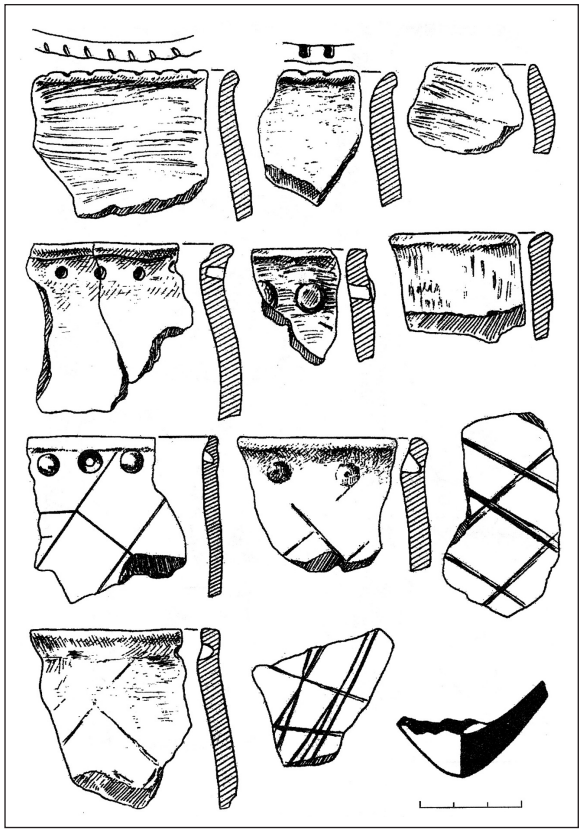


Fig. 8. Elshanian pottery. Lebyazhinka IV site.

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A new approach to the problem of the Neolithisation of the North-Pontic area: is there a north-eastern kind of Mediterranean Impresso pottery?

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ABSTRACT – *Potsherds from a few vessels with* Cardium *decoration were recently found in old collections of some Neolithic sites of the Northern Black Sea area. A good samples of the valves of brackish water ostracods were discovered in the raw material in most of these vessels. This could indirectly indicate the presence of Neolithic settlements with* Cardium *pottery on what is now a flooded region of the northern Black Sea coast. Some data show that its inhabitants could have been the initial source of the Neolithisation of neighbouring inland territories. Thus, the whole local Neolithic in the region is interpreted as a northeastern branch of the Mediterranean Neolithic with Impresso and* Cardium *pottery.*

IZVLEČEK – *V starejših zbirkah nekaterih neolitskih najdišč s področja na severu Črnega morja so bili nedavno odkriti odlomki keramičnih posod s* Cardium *okrasom. V lončarskih masah večine posod so bili odkriti tudi ostanki oklepov morskih rakov dvoklopnikov (*Ostracoda*) iz brakičnih okolij. To lahko posredno kaže na prisotnost neolitskih naselbin s* Cardium *lončenino na področju obale na severu Črnega morja, ki je danes poplavljeno. Nekateri podatki kažejo, da bi lahko prebivalci tega področja predstavljali prvotni vir neolitizacije sosednjih območij v notranjosti. Tako lahko celoten lokalni neolitik v teh regiji razlagamo kot severovzhodno vejo sredozemskega neolitika z impresso in* Cardium *lončenino.*

KEY WORDS – *Neolithic; Northern Black Sea area; Mediterranean;* Cardium *Impresso pottery; maritime colonization*

Introduction

The Northern Black Sea area is a historical-geographical region limited in the south by the Black Sea, in the west by the lower reaches of the Danube and Prut rivers, and in the east by the lower reaches of the Kuban and the Don rivers. The northern border of the region is indistinct. Researchers usually include in this region the steppe zone and southern part of the forest-steppe zone extending approximately 200–250km to the north from the coast of the Black Sea and Azov Sea, plus the territory of the Crimean Peninsula. The greater part of the Northern Black Sea area is in Ukraine; a small area is in the extreme west of the region, bordering Moldova, and to the east, the Rostov area and the Krasnodar region of the Russian Federation. The landscape is mainly low-lying, with uplands in the west (the central-Moldavian upland), north (southern slopes of the Podolian and Dnipro (Dnieper) uplands), east (the Asov upland and Donetsk Range), and with the low Crimean Mountains in the south of the Crimean Peninsula. The absolute heights of the continental part of the region range from 0 up to 500m above sea level, and the heights of the Crimean Mountains up to 1545m.

Only two archaeological cultures with a reliably complete 'Neolithic package' are known in the Northern Black Sea area. Firstly, the settlements of the Criş

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culture, investigated at the extreme west of the region at the interfluve of the Prut and Dnister (Dniester) River. Secondly, the settlements of Linear Band Pottery culture in an area between the Prut and the South Buh (Bug) River (*Larina 1994a; 1994b; 1999*). The most easterly Linear Band Pottery site is Vita-Poshtova 2 (*Gaskevych 2006*). It is situated north of the Northern Black Sea area, close to Kyiv, only 10 kilometres from the valley of the Dnipro River. The population of both the Criş culture and Linear Band Pottery culture were classic early farmers from the Carpathians-Danube region. Consequently, the northwest part of the Black Sea area is the easternmost area of these cultures.

In Nadezhda Kotova's opinion, the full 'Neolithic package' is also present in the finds from the Rakushechny Yar site in the Lower Don area in the extreme east part of the region. She relates the origin of the people who left the materials to the migration of small groups of early farmers from Eastern Anatolia to the Azov Sea area *c.* 6900 calBC (*Kotova 2009. 164, 165*). But it should be noted that some components of the 'Neolithic package' mentioned by Kotova occur only in strata with radiocarbon dates from the 6th millennium calBC at the Rakushechny Yar site. Consequently, their association with a hypothetical migration *c.* 6900 calBC is not indispensable. Furthermore, there is no archaeological evidence of such migration through the Zagros and Caucasus Mountains, a distance of some 1500km. Therefore, the only real basis for the Nadezhda Kotova hypothesis is the presence of pottery and domestic animal bones in the lowest layers of the Rakushechny Yar site, and the close radiocarbon dates from the lowest layers of the Yumuktepe site and Rakushechny Yar site.

The Neolithic way of life spread very slowly in the Northern Black Sea area from outside territory, populated by migrants. The components of the 'Neolithic package' are partially present at local sites. Some archaeologists think that the beginnings of the spread of these innovations is related to the western influence of population of the Balkan and Danubian Neolithic cultures (*e.g., Zaliznyak 1998a.230–237; 1998b; 2005.120–126; Zvelebil, Lillie 2000*), while some relate this to the eastern influence of the population of the Rakushechny Yar culture (*e.g., Kotova 2002.74–81; 2009*).

Apart from actual hypotheses about the Neolithisation of the Northern Black Sea area, there were earlier hypotheses. Thus, for example, in the 1950s–70s, Ukrainian archaeologist Valentin Danilenko related the genesis of the southern Ukrainian Neolithic to migrations from the territory in the Trans-Caspian region (*Danilenko 1969.177–186*). Yet a further hypothesis came from the Romanian archaeologist Dumitru Berciu, who casually, with no supporting argument, supposed the presence of the locus of Early Neolithic sites with *Cardium* pottery in the Northern Black Sea area:

"*In the northern Pontic area, the same 'cardial' horizon can also be assumed, given the similarities between the culture of the Southern Bug River and that of Hamangia. Such a hypothesis can be supported by the identification of a horizon 'cardial' in Mesopotamia and Iran, where a cultural influx could have migrated to the Caucasus and south-eastern shores of the Black Sea.*" (*Berciu 1966.292*).

Berciu's hypothesis was forgotten during the following forty years, but in the last few years has become current again, after the ascertainment of new facts as presented in this article.

The new data

What undisclosed facts allowed Berciu to suggest his idea? For many years, in the context of Neolithic of the South Buh region, pottery with *Cardium* decoration had been mentioned only once by Valentin Danilenko in his 1969 monograph. It is a description of a single potsherd found on the Savran' site, close to the town of Savran' in the Odessa area in 1955. No figure of it has been published. The researcher only briefly wrote about this item as follows:

"*... a piece of vessel rim, more than 1 cm thick, made from black clay and decorated with a herringbone row consisting of small angular impresses printed by bracket stamp. Some analogies are known only among fragments from pottery with the so-called* Cardium *decoration from the Adriatic region*" (*Danilenko 1969.132*).

The author of the current article succeeded in finding this potsherd among the material in the collection of the Institute of Archaeology of the National Academy of Sciences of Ukraine. It is a fragment with a straight vertical rim 1.4cm thick. The edge of the rim is rounded at first, and thence slightly flattened. The external surface is black sub-burnished; the internal surface is dark-brown, well smoothed. Two horizontal rows of alternately directed diagonal im-

prints from the sinuous edge of a *Cardium edule* valve run along the rim on the outside (Fig. 1.1). Thus, this potsherd was decorated with real *Cardium* shell impressions, but not 'small angular impresses printed by bracket stamp', as described by Valentin Danilenko.

The vessel from which this fragment came was manufactured from raw material peculiar to local Neolithic pottery. It contains a small quantity of vegetal temper, sand, and a large quantity of valves of small (less than 1mm) seed shrimps (*Ostracoda*) of *Cyprideis torosa littoralis* (Brady, 1864), which gives the fragment a porous appearance. All identifications of ostracods and mollusc species mentioned in the article were by Valentin Prisyazhnyuk at the Institute of Geology of the National Academy of Sciences of Ukraine.

Unfortunately, the position of the rim fragment on the site makes it impossible to date accurately. Several concentrations of artefacts of the Eneolithic Trypillia, Neolithic Bug-Dniester, and Mesolithic Kukrek cultures were localised at the Savran' site (*Danilenko 1969.125–134*). The potsherd with *Cardium* decoration was found separately on the periphery. An Eneolithic flint triangular bifacially retouched javelin head, a Neolithic sherd representative of Savran' type pottery of the Bug-Dniester culture, a Mesolithic flint tool of so-called 'Kukrek insert' type, plus some ten ordinary flint artefacts, a few animal bones, and *Unio* freshwater mollusc shells were also found here. They were collected around a large granite block on the surface of a high area of the South Buh River flood-plain, broken by sand shallow delf, and also from a 24sq. m trench (*Danilenko 1969.132*). Based on the character of the finds and their occurrence on the surface and in a layer of sandy loam to a depth of 0.3m, I conclude that this excavation revealed some mix of redeposited scattered artefacts of different ages. Thus, the potsherd with *Cardium* decoration may be dated within a wide time frame from the 7th to the 5th millennium calBC (*Gaskevych 2010.238*).

Ukrainian archaeologist Mykola Tovkaylo focused on the hypothesis about the North Pontic Impresso Neolithic after my presentations and publications. As a result of his research, important new arguments were obtained in materials from the Neolithic sites in the steppe area of the South Buh basin, which he has been investigating for over twenty years. According to information he kindly provided, he recently found sherds from no fewer than five vessels with *Cardium* decoration in the collections of some sites he excavated earlier. A drawing of at least one from the pots has already been published by Tovkaylo, but he did not identify it as a fragment of *Cardium* pottery at the time (*Tovkaylo 2005.130, Fig. 48.3*). This vessel is represented by only one fragment of its rim, the edge of which is rounded; its surfaces and section are black. The external thickened edge of the rim is decorated by three rows of diagonal, four-fluted imprints of a notched stamp. Below it is a row of imprints of the ribbed back of a *Cardium* cockleshell (Fig. 1.2). The four-fluted imprints were most probably impressed with the same shell, but with its sinuous edge. The vessel is made of a raw material identical to the foregoing potsherd from the Savran' site.

The described potsherd was found in 1981–1983 in horizon 'b' of the 'Neolithic' level of the Pugach 1 site excavated by Tovkaylo on the left bank of the South Buh River, close to the town of Yuzhnoukrainsk, in the Arbuzinka district of the Mykolaiv area of Ukraine. Horizon 'b' contains a mix of artefacts of the Neolithic Bug-Dniester and the Eneolithic Trypillia cultures (*Tovkaylo 2005.68*).

Another vessel with *Cardium* decoration was found at the Pidgorivka site in the eastern part of the Northern Black Sea area. It appeared in a figure drawn by Sergiy Telizhenko and published in the monograph

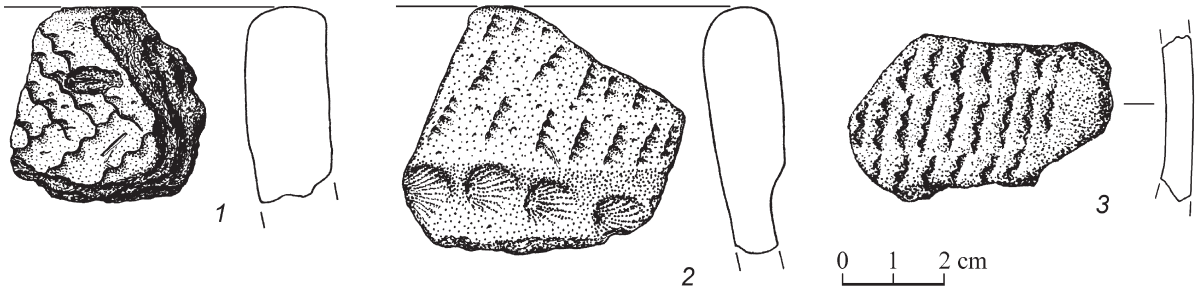


Fig. 1. Pottery with* Cardium *decoration from Neolithic sites of the Northern Black Sea area. 1 Savran'. 2 Pugach 1 (after* Tovkaylo 2005.130, Fig. 48.3*). 3 Pidgorivka (after* Man'ko 2006.250, Fig. 130.3*).

of Valery Man'ko (*Man'ko 2006.250, Fig. 130.3*). Man'ko didn't recognize it as a representative of *Cardium* ware. One fragment of a wall of the vessel decorated with three horizontal rows of sub-vertical imprints made with the edge of a *Cardium* shell is shown in the figure (Fig. 1.3). I have not examined it, so the details of its technological characteristics are not known to me. According to information kindly provided by Sergiy Telizhenko, it contains an admixture of crushed cockleshell.

The Pidgorivka site was discovered by Vladislav Gladilin in 1963 and investigated by Yury Gurin in 1980s and Sergiy Telizhenko in 2002 and 2007. It is situated on the former left (nowadays – right) bank of the Aydar River, a tributary of the Siversky Donets, between Pidgorivka village and the town Starobil'sk in the Starobil'sk district of the Lugansk area. Gurin, who found the above-described sherd, attributes the Neolithic materials at the Pidgorivka site to the Lower-Don culture (*Gurin 1992*). The vegetal temper based radiocarbon dating shows the date to 6050±90 uncal BP (Ki–9439–40) (*Man'ko 2006.250*).

Thus, the presence of *Cardium* pottery in the Northern Black Sea area is an evident fact. The gradual appearance of further potsherds with *Cardium* decoration in old collections from Neolithic sites in the region has become a consistent trend since the present author's publications. However, the number of such sites and the finds in collections are far from enough. The most probable explanation for the presence of this material is that these vessels were imported, which allows us to raise the question of where in the region these ceramics originated.

The origin of *Cardium* pottery in the Northern Black Sea area

As we know, the spread of *Cardium* pottery in the Mediterranean was related to maritime navigation. A large majority of the respective finds were discovered directly on the seashore or nearby, whereas in the Northern Black Sea area all vessels with *Cardium* decoration have been found at considerable distances from the modern coastline – approximately 185km for Savran', 130km for Puhach 1, and 220km for Pidgorivka (Fig. 2). Also, it should be noted that the level of the Black Sea was approximately 10m lower than today, and there was a lagoon of the Don River in the 7–6th millennium calBC which is now the area of the modern Azov Sea. Accordingly, the ancient marine coastline was still farther from the sites. Nevertheless, it is proposed that the *Cardium* vessels of Savran', Puhach 1, and Pidgorivka are also imports from a coastal area. There is some 'hard' evidence in the archaeological record to argue for it.

As noted earlier, the raw material of some vessels with *Cardium* decoration from Savran', Puhach 1, and a few other sites of the steppe part of the South Buh River basin contained large quantities of *Cyprideis torosa littoralis* valves. These ostracods live in waters with wide ranges of salinity, from almost fresh to hypersaline, but they occur in great numbers in brackish water with salinity between 2 and 16‰. They prefer the quiet waters of inland lakes, as well as bays, fjords, lagoons, river mouths, deltas, and other marginal marine environments with depths to 30m, and slimy and sandy-slimy bottoms. They are widely distributed, being found on all seashores of Europe, the Mediterranean coasts of the Middle East and North Africa, lakes of Central Africa, and Central Asia. They are widely present both in the ancient and modern fauna of the Black Sea (*Athersuch, Horne and Whittaker 1989.114; Opreanu 2003.74*). Consequently, sand that was supersaturated with these valves could have come from a sea or lagoon beach.

Initially, Tovkaylo was sceptical about the presence of *Cardium* pottery on the northern coast of the Black Sea. Therefore, he supposed that the *Cardium* shells used for decorating some Neolithic vessels from the steppe region of South Buh River basin, and also the remains of *Cyprideis torosa littoralis* in their raw material, came from local tertiary deposits, outcropping on a surface of the southern slopes of the Podolian upland. To check this supposition, he collected samples of tertiary sediments in gullies within a radius of 10–15km from the Puhach 1 site, but these yielded neither *Cardium* nor *Cyprideis torosa littoralis* valves (*Tovkaylo, personal communication*).

Thus, new facts discovered in recent years can indirectly indicate the presence of Neolithic settlements with *Cardium* pottery on the northern coast of the Black Sea. It is necessary to link their origin to the same processes that spread *Cardium* pottery along the coast of the Mediterranean. The dating of the Pidgorivka site to the end of the 6th millennium calBC confirms the synchronicity of North-Pontic *Cardium* pottery and the period of its most wide distribution in the Mediterranean.

However, no Neolithic settlement in the coastal zone of the Northern Black Sea area is known. This is pro-

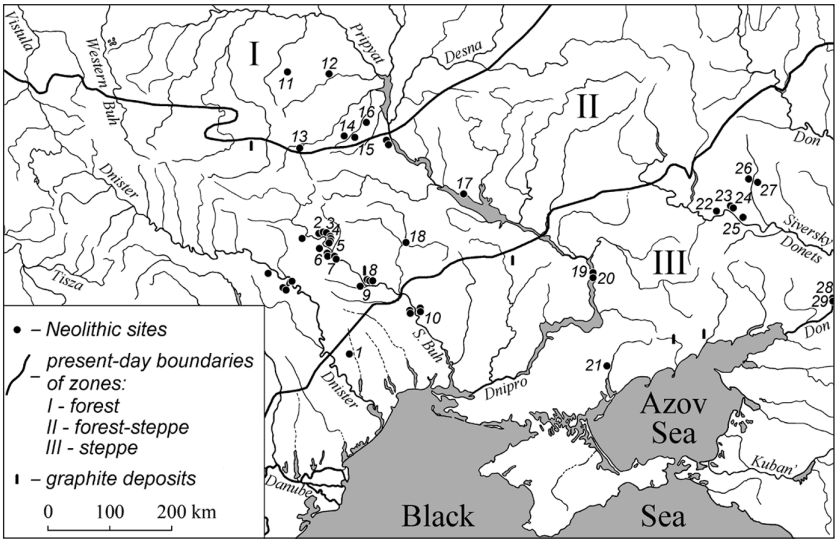


Fig. 2. The location of sites with 'Samchyntsi' pottery and its derivatives. Only the sites mentioned in the article are numbered. 1 Ghirzhove. 2 Samchyntsi 1. 3 Samchyntsi 2. 4 Schurivtsi-Porig. 5 Sokiltsi 6. 6 Ladyzhin 2. 7 Baz'kiv Ostriv. 8 Zhakchyk. 9 Savran'. 10 Pugach 1. 11 Korma 1B. 12 Krushnyky. 13 Gyrlo Gnylopyati. 14 Lazarivka. 15 Zavalivka. 16 Borodyanka 3V. 17 Mutykhi. 18 Dobryanka 1. 19 Strilcha Skelya. 20 Kizlevy Ostriv 5. 21 Semenivka 1. 22 Zlyvki. 23 Zelena Gornytsya 5. 24 Zelena Gornytsya 6. 25 Tuba 2. 26 Pidgorivka. 27 Starobil'sk. 28 Razdorskoe 1. 29 Rakushechny Yar.

bably the consequence of the submergence of the Neolithic coastline with the rise of the Black Sea over the last eight thousands years.

The problem of coastal Neolithic sites

The submersion of coastal archaeological sites younger than 125 000 and older than 5000 years due to glacial-eustatic processes took place on most coastlines of the world. According to some estimates, some 80–90% of evidence of past coastal activities are now submerged (*Flemming 2004.1226*). The submersion of Neolithic settlements by sea and estuaries is also characteristic of most of the Mediterranean region. However, the discovery and thorough research of such settlements (Leucate-Corrège, Atlit-Yam) have been a matter of luck rather than the result of systematic exploration (*Guilaine* et al. *1984; Galili* et al. *1993*).

Coastal sites that have not been submerged are also not always accessible for archaeological research. Because of the rise in global sea levels, river mouths where Neolithic settlements were often located have become gulfs. Continuous fluvial dynamics have formed new deltas, and even Neolithic sites situated at higher elevations came to lie under thick layers of alluvial sediments (*Brückner* et al. *2005*), making their discovery practically impossible in such cases. Discoveries sometimes occur accidentally. For example, 5th millennium calBC finds were found at a depth of 7m relative to a modern land surface at the Minshat Abu Omar site in the Nile delta, but only because of geological drilling (*Shirai 2010.9, 10*). Another striking example is the Yenikapı site at the mouth of the Bayrampaşa River in the centre of Istanbul. It was discovered only owing to the tube tunnel construction for the Marmaray high speed train under the Bosphorus. Its Neolithic 7th millennium calBC layer lies in a stratum of alluvium 6m below the present level of the Sea of Marmara (*Algan* et al. *2009*).

With the foregoing as background, the likelihood of discovering Neolithic settlements on the shoreline of the Northern Black Sea area in the near future is improbable. This is due to both the submergence of ancient seashores and the sedimentation of thick alluvium in the deltas and lower reaches of large rivers debouching into the sea: the Danube, Dnister, South Buh, Dnipro, Don, Kuban rivers. There is a better chance of finding such sites on the south coast of the Crimea only. Because of the presence of the Crimean Mountains, the Holocene rise in sea level had almost no effect on the outlines of the coast in this region, a landscape which resembles that of Provence and the Côte d'Azur.

The absence of Neolithic sites in the modern coastal zone of the Northern Black Sea area does not mean that there was no ancient population in this region of plentiful food resources: animals, waterfowl and fish. In my opinion, the presence of a population is indirectly confirmed by the imported vessels with *Cardium* decoration described above, which were discovered far to the north. Consequently, investigating the Neolithic of the Northern Black Sea area, we must always bear in mind the population that is 'lost' to research. Against the background of the foregoing idea, there is an opportunity to review the Neolithic in the region as a whole and attempt to find some other, probably less obvious, indirect traces of participation of the hypothetical coastal popu-

lation in cultural, social, demographic processes 8–9 thousand years ago. The character of these indirect traces can cast light on the character of the material culture of the same coastal population, the settlements of which are unavailable to excavation today.

'Samchyntsi' pottery and its origin

To expose possible traces of influence of the hypothetical coastal Neolithic on the Neolithic of the interior regions of the Northern Black Sea area, I have studied processes and phenomena which have no logical explanation within the framework of existing concepts of development of the local Neolithic. The most striking of such phenomena are ceramics of the so-called 'Samchyntsi' type.

'Samchyntsi'-type pottery was defined by Valentin Danilenko in 1958. Its name originates from the Samchyntsi 1 and Samchyntsi 2 sites investigated by Pavlo Khavlyuk and Danilenko on the left bank of the South Buh River, close to Samchyntsi village, in the Nemirov district of the Vinnitsa area in 1956–1958 (*Danilenko 1969.118, 119*).

Sketching in the broad outlines, 'Samchyntsi' pots had rounded and pointed bottoms, with slightly S-shaped, cylindrical, and oblong spherical bodies. In most cases, they were made from raw material with an abundant coarse-grained mineral admixture of quartz and feldspar gruss and a small admixture of fibrous organic remains; it rarely included graphite and micaceous sand and crushed cockleshells. External surfaces are usually slightly burnished and most frequently dark grey or dark brown, and less often the colour is fulvous or reddish. The decoration is present almost on all vessels, most frequently on the upper half of the pot. The specific decoration of 'Samchyntsi' ware consists of elongated imprints of a notched stamp, and narrow superficial lines made with the same stamp, and frequent decoration of the internal edge of pottery rims by notched stamp impressions or lines. Usually, a few lines of the imprints form a continuous encircling horizontal belt or vertical zone. Frequently, some of these belts or zones are separated from one another by a horizontal or diagonal lines, or lines which form a herringbone or sinuous composition (Figs. 3–5). Vessels are rarely decorated only with narrow superficial lines which form a grid or some more irregular angular figures.

All the researchers writing on 'Samchyntsi' pottery have long repeated Danilenko's opinion. According to his periodisation, the presence of this ware on the site was a sign of its affiliation with the 'Samchyntsi' phase of the Bug-Dniester culture. The dating of this phase was defined by two imported Linear-Band Pottery culture vessels found together with the 'Samchyntsi' pots in the Baz'kiv Ostriv site on an island in the middle of the South Buh River. Danilenko connected the origin of 'Samchyntsi' pottery with a northern impulse from the upper reaches of the Dnipro after the long period of domination of Criş culture influence in the area of the Bug-Dniester culture (*Danilenko 1969.36, 153*).

At first sight, Danilenko's theory seemed to be confirmed by the presence of some 'Samchyntsi' vessels on sites of the Dniepro-Donets culture (Lazarivka, Krushnyky, Zavalivka *etc.*) and the Pripyat-Neman culture (Gyrlo Gnylopyati, Korma 1B, Borodyanka 3V) in the Kyiv and Zhitomir areas of Ukraine (*Neprina 1969.135, Figs. 1.2, 3; Zaliznyak, Balakin and Okhrimenko 1987.69, Figs. 4.10, 12; Zaliznyak 1998a.*

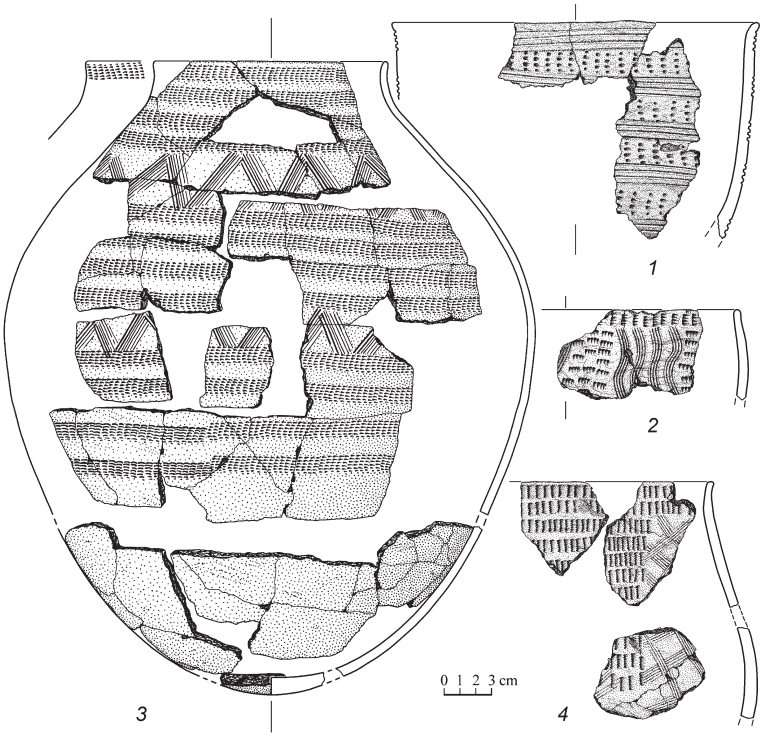


Fig. 3. The 'Samchyntsi' pottery. 1, 2 Sokiltsi 6. 3 Samchyntsi 1. 4 Baz'kiv Ostriv.

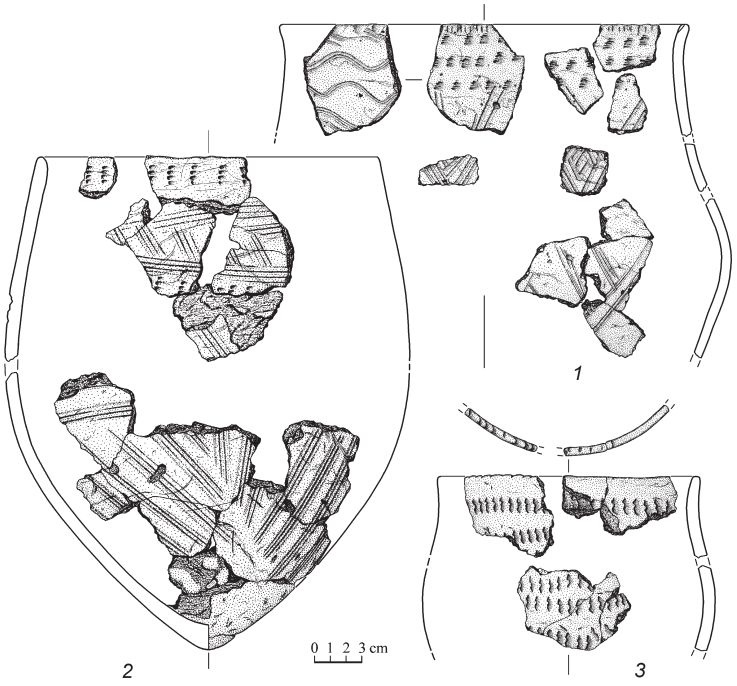


Fig. 4. The 'Samchyntsi' pottery. 1 Ladyzhin 2. 2 Schurivtsi-Porig. 3 Baz'kiv Ostriv.

233, Fig. 91; Gaskevych 2001.45, 46, Figs. 5.16, 18, 6.27–32). However, they are more rare here than in the forest-steppe area. The decoration looks poorer and more monotonous than on the material from the southern sites. Moreover, the raw material of a few of these vessels contains an admixture of graphite, the main deposits of which are found in the south – in the Northern Black Sea area (Fig. 2). These facts lead one to consider these finds as an effect of the influence from south to north, but not *vice versa*. Nadezhda Kotova was the first to understand this some 20 years ago (*Kotova 1994.77, 78*). She therefore offered her own hypothesis on the origin of 'Samchyntsi' ceramic traditions: in her opinion, a Neolithic population moved from the area of the Lower-Don culture, bringing the ceramic traditions to the Buh-Dnister area (*Kotova 1994. 53, 54, 77; 1998.182, 184*).

Indeed, several vessels with decoration very similar to the 'Samchyntsi' were also found east of the area of Bug-Dniester culture in the forest-steppe part of the Dnipro River basin (Dobryanka 1, Mutykhi sites), the Dnipro rapids region (Semenivka 1; Kizlevy Ostriv 5; Strilcha Skelya sites), the Siversky Donets River basin (Starobil'sk; Tuba 2, Zelena Gornytsya 5; Zelena Gornytsya 6; Zlyvki sites), and the Lower Don region (Razdorskoe 1, Rakushechny Yar sites) (*Telegin, Titova 1998.142, Fig. 42.19; Belanovskaya 1995.100–116; Kotova 2002.129, 134, 136, 196, 202, 230, Figs. 5.2, 3, 13, 14, 10.3, 12.1–3, 7, 72.1, 2, 78.2, 5, 106.3; Zaliznyak, Man'ko 2004.161, Fig. 8.1; Tuboltsev 2005; Man'ko 2006.162, 165, 205–206, 221–232, Figs. 42, 45, 85.1, 86.2, 101–112*).

However, Kotova could not explain the sources of the pottery of the Lower-Don culture per se. Her sole assumption connects its origin with the Early Neolithic of the Urals region. But the Isetskoe right-bank site – the only site, material of which was used to illustrate the hypothesis – is situated in Asia, far to the east of the Urals in the Sverdlovsk area of Russia, a distance of some 1700km from the Rakushechny Yar site. In so doing, the researcher recognised that similar pottery is absent from the steppes to the east of the Don River. She explained this fact by the single migration of a group of Neolithic population of the Ural region to the Azov region which left no traces en route (*Kotova 1998.182, 183*).

The results of the radiocarbon dating of a great number of East European Neolithic sites received in the Kyiv radiocarbon laboratory (Ki-) in the last fifteen years conclusively confirm the native North Pontic

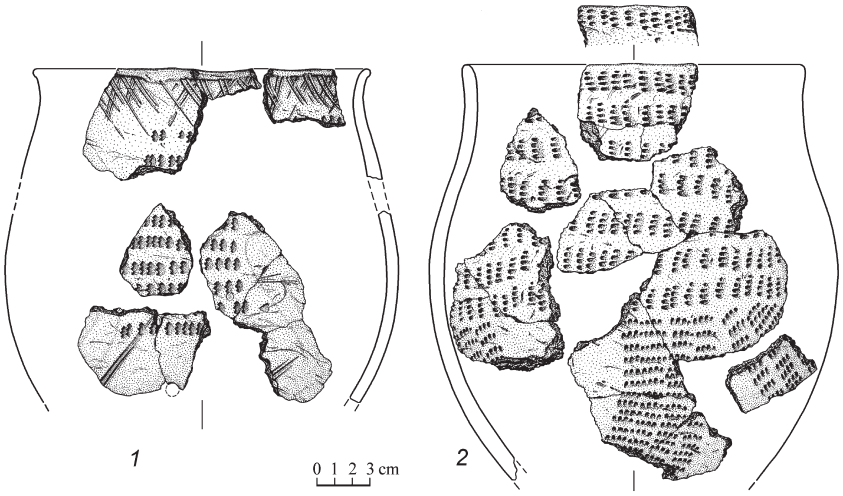


Fig. 5. The 'Samchyntsi'. 1 Baz'kiv Ostriv. 2 Schurivtsi-Porig.

origin of 'Samchyntsi' pottery. It should be noted that the absolute age of these dates has been repeatedly called into question (*Tovkaylo 2005.44–49; Zaliznyak 2005.125; Gaskevych 2007; Kadrow 2007. 254*). However, comparison of these dates among themselves can be used for relative comparison of the age of the sites, as all of the dates were obtained by one method in one laboratory.

'Samchyntsi' pottery is known from multiple sites in the Buh-Dnister area. These sites date from the middle of the 7th millennium calBC to the beginning of the 5th millennium calBC, according to the Kyiv laboratory (*Videyko, Kovalyukh 1998; Kotova 2002. 103, 104; Tovkaylo 2010.214*). But Neolithic vessels of other specific types were found mixed up with the 'Samchyntsi' ones in the overwhelming majority of cases. Therefore, no one can be sure that these dates give the exact age of the 'Samchyntsi' ceramics. There are only five sites with representative collections which contained only 'Samchyntsi' pottery – Samchyntsi 2, Schurivtsi-Porig, Ladyzhin 2, Zhakchyk, and Ghirzhove. The radiocarbon dates from the Kyiv laboratory are for the Ghirzhove site only (Tab. 1), which is the southernmost of them (Fig. 2). The site is situated in the steppe zone between the Buh and Dnister rivers on the bank of the Kuchurgan River (the left tributary of the Dnister) close to Ghirzhove village, in the Velyka Myhailivka district of the Odessa area. The distance to the modern coast of the Black Sea is approximately 95km. This site was researched by Pavel Boriskovskiy and Vladimir Stanko in 1961–1963 (*Stanko 1966; 1967*).

The pottery with imprints of a notched stamp and lines drawn by such stamps is casually mentioned by Tatyana Belanovskaya among the finds of the bottom layers of the Rakushechny Yar site (*Belanovskaya 1995.100–109*). These layers are older than at the Ghirzhove site, because they are dated to the first half/middle of the 7th millennium calBC by the Kyiv laboratory (Tab. 2).

On the other hand, for the earliest dated sites with 'Samchyntsi' pottery in the forest part of the Dnipro River basin, the dates are from the first half and middle 6th millennium calBC (Tab. 3).

These data testify to the inconsistency of Danilenko's hypothesis about the northern origin of 'Samchyntsi' pottery.

According to the dates from the Kyiv laboratory, the Koksharovsky Kholm and Nizhnee Ozero 3 sites, with comb decorated pottery of the Middle and Southern Trans-Ural regions are dated no earlier than the mid-6th millennium calBC (*Chairkina 2009.180, 181; Shorin 2009.177*), showing the inconsistency of Kotova's hypothesis about the Urals origin of 'Samchyntsi' ornamental traditions also.

Thus all the facts testify that 'Samchyntsi' pottery appeared in the south of the Northern Black Sea area. From the beginning, it was characterised by rich decoration and perfect making. No analogues are known in the neighbouring Neolithic cultures of the East Balkans, the Lower Danube region, or the Caucasus. Therefore, one has the impression that it originated 'from nowhere'. Then, during the following two thousand years, it spread northward over the territory of modern Moldova and the greater part of the territory of modern Ukraine.

In my opinion, the inhabitants of what are now the submerged coastal Neolithic settlements of the Northern Black Sea area could have been the initial source of distribution of 'Samchyntsi' ceramic traditions. The same arguments, as in the case with *Cardium* pottery, provide evidence to support this thesis. According to Tovkaylo, there are remains of the ostracod *Cyprideis torosa littoralis* in the raw material of some vessels with notched stamp imprints from the Neolithic sites of the steppe part of the South Buh River basin. So, ordinary notched imprints could have been made with the slackly pressure of the sinuous edge on the interior surface of a *Cardium* shell, and elongated notched imprints could have been made with the edge of the external surface with radiating ribs on the same shell when placed at an acute angle to the surface of the vessel. The paral-

Site name	Lab. Number	Material	Date BP	Calibration date range BC* (1 sigma)	Calibration date range BC (2 sigmas)	Reference
Ghirzhove	Ki–11240	bone	7390±100	6400–6100	6440–6060	*Man'ko 2006.19*
Ghirzhove	Ki–11241	pottery inclusions	7280±170	6360–6000	6500–5800	*Man'ko 2006.19*
Ghirzhove	Ki–11743	pottery inclusions	7200±220	6350–5840	6500–5650	*Man'ko 2006.19*

Tab. 1. Radiocarbon dates of the Ghirzhove site. *Calibrated by OxCal 3.10 (*Bronk Ramsey 1995; Reimer *et al.* 2004*).

Site name	Lab. Number	Material	Date BP	Calibration date range BC (1 sigma)	Calibration date range BC (2 sigmas)	Reference
Rakushechny Yar, layer 20	Ki–6476	pots-snuff	7930±140	7040–6660	7200–6450	*Telegin* et al. *2000*
Rakushechny Yar, layer 20	Ki–6477	pots-snuff	7860±130	7030–6590	7100–6450	*Telegin* et al. *2000*
Rakushechny Yar, layer 20	Ki–6475	pots-snuff	7690±110	6640–6440	6900–6250	*Telegin* et al. *2000*

Tab. 2. Radiocarbon dates of the bottom layers of the Rakushechny Yar site.

lel lines could also have been drawn with the sinuous edge of the same shell (Figs. 6, 7).

The Neolithisation of the Northern Black Sea area – a new approach

If our hypothesis on the origin of 'Samchyntsi' pottery is correct, it considerably changes traditional ideas about the Neolithisation process in the Northern Black Sea area. Neither of the hypothetical scenarios for the Neolithisation of this area mentioned at the beginning of the article can be completely confirmed by the archaeological record.

So, the overland spread of Neolithic innovations from the Balkans in the Northern Black Sea area could not have begun before approximately 6100 calBC, when the first farmers appeared in the territory of modern Romania (*Biagi, Shennan and Spataro 2005; Biagi, Spataro 2005*). The presence of the Pre-Pottery Neolithic in the Caucasus is now being discussed (*Badalian* et al. *2004.404; Kiguradze, Menabde 2004.361; Connor, Sagona 2007.27, 28*). But all of the already quite abundant radiocarbon dates for the pottery Neolithic of Transcaucasia (Goytepe; Aratashen, level II; Aknashen-Khatunarkh, horizon III–V; Kamiltepe; Aruchlo; Gadachrili Gora), and the Northern Caucasus (Cmi, horizon 3) fall into the 6th millennium calBC (*Badalyan* et al. *2007; 2010.210; Aliyev, Helwing 2009.38; Hansen, Mirtskhulava and Bastert-Lamprichs 2009.22; Guliev, Gusejnov and Almamedov 2009.30; Rostunov, Ljachov and Reinhold 2009.65; Kvavadze, Jalabadze and Shakulashvili 2010*). According to palynological and paleoclimatological data, Neolithic layer 'C' at the Chokh site in the Eastern Caucasus was formed in more humid conditions than today. On this basis, it was correlated with the New Caspian transgression and dated to the beginning of the 6th millennium calBC (*Amirkhanov 1987.27–31*). New research of sediment records of eleven lakes with reliable chronologies and robust proxies from arid Asian regions fully confirms this conclusion (*Chen* et al. *2008*). However, the radiocarbon dates of the earliest Neolithic sites of the Northern Black Sea area are older. This can partly be explained by the imperfection of the dates from the Kyiv laboratory derived from samples of potsherds, which has been noted repeatedly.

In any case, the prototypes of most types of early Neolithic pottery of the Northern Black Sea area are unknown in the Neolithic of the Eastern Balkans, the Carpathian-Danube region, and the Caucasus. This holds not only for 'Samchyntsi' pottery with notched stamp imprints, but also for some types of pottery with flat and conical bottoms decorated with a stroked pin-action and drawn linear techniques, not considered in detail here. Indeed, all the types of pottery mentioned so far are – formally – Impresso ware, in so as far as they have printed decoration. The *Cardium* pottery – finds of which are already well-attested in the region – is also a variety of Impresso ware. Thus, the Neolithic with the Impresso ware of the Mediterranean is the closest analogy to this pottery in the Northern Black Sea area.

Site name	Lab. Number	Material	Date BP	Calibration date range BC (1 sigma)	Calibration date range BC (2 sigmas)	Reference
Lazarivka	Ki–9840	pottery inclusions	6900±150	5980–5660	6100–5500	*Man'ko 2006.16*
Gyrlo Gnylopyati	Ki–8691	pottery inclusions	6490±90	5530–5360	5620–5300	*Man'ko 2006.16*

Tab. 3. Radiocarbon dates of the Lazarivka and Gyrlo Gnylopyati sites.

The similarity between some types of Early Neolithic ware from Eastern and Western Europe has been noted recently. However, this similarity has been explained by a wave of initial pottery making spreading from sources located in the east of the steppe zone, approximately from the lower Volga-Ural interfluves, far to the west, reaching the western confines of Europe (sites of the La Hoguette, Limbourg, 'Epicardial' and Roucadour groups) (*Dolukhanov, Mazurkevich and Shukurov 2009.249–251*). In my opinion, as the Black Sea, through the Bosphorus, the Sea of Marmara and Dardanelles, is connected with the Mediterranean, and local Neolithic pottery is a kind of Impresso ware, the whole local Neolithic of the Northern Black Sea area might be interpreted as a separate north-eastern branch of the Mediterranean circle of Neolithic cultures with Impresso ware (*Gaskevych 2009; 2010*). If this is true, identical mechanisms of Neolithisation could have been at work in both the Northern Black Sea area and the Northern Mediterranean region.

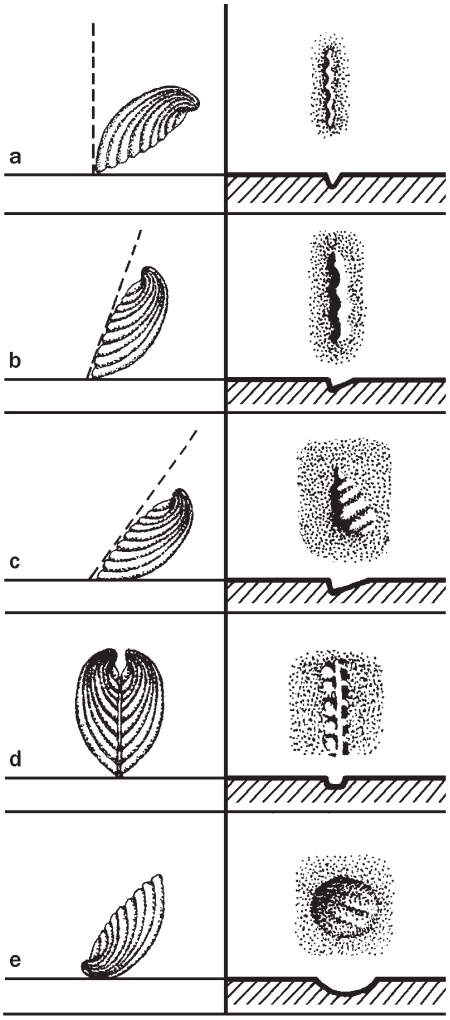


Fig. 7. Various techniques of the imprinting by a* Cardium *shells (after* Brandaglia 2002.416*).

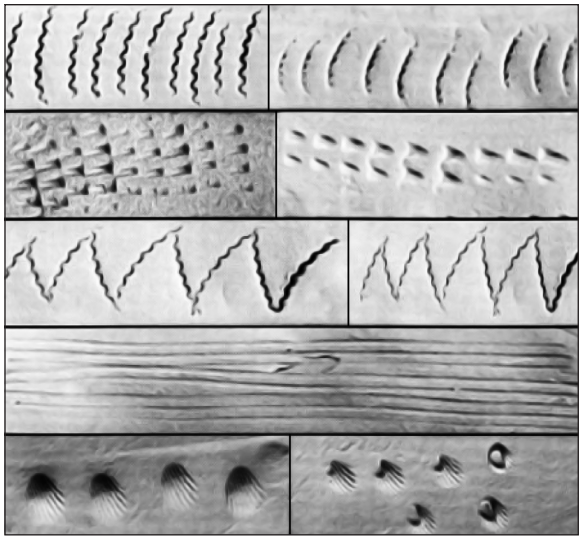


Fig. 6. Types of the decoration made by* Cardium *shells (after* Manen 2002. 126, Fig. 3*).

The spread of the Neolithic with Impresso ware in the Mediterranean has the character of so-called 'leapfrog colonisation', carried out by coastal navigation. Some evidence suggests that it occurred very quickly – at a rate of 4.5km/year in the southern part of the Adriatic (*Forenbaher, Miracle 2005.521*), and 10–20km/year in the Western Mediterranean from the Gulf of Genoa to the estuary of the Mondego River (*Zilhão 2001.14184*)

Similar parameters of average advection rates – 10km/year along the coast and 5km/year along the valleys of two major European rivers, the Danube and Rhine – have been used in a mathematical model of the population dynamics of the spread of incipient farming in Europe developed by archaeologists and mathematicians at the University of Newcastle upon Tyne. The model also allows for diffusivity of space, which gradually declines with increasing distance from a coastline and with increasing altitude, and disappears completely at 1000m above sea level (for details, see: *Davison* et al. *2006.644–647*). The results of this modelling for well investigated regions of South-Eastern, Central and Western Europe appear close to the results obtained by archaeological research. Therefore, there is reason to believe that the results for the Northern Black Sea area are also correct.

The modelling shows the rapid spread of Neolithic innovations from the west to east along the western and northern coast of the Black Sea. The simulated time for the beginning of Neolithisation in the region corresponds to the time when the process began in the south of the Balkan Peninsula and the coasts of

the southern Adriatic (*Davison* et al. *2006.648, Fig. 4*). The reliable radiocarbon dates assigned to the earliest sites from Thessaly, Macedonia (Achilleion, level Ia, Ib; Argissa; Nea Nikomedeia; Sesklo, level of the 'The Earliest Pottery Neolithic'), and Corfu (Sidari C bottom) are no earlier than *c.* 6600 calBC (*Perlès 2001. 99–110*). In general, the results are close enough to the actual dates of the Early Neolithic of the Northern Black Sea area from the Kyiv laboratory. The simulated Neolithisation process spreading along the opposite southern and eastern coasts of the Black Sea did not extend to the North Pontic region (Fig. 8).

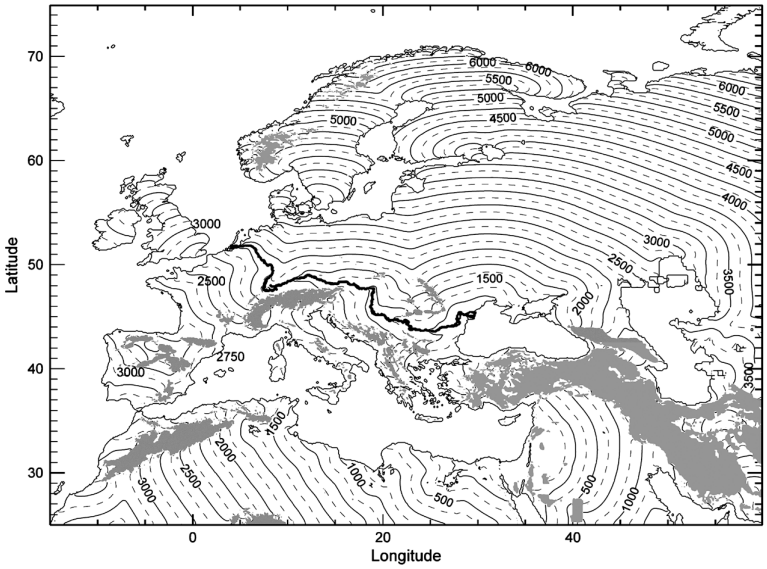


Fig. 8. An isochron map of simulated Neolithic dispersal from one centre at the Jericho settlement with consideration for faster spread along the Danube-Rhine corridor and coastlines. Regions inaccessible to the population (where altitude exceeds 1000m) are filled with grey. The latitude and longitude scales are given in degrees (after* Davison *et al.* 2006.648, Fig. 4*).

It is intriguing that the first appearance of some other similar groups of artefacts is a little earlier in the Northern Black Sea area compared to Mediterranean Europe. For example, the parallel-sided blades and isosceles and rectangular trapezes industries appeared in the Northern Black Sea area in first half 8th millennium calBC (*Biagi, Kiosak 2010*), and on Sicily, in the south of the Italian peninsula and, probably, on the south-eastern coast of the Adriatic only around 7000–6600 calBC (*Perrin* et al. *2010*).

One more striking example is the so-called 'transverse grooved stones', often called 'chovnyky' in Ukrainian literature and 'chelnoki', 'utyuzhki', or 'poliroval'niki' in Russian. Their initial area was in the Near East, where they have been found in Epipalaeolithic and Protoneolithic complexes of the 10th to the first half of the 8th millennium calBC (*Solecki, Solecki 1970.834–836; Wechler 1997a; 1997b*). These artefacts existed on the Mediterranean coast of North Africa, the Trans-Caucasus, the Northern Black Sea area, and Central Asia in the 7–6th millennium calBC. In the 5–4th millennium calBC, their distribution was displaced east and covered the forest-steppe and the steppe zone from the Dnipro River in the west to the Ob' River in Siberia in the east, and also a small area in the interfluves of the Amu Darya and Syr Darya rivers in Central Asia (*Usacheva 2005.15, 16, Figs. 3, 4*). Similar artefacts occasionally occur in materials from Western Mediterranean sites with *Cardium* – Impresso pottery of the 6–5th millennium calBC also. For example, a typical transverse grooved stone was found at the Valada do Mato site in the interior of Southern Portugal which is dated to the first quarter of the 5th millennium calBC (*Diniz 2007.151*). The researcher, Mariana Diniz, interpreted this find as a 'hone of amphibolite, with a groove' and considered that it was used for making stone, bone or cockleshell personal ornaments (*Diniz 2007.109, 249, 291, Figs. 15.4, Photo 41*). The important point is that the Valada do Mato site was settled by people with a mixed economy having cultural traits of both the Mesolithic and Neolithic cultural packages (*Diniz 2007. 156–164*). No such combination of traits has been found in synchronous Neolithic sites in Portugal, but they are characteristic of practically all Neolithic sites of the 7–6th millennium calBC in the Northern Black Sea area.

On the one hand, the similarity of some processes and the distribution of similar groups of artefacts can confirm that the Neolithic with Impresso ware of the North-Mediterranean and North Pontic areas were two parts of a single cultural circle. On the other hand, the asynchronism of the beginning and progress of these processes and the existence of original traits in the Neolithic of the mentioned areas is evidence against regular direct contacts of their population. In addition, such contacts could have been hampered, as the area of the Anatolian and Balkan Neolithic groups with other cultural traditions (Karanovo-Starčevo-Körös-Criş complex) divided them geographically. At first, there probably

was a common origin and similar mechanisms of Neolithisation in both remote regions, and separate development later. The common characteristics typical of the whole area of the Great Mediterranean Neolithic with Impresso ware indicate that its origin can be related to the same groups having available the economic achievements of the Near-Eastern Early Neolithic and traditions of pottery making of the Sahara-Sudanese Neolithic of North Africa (*Gaskevych 2010.238–241*).

For all these reasons I have proposed a third hypothetical scenario of Neolithisation in the Northern Black Sea area in addition to the two available, which proposes that Neolithisation in the region began with a process of demic diffusion consisting of the rapid spread of small Mediterranean seafaring communities along its coastline in the first half or the middle of the 7th millennium calBC. Their beachhead colonies are probably submerged now. The process of cultural diffusion, when some elements of the 'Neolithic package' were adopted by local Mesolithic populations began afterwards. A possible consequence of this is the occurrence of the first pottery with decoration using pin-action and comb stamp impression techniques, and also the polished stone artefacts and livestock in inland territories. The evidence of direct contacts of interior groups with their coastal neighbours is the pottery found far from the sea, but made of sand with the remains of brackish water ostracods, and decorated by marine cockleshells prints. Simultaneously, the first farmers of the Balkan region and the Carpathian-Danube basin, who were of Anatolian origin, migrated overland from the west to the Northern Black Sea area. As a result, the Neolithic of the Dnister and South Buh river basins became syncretic. It combines traits of the early Danubian Neolithic and the Mediterranean Neolithic with Impresso – *Cardium* pottery (Bug-Dniester culture). In the remaining territory of the Northern Black Sea area, traditions based on the cultural complex of the Mediterranean maritime migrants continued to develop.

I again draw attention to the preliminary character of this idea. Unfortunately, at present it is based on isolated finds, radiocarbon dates which are often questionable, and sites researched quite a few decades ago. However, it should be emphasised that alternative concepts of Neolitization in the Northern Black Sea area have a probative base of the same and even weaker nature. In doing so, this concept is at a doubtless advantage, because it conforms remarkably to the general tendency of historical development of the region, which although remote, is an integral part of the Mediterranean. The existence of settlements of Mediterranean civilizations spread mainly by sea (ancient Greek colonies, Roman and Byzantine towns, the fortresses and trading stations of Genoa and the Republic of Venice) confirms it here. Therefore, I consider the current publication only as a first step in promising research into this newly discovered phenomenon in the archaeology of the Northern Black Sea area.

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Early Neolithic settlement patterns and exchange networks in the Aegean

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ABSTRACT – *The Neolithisation process is one of the major issues under debate in Aegean archaeology, since the description of the basal layers of Thessalian tell-settlements some fifty years ago. The pottery, figurines or stamps seemed to be of Anatolian origin, and were presumably brought to the region by colonists. The direct linking of the so-called 'Neolithic Package' with groups of people leaving Central Anatolia after the collapse of the Pre-Pottery Neolithic B resulted in the colonisation model of the Aegean. This view is not supported by results obtained from natural sciences such as archaeobotany, radiocarbon analyses, and neutron activation on obsidian. When theories of social networks are brought into the discussion, the picture that emerges becomes much more differentiated and complex.*

IZVLEČEK – *Proces neolitizacije predstavlja enega glavnih vprašanj v okviru razprav v egejski arheologiji vsaj od opisa temeljnih plasti naselbin tipa tell v Tesaliji pred 50 leti. Za keramiko, figurine in pečatnike se je zdelo, da izvirajo iz področja Anatolije, in so jih na področje Tesalije prinesli kolonisti. Neposredno povezovanje t.i. 'neolitskega paketa' s skupino ljudi, ki je zapustila centralno Anatolijo po padcu kulture predkeramičnega neolitika B, je postalo osnova za egejski kolonizacijski model. Ta vidik pa ne podpirajo rezultati iz naravoslovja kot so arheobotanika, radiokarbonske analize in nevronska aktivacijska analiza obsidiana. Če v razpravo vključimo še teorije socialnih omrežij, postane slika veliko bolj raznolika in zapletena.*

KEY WORDS – *Aegean; Neolithic; Mesolithic; Neolithisation; networks*

Introduction

'For lack of a name' James H. Breasted (*1919.55*) labelled the area covering the Levant, Upper Mesopotamia, and the Western flanks of the Zagros Mountains as 'The Fertile Crescent'. This telling name now refers to the core area in which the 'Neolithic Revolution' – a term coined by Gordon V. Childe – began. In his seminal book 'Man Makes Himself', Childe (*1951*) dedicated a whole chapter to those transformations that cover all aspects of life, leading to the most radical restructuring in human (pre)history. At its far end is our modern society, still comprised of sedentary communities relying on plant and animal husbandry exclusively.

According to the two basic alternative views of the spread of the Neolithic way of life, Early Neolithic communities in areas adjacent to the Fertile Crescent were either deeply influenced by the transformations happening there, or were a direct offspring of people living in the Near East who, for whatever reasons, moved West and colonised not only the Aegean, but also Southeast Europe. Eminent archaeologists dealing with these questions advanced various narratives, three of which were recently published in the same catalogue (*Lichter 2007*).

From a Central European viewpoint, the direction of the movement as presented by Jens Lüning (*2007. 179*) seems rather clear and very linear (Fig. 1). Represented by thick arrow-lines, the dissemination started from the Eastern Mediterranean, reaching Europe via the islands of Cyprus, Crete and both

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mainland Greece or Sicily and Magna Graecia. Lüning's other route is supposed to have led via the Sea of Marmara. Certainly, these routes seem logical and navigable. Yet, the archaeological evidence for this linear movement takes us no farther than the first steps: the colonisation of Cyprus from the Levant.

Mehmet Özdoğan's (*2007a. 151*) narrative dispenses with arrows, but suggests a very powerful expansion starting throughout Anatolia, sweeping over whole regions, covering enormous areas, and leaving no gaps behind (Fig. 2). Neither were any unoccupied territories admitted (for example, the Southern Peloponnese), nor were enclaves of Mesolithic groups taken into consideration (*e.g.* the Danube Gorges).

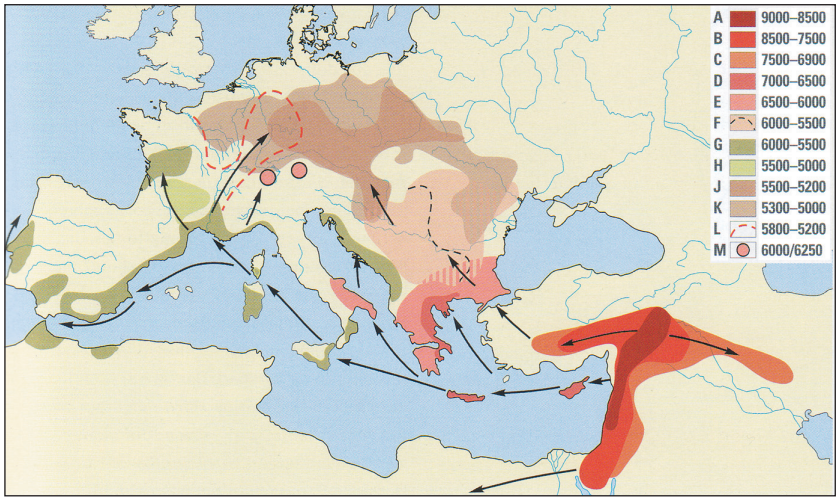


Fig. 1. Neolithisation model according to Lüning (*2007.179*).

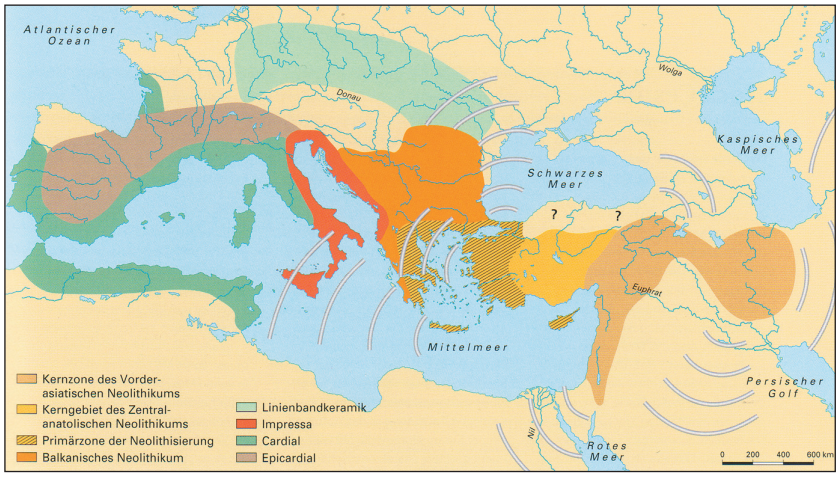


Fig. 2. Neolithisation model according to Özdoğan (*2007a.151*).

The third narrative, by Jean Guilaine (*2007.171*), operates with more limited and defined areas, and does not use symbols to indicate unidirectional movements, but calibrated dates to show the boundaries between even neighbouring areas (Fig. 3). The gaps might result from insufficient evidence and/or insufficient investigation.

Whereas the first two narratives operate within the colonisation paradigm, option [A], the third dispenses with indicators for direct movement, leaving open the possibility of the transmission of ideas, option [B]. It is the third narrative that also transmits our sparse knowledge about certain regions like the one under discussion in this contribution. By 'Aegean' I mean both littorals of the Aegean Sea: the Eastern, Anatolian coastal area with its hinterland, and the Western, including Eastern Greece. The Southern boundaries are formed by the island of Crete, the Northern ones are formed by Aegean Macedonia as well as Greek and Turkish Thrace. Northwest Anatolia, with its complex geographical setting close to the Marmara Region deserves a separate and comprehensive study.

The spread of the Neolithic is directly linked to the geographical setting of Anatolia: regional groups are delimited by geographical borders, like the Middle Taurus mountain range that separates Upper Mesopotamia from Central Anatolia, and farther West, the Hasan Dağları of the Western Taurus mountain range, with heights around 3000m, between the Anatolian Plateau and the Lake District. These ranges are certainly not impenetrable, but nevertheless form natural barriers separating not only the regions in an East-West direction, but also in a North-South-direction: the coastal plains around the gulfs of Mersin and Antalya also have specific regional characteristics.

The 'Neolithic Package'

Before discussing the character of the spread of the Neolithic – whether of people and/or ideas and/or commodities – a closer look should be taken at the arguments for a Near Eastern colonisation of the

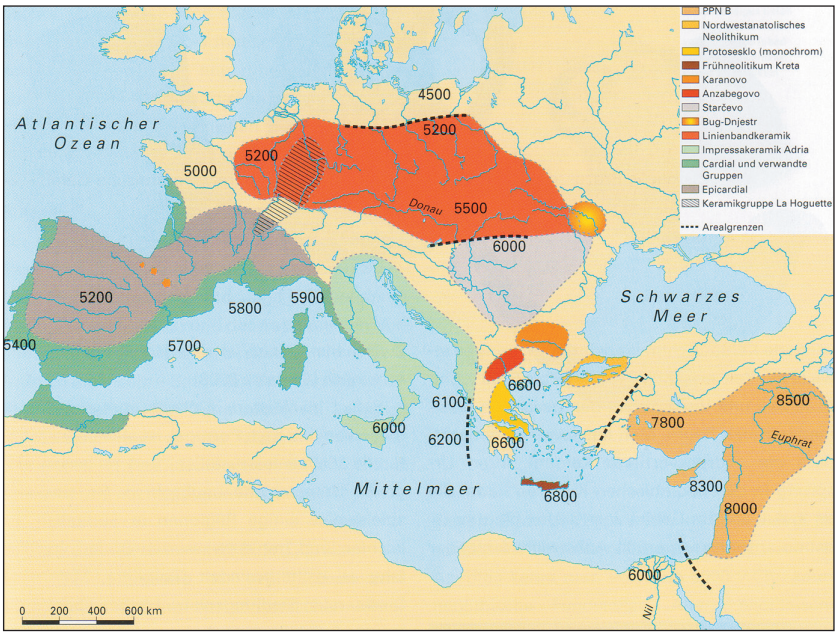


Fig. 3. Neolithisation model according to Guilaine (*2007.171*).

Aegean region based on material culture. According to Childe, both the agricultural economy relying on domesticated plants and animals, as well as sedentism, were among the key features of the Neolithic way of life. In his view, ground stone implements (hoes and axes), pottery (mainly for storage), spindle whorls, and other weaving implements for producing textiles formed the basic elements of the Neolithic. Other features of Childe's primary components are exponential population growth, the storage of surplus products, trade networks focusing on non-essential items, decentralised social mechanisms for the coordination of collective activities, and magic-religious traditions that focus on the promotion of fertility (*Childe 1951.75-80; Zeder 2009.13*).

It is well known that the 'Neolithic Revolution' was a long-lasting process, since even the appearance of the three main elements of material culture that Childe mentions (pottery, ground stone, spindle whorls) encompassed a very long period, more than 15 millennia (from roughly 24 000 to 8400 calBP) (*Zeder 2009.18*). In Melinda Zeder's (*2009.39*) view, "*Childe clearly did not conceive of the constituent components of the Neolithic bursting forth fully formed as a complete package. Instead, Childe saw these different components as mutually reinforcing parts of an unfolding process.*" Zeder (*2009.3*) borrowed the concept of the '*Bauplan*' from macro-evolutionary theory in biology. It is based on the idea that single traits should not be analysed alone; instead, integrated wholes or constellations of traits that follow basic structural plans should be studied. Following this approach, we should not just be content with the definition of the 'Neolithic Package' and the description of its individual components when studying the Neolithisation process, but rather embed them in their social context.

In an attempt to place these components within living environments, I shall make use of another concept that seems most suitable for approaching prehistoric societies: social network theory (*Watkins 2008. 139–171; 2003.36–37*).

In 6700 calBC at the latest, the so-called 'Neolithic Package' was fully developed in Eastern and Central Anatolia, including not only economic and technical items, but also social and symbolic cultural objects like figurines, stamps, and ornamentation on pottery. Thus, at the moment when the Neolithic way of life spread into the Aegean, all of the features were available. Therefore, they were seen in research as an integrated component of a single 'Neolithic Package'. Yet, the more sites were excavated in the Aegean, the more it became clear that the concept of such a single package arriving with colonists from farther East could not properly explain the complicated process of Neolithisation, as I will argue in the rest of this paper.

The concept of the 'Neolithic Package' has long been the main argument in research for explaining the Neolithisation of the Aegean and the Balkans by colonists (*Perlès 2005.286*). Its seemingly sudden spread into the Aegean paired with the again seemingly sudden appearance of new sites in the initial stage of the Early Neolithic (EN I) were the main reasons for taking a colonisation process – triggered by a collapse at the end of the Pre-Pottery Neolithic B (PPNB) (*Perlès 2001; Özdoğan 2007b*) – for granted. But in the last decade, the positivistic approach to dealing with the arrival of the 'Package' in Europe has been moderated to some degree. According to Çilingiroğlu (*2005.Tab. 2*), the 'Neolithic Package' should be divided into several packages that arrived in the Aegean at different times. This proposal, taken a step further, raises the question as to whether it is meaningful to conceive of 'packages' at all. Is a pa-

ckage not a combination of several things belonging together or relating to one another? Yet, if the single parts of the 'Neolithic Package' occurred in several periods and in different combinations from region to region, even from site to site, are we then still dealing with a package or packages? And who might have been packing the parcels? Was it indeed 'colonists' expanding from Anatolia to the West who packed them (according to view [A] in the introduction), or were any local populations involved in the process, who adopted only parts of it, leaving certain features and contents aside (according to view [B] in the introduction)? Or instead, is the 'Package' rather the result of a combination of two processes: mobile groups of people relying increasingly on domesticates (with all the consequences involved), and influencing other mobile groups of hunter-gatherer-fishermen through regular contacts and exchanges in such a way that the latter groups also adopted and became adapted to innovations, and to social and cultural change?

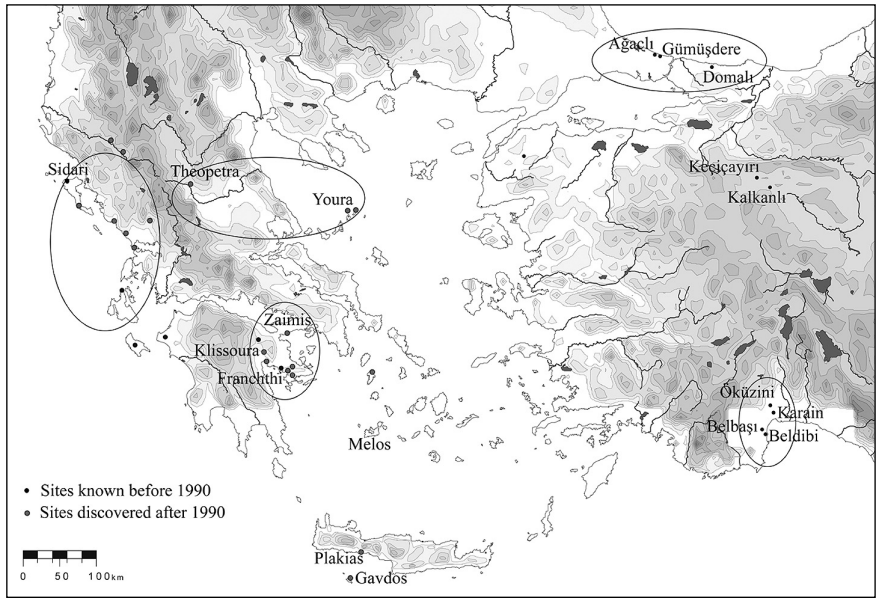


Fig. 4. Mesolithic sites in the Aegean (after* Reingruber 2008.Map 1*).

When archaeologists structure the 'Neolithic Package', there seems to be no broad consensus on what should go into the parcel(s). Depending on the knowledge and priorities peculiar to the archaeologists dealing with this concept, the supposed package tends to be quite varied. Upon close examination, the limits of this concept become more than clear. The impossibility of fitting the package into tables is obvious, when comparing the suggestions made by Perlès (*2005.Tab. 1*) and Özdoğan (*2010.Tab. 1– 2*): in their view, the 'Neolithic Package' reaching Greece should contain – in addition to mud bricks – complex hearths, plastered and lime floors, clay benches and buttressed walls. These elements did not appear before the Early Neolithic II (EN II) or even the Middle Neolithic (MN) in Thessaly and the Argolid, if at all. When small finds are also included in the discussion, it is even more difficult to reach a consenus: the stamp seals, bone spoons, antler hafts, pebble figurines or M-shaped figurines, supposedly brought by the early colonists, have not been found at any EN I sites in Greece.

I believe that, when trying to explain the Neolithisation of the Aegean by the arrival of colonists bringing their package(s) with them, one should focus first on the initial stage of the Neolithic, EN I. After 'freeing' this period of all the assumptions connected with it and then rigorously examining the finds from this stage, very little is left for discussion. As shown in an earlier contribution (*Reingruber 2005*), investigations in the Western Aegean are limited to small trenches when reaching the basal layers of tell settlements. Every study dedicated to the Neolithisation process of the Aegean, the present one included, is hampered by at least two major shortcomings: (1) the lack of large-scale excavations carried out according to modern standards, and (2) few comprehensive publications with a convincing discussion of the stratigraphy and a precise placement of the finds in a specific layer and a certain context. Instead, there is an abundance of papers with a rather general appraisal of the cultural material.

Despite these shortcomings, one should not waste the chance to at least attempt, even within limited terms, to analyse the EN I material – not merely to contradict the concept of the 'Neolithic Package', but taking a more comprehensive view as suggested by Zeder's (*2009*) concept of a '*Bauplan*'. The idea of enumerating single items of the 'Neolithic Package', that seem to occur both in Anatolia and the Aegean, and explaining the introduction of such items to Europe by the unidirectional movement of people, by colonists, actually oversimplifies the complicated and complex procedure that the Neolithisation process must indeed have been. Therefore, one must

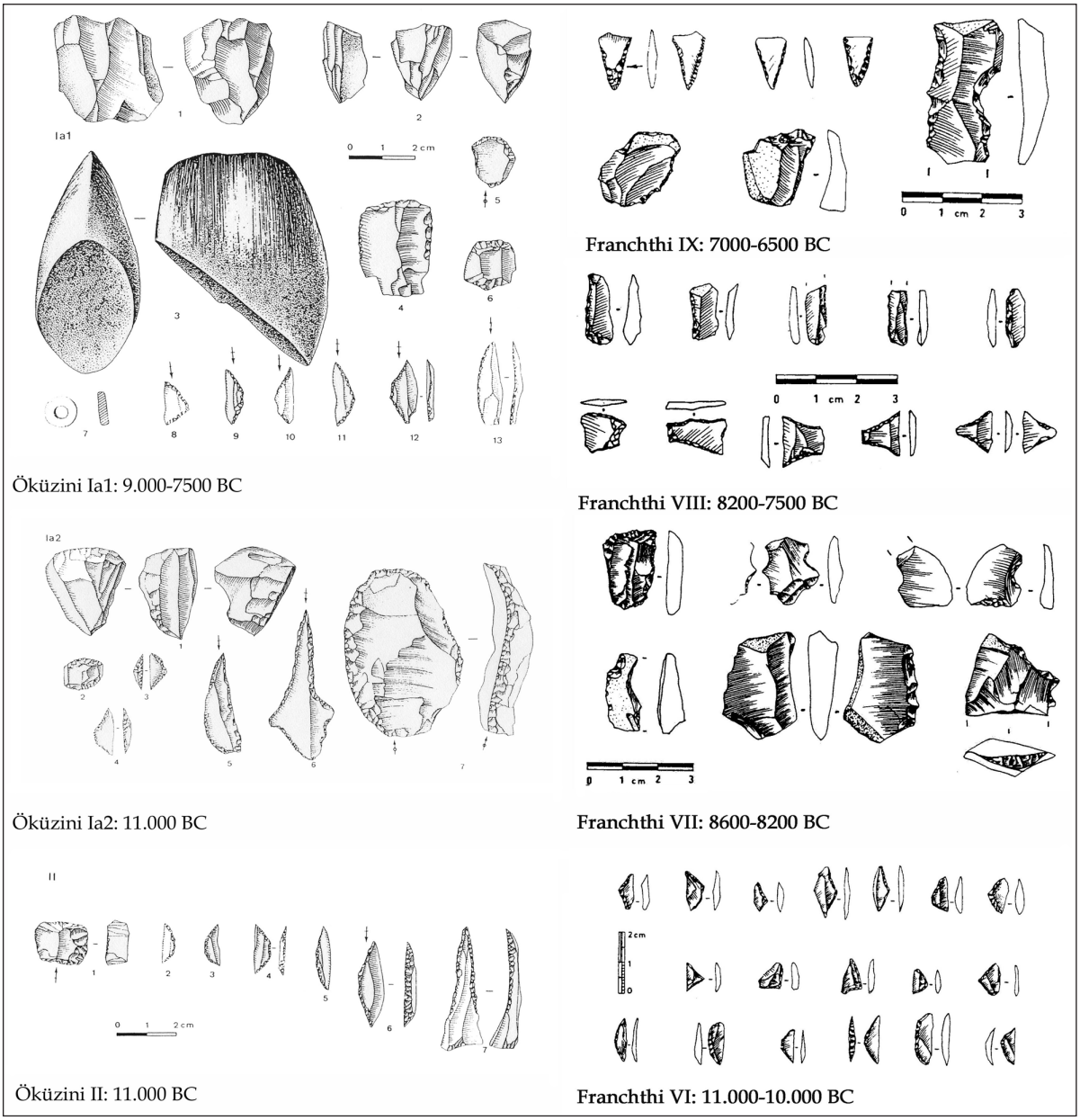


Fig. 5. Stone tools from Öküzini (*Yalçınkaya *et al.* 1995*) and Franchthi (*Perlès 1990*).

acknowledge the limits of the 'Package' as a tool for analysis. The 'Neolithic Package' seems to be a construct that helps archaeologists structure their information and knowledge rather than reflecting a historical process. Instead of focusing on presupposed colonists bringing their parcels of items and knowledge into the Aegean, one should take a step back into the Mesolithic period and include archaeological remains from caves in Southwest Anatolia and Eastern Greece in the discussion.

The Mesolithic and the EN I in the Aegean

After the two decades of intensive study of the Greek Neolithic by Milojčić and Theocharis during the 1950s to the end of the 1970s, systematic investigations of the Early Neolithic in Eastern Greece have been few and only on a limited scale. Yet even the sparse evidence produced, when studied in detail and not only in a broad perspective, offers clues for a differentiated discussion of the ensuing Neolithic in the region.

As stagnant as the investigation of the Early Neolithic is, just as slowly are new pieces added to the puzzle that is the Mesolithic. Furthermore, investigations of the Mesolithic are linked to a few researchers active in the different regions. In the European part of the Aegean, new sites have been revealed in the last two decades by Adamantios Sampson, Stefan Kozłowski, Nina Kyparissi-Apostolika, Curtis Runnels

and Thomas Strasser (*Sampson 1998; Sampson* et al. *2002, Kyparissi-Apostolika 2000; Strasser* et al. *2010*). Thus, the many blank areas on maps in earlier monographs dealing with or including the Aegean Mesolithic (*Perlès 1990*) can be filled with more find spots (Fig. 4). The island of Crete alone, which often served as the prime example of Neolithic colonisation, now must be reckoned to have had a significant hunter-gatherer-fisher presence on the southern coast (*Strasser* et al. *2010*). Mesolithic finds have been recorded even on the small island of Gavdos, south of Crete (*Kopaka, Matzanas 2009.Fig. 5*). It is only a matter of time before camps of hunter-gatherer-fishermen are also detected in the Eastern Aegean.

Not including Western Greece, with many newly discovered sites in the Preveza region, the focus of this contribution will be on the Argolid and Thessaly. At the moment, intra-Aegean comparisons can be made between Eastern Greece and Southwest Anatolia, where in the Antalya region, stone inventories of the Early Holocene were brought to light in the middle and late 20th century.

Groups of hunter-gatherer-fishermen seem to have preferred secure bay-like situations close to hilly areas (Fig. 4). This is not only the case with the region around Antalya (Beldibi, Belbaşı, Öküzini and Karain), but also in the Argolid (with sites like Franchthi, Klissoura, Koukou, Ulbrich or Zaimis). When comparing the inventories of stone artefacts found in these two regions, the similarities are much more convincing than any comparisons with coeval sites in Central Anatolia. In Çatal Höyük during the 8th and early 7th millennium, bifacially retouched tools are the most evident feature suggesting a very sophisticated *chaîne opératoire*. At the same time in Öküzini, Beldibi and Belbaşı, backed bladelets, end-scrapers and geometric microliths predominate. When comparing the stone tool-inventories from the two sites of Öküzini (*Yalçınkaya* et al. *1995*) and Franchthi (*Perlès 1990*), starting with the Early Holocene, the similarity in concepts of tool-production is striking (Fig. 5). The rhythm in which the changes occur in the West and East is the same: backed bladelets are typical of the transition from the Late Upper Palaeolithic to the Mesolithic around 10 000 BC; splintered tools and transformation tools appear often in the Early Mesolithic, whereas geometric microliths are identified as Mesolithic.

If one accepts the view that colonists from Central Anatolia arrived in the Aegean around 7000 BC (*Perlès 2003.103*), one has to find convincing answers as to why they did not bring with them (that is, in their packages) their most advanced technologies for flint-knapping and tool production, but instead reverted to a less sophisticated *chaîne operatoire*.

After the middle of the 7th millennium, regularly cut blades, probably pressure-made, appeared on both coasts, such as Çukurici Höyük, Dedecik-Heybelitepe, Ege Gübre and Yeşilova in the East (*Begner* et al. *2009; Herling* et al. *2008; Sağlamtimur 2007; Derin 2007*), and at Sesklo (*Moundrea-Agrafioti 1981*) and Argissa (Fig. 6) in the West. However, geometric items with Mesolithic forms did not disappear. The stone tool-kit found in Argissa-Magoula is among the most complete inventories from Thessaly. Tools made from blades dominate the assemblage, but types known from the Mesolithic, such as trapezes, segments, denticulates and notched pieces, still occur (Fig. 7). Triangular arrowheads appear in the Aegean only in the late Middle Neolithic and become more abundant during the Late Neolithic and Chalcolithic, when trapezes were still in use (*Reingruber 2008.531; Alpaslan-Roodenberg 2011.60-61*). New



Fig. 6. Stone tools from Argissa-Magoula.

Tools	Flint	Obsidian	Total
tools made on blades	46	33	79
sickles on blades	18	–	18
pointed blades	3	6	9
tools made on flakes	8	2	10
notched pieces	4	3	7
trapezes	5	2?	7
segments	1	–	1
microtools	1	1	2
borer	–	2	2
denticulates	–	1	1
Total	**86**	**50**	**136**

Fig. 7. Stone tools from Argissa-Magoula.

techniques, like the application of pressure for the production of long and thin blades, need not necessarily be explained by a replacement of people, but rather by a replacement of activities and tasks (plant harvesting instead of hunting).

An interesting point here is that, according to our current knowledge, those areas that formed the territory of hunter-gatherer-fishermen were used later by early groups of farmers: the first Neolithic settlements appeared between the outer margins of Theopetra and Youra in Thessaly and later around Argive Bay (Fig. 8). At first sight, there seems to be a stark contrast between the very few sites from the Mesolithic period and the numerous settlements of the Early Neolithic, which would support the explanation that colonists intruded into Greece and founded many new settlements. This view, however, must be challenged: on the one hand, many more Mesolithic sites discovered since 1990 must be taken into consideration than was possible before; and, on the other, many of the sites that have been labelled as EN I date, in fact, to later periods – whether to later phases of the EN or even the beginning of the MN. The Early Neolithic of Crete (Knossos IX–V) or the Early Neolithic sites of Euboea, for instance, are – from a supra-regional Aegean view – of late Middle or even Late Neolithic date. Moreover, the sites dated to the EN I in the Argolid are not coeval with the EN I-sites in Thessaly, but some hundred years younger (*Reingruber and Thissen 2009*).

All maps denoting EN-sites in Thessaly and created on the basis of Gallis' Atlas (*Gallis 1992*) should be seriously questioned. The basic information on Gallis' map is the occurrence of sites with an inventory of monochrome pottery, sites with painted sherds, or those with impresso decoration. Yet 'monochrome pottery' is a vaguely defined term which in no case can be used in a chronological sense (*Reingruber in print*). Keeping in mind that painted sherds are always very rare and the painting mostly restricted to rims, it is evident that surface collections without painted fragments may be of pure coincidence. Assigning a site by surface material alone to a certain stage of the Neolithic on the basis of only a single, ill-defined criterion is misleading. Rather, the pottery inventories can date to more than one period.

A supra-regional, methodologically correct analysis should be made on the basis of coeval sites. Alone from the Western and Northern Aegean, can we rely on a body of 241 radiocarbon dates (*Reingruber, Thissen 2005.295–327*). With the help of modelled ^{14}C dates for each site, the approximate time at which Neolithic life started in a specific region can be inferred (*Reingruber, Thissen 2009; Thissen 2010*). The oldest sites are in the Southern Aegean, with Crete and the Lake District, and date to the first half of the 7th millennium. They are followed by the Central Aegean sites in Thessaly and Western Anatolia, while the youngest sites were founded at the end of the 7th millennium in the Northern Aegean

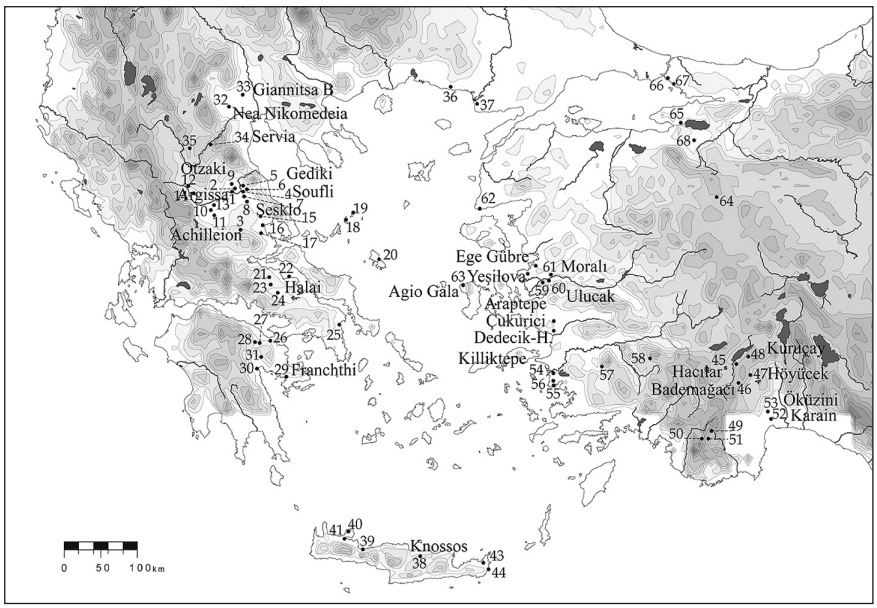


Fig. 8. Neolithic sites in the Aegean (after* Reingruber 2008.Map 2*).

(Fig. 9). Astonishingly, in the Argolid, where there was a strong Mesolithic presence, long-lasting settlements appear comparatively late, around 6000 BC. The islands, as well as Crete, were (re)inhabited continuously only after 5500 BC.

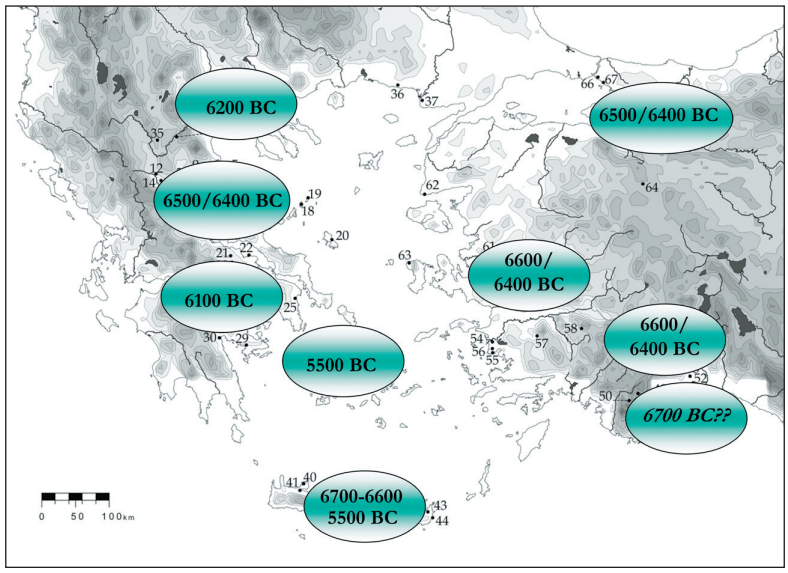


Fig. 9. First appearance of Neolithic sites in the Aegean.

After a detailed examination of both the material culture and ^{14}C dates, the model of a wave of colonisation sweeping over the Aegean as a whole must be rejected: that is, sites appear there at different stages in different landscapes. The ^{14}C dates suggest that the EN I period can be dated to between *c.* 6500/6400 (somewhat earlier in the Southern Aegean with Crete and the Lake District) and 6300/6200 calBC. All sites with dates later than these, although purported to be of EN I date, will not be taken into account here. Hence, for the whole of Greece, there remain Knossos, Argissa and Sesklo, and in Anatolia, only Ulucak and Bademağacı. Interestingly, the sites in the Lake District are older the closer they lay to the sea. Generally, the oldest known sites are situated in coastal areas. The basal layers at Knossos, Ulucak and Bademağacı are still only poorly understood – their dating around 6700 calBC is to be considered tentative (*Thissen 2010.Fig. 13*). Therefore, the modelled ^{14}C dates do not support the idea of direct colonisation from Central Anatolia, but testify to a marine-oriented population living in this area in the transition to the EN I.

The Neolithic '*Bauplan*' in the Aegean

When compiling all the data available for the first phase of the EN, we should first note the following:

Architecture

Sufficient data for reconstructing the earliest dwellings is available only from three sites: in Argissa, a more or less rectangular discolouration appeared in level 28a (level 31 being the lowest), which probably represents the contours of a hut (*Milojčić 1962*) (Fig. 10). In Sesklo A, some remains of what appear to be the corners of lightly-built structures were uncovered, but the outline remains unclear (*Theocharis 1973*) (Fig. 11). In Sesklo C, signs of a wall foundation were traced over a distance of *c.* 5m, but nothing could be connected to it (*Wijnen 1981*) (Fig. 12). In Knossos X, a threshing area was superimposed by mud brick walls from Knossos IX. Further, the basal part of pits with burials of children were also found there; the pits for the burials might have been dug from higher above (Fig. 13). At none of these sites were mud bricks or complex hearths or clay benches discovered. Mud bricks appear only later in EN II in Otzaki (*Milojčić-v.Zumbusch and Milojčić 1971*); in Argissa, mud bricks were found as a cover for the body of a child buried in EN II–III.

These remains of lightly-built, surface structures form the basal layers of incipient tell-settlements. Several areas were inhabited in Sesklo before the concentration at one main site – the later Acropolis – occurred. This settlement concept continued during the MN, with houses built not only on the tell, but also around it (*Kotsakis 1983*). The remains of Knossos X were nothing but a thin layer of settlement debris; only some 1000 years later did the inhabitants of Knossos IX build their houses atop it. The EN I–II-layers in Argissa are approximately 2m high; the MN and LN, conversely, are known only in the form of a few pits. Either there was a shift in the habitation area, or these layers were thoroughly destroyed during the Early Bronze Age.

The concept of building on the same plot like the previous generation becomes more pronounced during the EN II, since most of the tells have depositions from this period at their base (Otzaki, Achilleion *etc.*).

Burials

Compared to the number of known habitation sites, burials are even more scant: a skeleton in a crouched

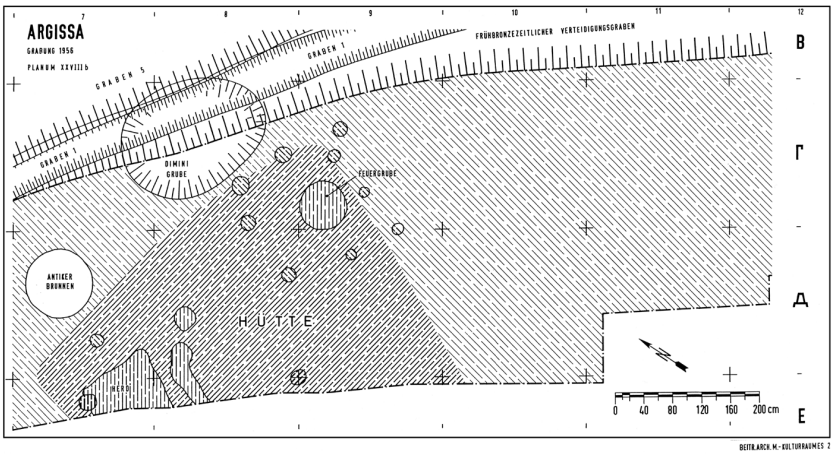


Fig. 10. Traces of architecture from EN I site Argissa-Magoula (*Milojčić 1962*).

position dated to the EN I was identified in Sesklo C. The skeleton of a child from a pit in Argissa can be dated to the EN II–III. The 15 cremations and 3 inhumations found by Gallis (*1982.221, Fig. 7*) in Soufli can be assigned to the EN II. Chourmouziades (*1971.164–175; 1973.210*) interpreted the remains of 11 individuals found in a pit under a house floor in Prodromos I as a collective grave consisting of three consecutive depositions of secondary burials (*Treuil 1983.427–428, Fig. 217*). Perlès (*2001.279–280*) draws parallels between this pit and the well-organised ossuary of the skull-building in Çayönu, which is located some 2000 kilometres and 2000 years apart. Yet, a reasonable interpretation of this feature is not possible, since no further information is available.

A comparable combination of different burial rites has not been observed thus far in Anatolia. However, human remains dating to the Mesolithic and found throughout Eastern Greece show a similarly wide spectrum: in the Argolid inhumations, single human bones and cremations appeared side by side in the cave of Franchthi. Seven burials, one in a crouched position, the others only partially preserved, were covered with stones. From the Mesolithic units, single human bones from at least 19 individuals were recovered. Two cremations appeared at the same depth with the inhumations (*Cullen 1995.274–281*). In addition, completely and partially preserved inhumations in slightly crouched positions and covered by stones were discovered in Maroulas on Kythnos. The bones were additionally covered with ochre (*Honea 1976.259; Sampson* et al. *2002.45–67*). A female skeleton in a crouched, supine position found in the Theopetra-cave is dated to 7000 calBC (*Kyparissi-Apostolika 1999.235*). In Youra, the skull of a woman found at a depth of 3.30m depth has been reported (*Sampson 1996.57*).

No skulls were remodelled or bear traces of special additional treatment. The insufficient data from Youra and Prodromos cannot serve as evidence of a 'skull cult', as in the Near East or in Central Anatolia (*Stordeur, Khawam 2007*).

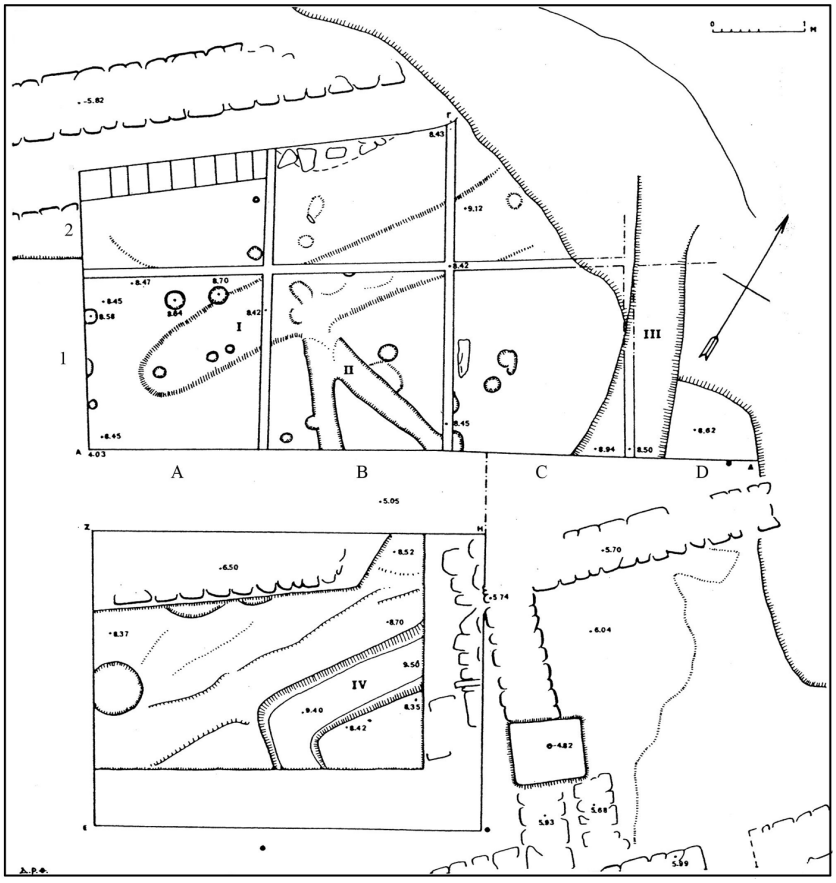


Fig. 11. Traces of architecture from EN I site Sesklo A (*Theocharis 1973*).

Stone tools: obsidian

Already at the very end of the Late Palaeolithic, the first pieces of obsidian from Melos appeared in Franchthi in the Argolid; they must have been brought there by boat, since no land bridge connected the islands with the mainland. Obsidian was in use at several sites in the Argolid during the Mesolithic (Klissoura, Koukou, Ullbrich) and on Kythnos (Maroulas) (Fig. 14). Only after *c.* 7600 calBC did this raw material appear in the Northern Sporades (Youra). By contrast, other Mesolithic sites like those on Crete, in Western Greece and even Western Thessaly (Theopetra) have not yielded any Melian obsidian. After 6500 calBC, obsidian was used in great quantities in Argissa (amounting to 46% of the stone material) and at other Thessalian sites (also in Central Greece). It reached the Northern Aegean (Nea Nikomedeia, Giannitsa, Servia) only after 5500 calBC (Fig. 15).

Obsidian from Melos was also transported to the Eastern Aegean coast: neutron-activation-analyses on samples from Çukuriçi, Dedecik-Heybelitepe and Araptepe have shown that the raw material was procured from Melos. Melian obsidian has been further documented in Altınkum Plajı/Didim, Moralı, Aphrodisias, Loryma and Latmos (*Herling* et al. *2008*). Only when analysed macroscopically, as in the case of samples from Ulucak (*Çilingiroğlu 2005.9*), Yeşilova (*Derin 2007*) or Ege Gübre (*Sağlamtimur 2007*), are Anatolian sources claimed. Here, however, the strong suspicion of a circular argument arises, according to which colonists came from Central Anatolia bringing with them their own raw materials; hence, since they used Anatolian obsidian, they came from Central Anatolia. Certainly, supra-regional networks for raw material procurement also worked in this direction, as one such piece of Central Anatolian origin from Dedecik-Heybelitepe proves (*Herling* et al. *2008.51*).

Unfortunately, no finds have been unearthed in Western Anatolia yet that can be assigned to the Mesolithic; but when such sites are discovered, it will be interesting to determine the provenance of the raw materials found there.

Subsistence and symbolic representation

Early Neolithic networks in the Aegean can also be traced in the use of certain combinations of grains, since not all regions cultivated the same varieties of cereal (Fig. 16). Before 6200 calBC, einkorn/emmer and both hulled and naked barley were planted in Southwest Anatolia and in Knossos X, but not in Thessaly, where only 'founder crops' were used. After 6200 BC, bread wheat (*T. aestivum*) appeared not only in Hacılar VI, but also in the Northern Aegean, although not in Thessaly or the Argolid (*Reingruber 2008.501–512*). Farmers in Thessaly continued to use plants that were already known to them.

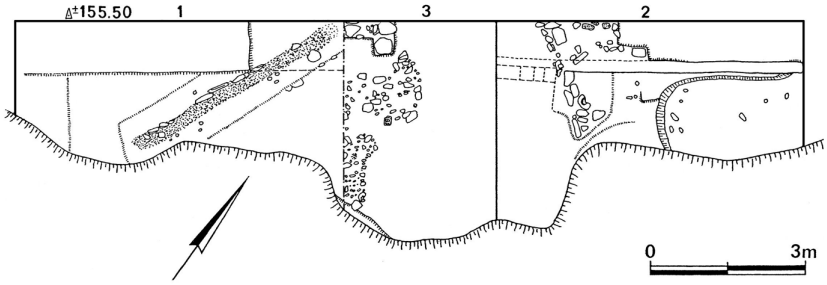


Fig. 12. Traces of architecture from EN I site Sesklo C (*Wijnen 1981*).

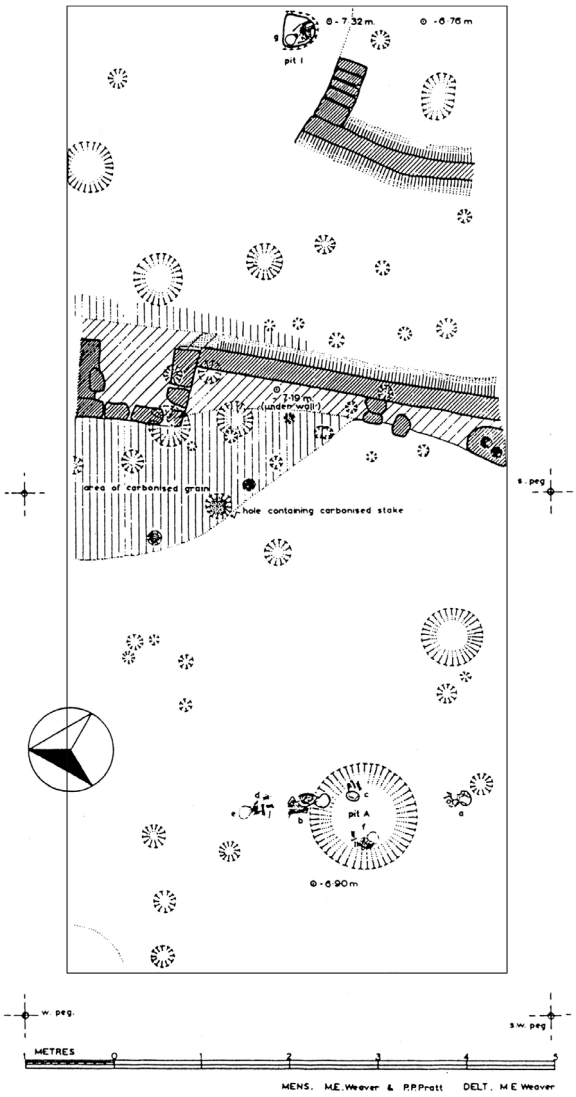


Fig. 13. Traces of architecture from EN I site Knossos IX and X (*Evans 1964*).

When contrasting this picture with the use of stamps, again a solid network becomes visible, connecting Southwest Anatolia and the Northern Aegean before 6000 calBC; and now, Thessaly is included in this sharing of symbolic expressions (Fig. 17).

No single stamp has been found in an EN I-context. The example from Argissa was assigned by its excavator to the EN; however, a reassessment of its exact position has revealed that the stamp was found in a disturbed context. Therefore, the earliest stamps are from Nea Nikomedeia, dating to post-6230 calBC (*Reingruber, Thissen 2009.756*). Those found in a secure context in Thessaly appeared only in the transition to the MN (Achilleion, Sesklo, Soufli). Again, the Argolid in the South of Greece is not part of this exchange network.



Fig. 14. Distribution of obsidian from the island of Melos in the Mesolithic.

Such a regionalisation is also visible in pottery production (*Thissen 2010.279*). Figurines – mostly female, but some recognisably male – are especially interesting in an East-West-comparison (*Hansen 2007*). Also worth noting is that none of the clay figurines can be securely dated to the EN I, but they do appear in secure contexts in the EN II (*Reingruber 2008.589*) and, therefore, are of an earlier stage than the stamps.

Discussion

During the Early Neolithic I:
- settlements appear in regions with a Mesolithic presence (Thessaly, Crete);
- huts are lightly built with thin posts and pisé walls;
- burial customs are similar to those of the Mesolithic period (cremations and inhumations);
- microlithic stone tools were still in use, but produced by new techniques;
- Melian obsidian becomes more widely distributed.

During the Early Neolithic II–III and at the beginning of the Middle Neolithic not all raw materials, products, and social practices are adopted in all regions:
- no obsidian in the North until the Late Neolithic (after 5500 BC);
- no new types of cereal in Thessaly after 6200 BC;
- no stamps and only a few figurines in Southern Greece.

This regionalisation and the slow pace at which the Neolithic way of life spread into the Western Aegean (from 6500–6000 calBC) does not accord with a massive colonisation beginning in Anatolia. Instead, interrelated regional networks become visible upon which were founded the dissemination of the Neolithic way of life into the Aegean. The main actors were not colonists, but highly mobile, seafaring groups whose roots were in the Mesolithic.

Networks from the Mesolithic and the EN in the Aegean

In his study on Palaeolithic societies, Clive Gamble (*1998*) differentiates between intimate networks, with five persons, effective networks with approximately 20 persons, extended networks with 100–400 people, and global networks with 2500 persons. In his view, interaction is based on face-to-face contact. Rather than the group, his emphasis is on the individual.

This view explains aptly the network that can be visualised with the aid of Melian obsidian found in the different regions of the Aegean. Both in the Mesolithic and the Neolithic, raw materials were procured from the same source. From a small local network in the Mesolithic, in the region around Melos, the network expanded into an effective and extended one during the EN I and MN, encompassing long

distances in both a North-South and East-West direction (Figs. 14–15). This transformation from a micro- to a macro-scale network, from a local to a regional and supra-regional one, fits well with the increasing size of groups. From the EN I to the MN, more and more sites appeared in all the regions of the Aegean. By the end of the Neolithisation process, there were several overlapping networks. The Neolithic settlements in Greek Macedonia in the Northern Aegean were not influenced by groups from Thessaly but can rather be connected with the Eastern Aegean. Unlike people in Thessaly, the inhabitants of Nea Nikomedeia cultivated *T. aestivum* and were probably the first in the Western Aegean to possess stamps. Network building must have worked from there in both a Northern (Neolithisation of the Balkans) as well as Southern direction (stamps in Thessaly). Neither a purposeful nor an irreversible colonisation/migration process lies at the basis of the Neolithic in the Aegean, but rather continuous and enduring exchange and contact over a long period, until the end of the MN around 5500 calBC.

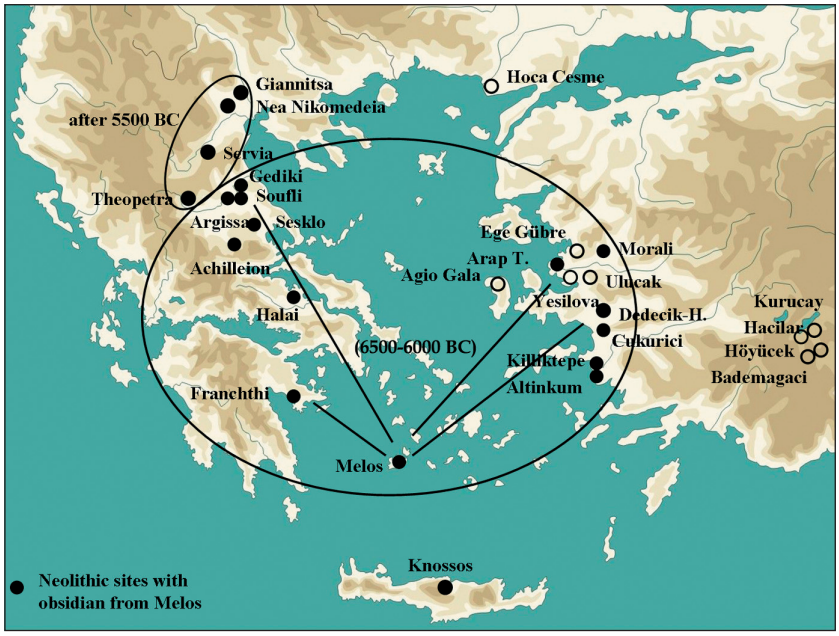


Fig. 15. Distribution of obsidian from the island of Melos in the Neolithic.

It is also Zeder's view that Neolithic communities were linked by interregional contacts and communication networks that dispersed the Neolithic way of life "*into ever-widening territories outside the area of origin*" (*Zeder 2009.22; 27*). At the end of the EN, a vast sphere of social and economic interaction had been established throughout the Aegean. The network was maintained and widened by new groups of people, who were highly mobile people rather than colonists. Such groups produced, for example, the impressed pottery that appears mainly in coastal areas around 6000 calBC. During the EN I–II, beakers and wide-mouthed, open bowls were the most common vessels – both probably used for the consumption of liquids. Storage vessel appeared only later during the MN. EN pottery was used in symbolic ways, in communicative acts – another sign of the appreciation of contacts. According to Gamble, human networks contain not only material, but also emotional and symbolic exchange. Similarly, in Watkins' view, the exchange of goods and materials should be understood in association with the sharing of symbols and symbolic be-



Fig. 16. Use of different cereals in the Aegean.



Fig. 17. Distribution of stamps in the Aegean.

haviour. Such networks grow in scale and intensity over time (*Watkins 2010.631*).

With this concept of regional and supra-regional networks based on the mobility of prehistoric people I do not argue in favour an exclusively autochthonous Neolithisation model. The input of the Anatolian/Near Eastern way of life in the Aegean is obvious. Many of the products and also the items used in symbolic activities were of Anatolian origin. Nevertheless, as has been shown, the Aegean '*Bauplan*' displayed other priorities, the material culture differing from region to region. What I wish to stress is interaction based on face-to-face contact, on integration and social competence. Also a precise examination of the ^{14}C dates argue against a demic movement ignited by a catastrophe at the end of the PPNB (compare also *Thissen 2010.278*).

Each generation of archaeologists has posed its own questions, depending on the zeitgeist of the period, the political background, and the social or economic disasters of their own time. The current generation of archaeologists in Europe has not directly witnessed war or colonisation; conversely, with the European integration process growing more powerful since the 1970ies, issues like integration and social competences now dominate our daily life. It is time to widen the discussion on prehistoric processes and approach them from an integrative perspective, accentuating the social interaction between neighbouring areas, not the domination of colonists over assumed retarded groups that seemingly played a negligible role.

ACKNOWLEDGEMENTS

The writing of this article was preceded by many discussions with scholars studying Neolithisation processes. Even if it is impossible to mention them all by name, I would like to stress that the formulation of some of the ideas put forward here were developed thanks to fruitful exchanges with Dr. Laurens Thissen, Dr. Clemens Lichter, Dr. Barbara Helwing, Giorgos Toufexis, Dr. Barbara Horejs and Prof. Dr. Konstantinos Gallis. Dr. Emily Schalk corrected the English version of the first draft and Frank Lünsmann helped with the maps. With this article, I wish to thank Prof. Dr. Harald Hauptmann for opening many doors into the exciting world of Aegean Prehistory.

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Adaptation of settlement strategies to environmental conditions in southern Slovakia in the Neolithic and Eneolithic

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ABSTRACT – *Environmental conditions such as climate, topography, and soil conditions had an impact on prehistoric settlement strategies. By studying changes in settlement structure in the Nitra, Hron and Ipel' valleys in southern Slovakia over the course of the Neolithic and Eneolithic, preferences for various climatic and topographic environments in different periods can be seen. Besides cultural and socio-economic factors, it can also be expected that changes in climate contributed to change in settlement patterns. Climatic changes in Neolithic and Eneolithic have been identified and correlated with major changes in socio-economic structure, as well as with known climate fluctuations in the North Atlantic area.*

IZVLEČEK – *Na strategije poselitev v prazgodovini so vplivali okoljski pogoji, kot so klima, topografija in vrste tal. Z raziskavo sprememb v strukturi poselitev v dolinah Nitre, Hrona in Ipela na južnem Slovaškem v obdobju neolitika in eneolitika lahko opazujemo preference za različna klimatska in topografska okolja v različnih obdobjih. Poleg kulturnih in družbeno-ekonomskih faktorjev lahko pričakujemo, da so tudi spremembe v klimi prispevale k spremembam v vzorcu poselitve. Prepoznali smo klimatske spremembe v neolitiku in eneolitiku ter jih povezali z glavnimi spremembami v družbeno-ekonomskih strukturah, pa tudi z znanimi klimatskimi nihanji na področju severnega Atlantika.*

KEY WORDS – *settlement strategies; climate fluctuations; Neolithic; Eneolithic; Central Europe; Slovakia*

Introduction

The increase in excavation activity over recent decades and the need to consolidate and make available in digital form the large body of archaeological data already collected has led to a renaissance in the study of settlement strategies and structure. Past micro-regional studies concerning the relationship between settlements and their natural environments indicated certain recurring patterns, which we attempt to verify using a larger dataset covering a broader geographical area. Our basic assumption is that the pattern of displacement of human settlements in the landscape is not random, but the result of a system of adaptation to different conditions – a settlement strategy. Diachronic change in this strategy is determined by resource usage and availability, cultural impulses and environmental influences such as climate change (*Škrdla 2006.34; Škrdla, Svoboda 1998.293*).

The source database for our analysis contains information on 1148 archaeological sites dating from the Neolithic and Eneolithic periods, and covers the area

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of the Nitra, Hron and Ipel' river valleys. The geographic localisation and dating[1] of 488 of these sites is sufficiently precise to be included in an analysis of the diachronic development of settlement structure with regard to environmental variables. All information was acquired from existing published or freely available sources. A recently compiled catalogue of sites was also used (*Tóth 2010a; 2010b*). The charting, analysis and synthesis of the data was performed using database software and geographical information systems.

The selection of analysed environmental variables is essentially unlimited and depends primarily on the focus of our study (*Kuna 1994.77; 1998.212*). In order to capture the environmental context of the settlements, we chose the following attributes: local elevation within a 200m radius (centred on the site location), walking distance to nearest potential water source, soil type (at the site location and in the site catchment area[2]), and the climatic zone of the site.

When calculating the distance to the nearest water source, the heavy regulation of mainly the lower reaches of the rivers in our area of focus was a major reason not to use recent data. A potential natural stream network was therefore modelled using an algorithm published by Tripcevich (online).

Recent data was used when determining soil types at and around the sites, based on the assumption that the soil cover did not fundamentally change in the late Holocene and was only subject to variations in its properties (*Wiedermann 2003.16*). The interpretation of the use of highly fertile chernozem and brown earth soils by Neolithic and Eneolithic farmers was based on the assumption that the basic difference between these soil types lies in moisture movement. Brown earths have a more favourable moisture regime and are less sensitive to fluctuations in precipitation than chernozem soils. On the other hand, brown earths are more difficult to work (they are stickier), and the tree roots and undergrowth connected with them pose an additional challenge to Neolithic and Eneolithic farming technology. In this respect, arid, more open chernozem areas with only insular, scattered forestation were better suited to agriculture (*Rulf 1981.127–128*).

Our study of relationships between settlement structure and climate conditions is also based on the present distribution of climatic zones (*Hrnčiarová* et al. *2002*). These are determined as a combination of average yearly temperatures and precipitation levels. While we have no data from climatic proxies in our focus area which would provide us with information on temperature and precipitation levels in the prehistoric period, we can assume that the relative differences in humidity and temperature between various climatic zones depend mainly on the geomorphological properties of the land, which have not significantly changed since the Neolithic (*Milo* et al. *2004.129; Modderman 1988.80*).

To reflect changes in demographics, which could also be subject to environmental influences, changes in settlement structure (represented by the mean distance between sites) were studied. Here, a simplified approach had to be taken, assuming that all sites dated to a particular culture (or its stage) were contemporaneous and of similar size. This simplification was necessary as the source base was insufficiently precise[3] to allow an assessment of contemporaneity between the settlements of a particular culture or cultural stage. It was also impossible to determine their exact lifespan or geographical extent (*cf. Milo* et al. *2004.132*).

The natural environment of the Nitra, Hron and Ipel' river valleys

The focus area of this study is delimited by the Nitra and Hron river valleys, the Slovak part of the River Ipel', and the adjoining left bank of the Danube, covering about 14 600 km^2 of western and central Slovakia (47,7–49° N, 17,8–20,3° E). Major climatic influences are the area of high pressure above the Azores and the area of low pressure over Iceland and Scandinavia. An oceanic climate prevails over a continental, the boundary passing approximately through central Slovakia. The northern boundary of our focus area is delimited by Carpathian mountain spurs, reaching altitudes of over 600m a.s.l. The southern part is flat and opens into the Pannonian Basin. The terrain does not exceed 300m a.s.l. over almost half of the area. The local climate is influenced by several highland and upland areas, which divide the

1 Also to avoid issues with synchronicity we did not involve finds from cultures which are not considered local to our area of focus and should be considered imports.

2 In a 1km radius around the site (*cf. Rulf 1983.61*).

3 The information about chronological assignment of the sites given in the respective literature was used. As the main body of our data comes from surface surveys, future re-evaluation of archaeological dating should be undertaken in order to obtain more reliable sources. This is especially true for the finds of stage Lengyel III where a major revision of the material has shown an incorrect assignment of many Lengyel IV finds to this stage (*Pavúk 2000.1–22; 2001.151*).

country into smaller regional units, cancelling the adverse effects of continental climatic influences (*Pavúk 1982.40; SHMÚ online*).

The subsoil on the upper reaches of the rivers is comprised mainly of pre-Quaternary rocks and undifferentiated rubble and slope deposits covered mainly by cambisols (41%). The quaternary deposits on the southern part of our focus area are mainly loess (15%), different soils (12%), and sandy loess terraces (8%). The soil cover in this part is mostly brown earth (20%), chernozem (12%), fluvisols (6%), and phaeozem (4%) (*Hrnčiarová* et al. *2002.Maps 17, 78*).

The average temperature in January in the north highlands is in the range of –4 to –7°C, in July 12–18°C. In the southern lowlands, the temperature reaches –1 to –3°C in January and 18 to 21°C in July (*Lukniš 1972.maps 65–66*)[4]. The highest precipitation occurs in the summer. In winter, precipitation takes the form of snow at medium to high altitudes. The lowlands experience great variability in precipitation levels, which leads to frequent and sometimes prolonged periods of drought. This effect is intensified by the fact that this is the warmest and most windy area of Slovakia, with high evaporation potential (*SHMÚ online*).

Chronological framework

The chronological focus of this paper is on the following Neolithic and Eneolithic cultures (5700–2300 calBC): early and late Linear Pottery culture (LBK), the Želiezovce group, Lengyel culture (3 Neolithic and 1 Eneolitic stage), the Boleráz group, Baden culture, the Bošáca and Kostolac groups, and Kosihy-Čaka/Makó culture (Tab. 1).

The wide chronological and geographical extent of the archaeological sources studied in this paper was chosen to alleviate the relatively low precision of the available data. Only by sampling a large area with a wide chronological focus is it possible to follow long-term trends in changes in settlement strategies and study their relationship to environmental conditions (*cf. Demján 2009.14; Tóth 2010a.100*).

Previous studies

The first study concerning the relationship between settlement structure and the natural environment in our focus area was by Csalogovits. The author pointed out the necessity of a cartographic mapping of archaeological sites and listed the factors which influenced the displacement of sites in the landscape (*Csalogovits 1930.28*). No follow-up work to this progressive study appeared for the next 50 years. Large field excavations and theoretical groundwork (mainly concerning chronology) were the focus of archaeological study at that time.

A renaissance of research into the settlement strategies of prehistoric populations occurred in the 1980s and 1990s with the work of Pavúk, which now forms the groundwork for the study of relations between human settlement and the natural environment. These studies focused on the Neolithic and Eneolithic of southwest Slovakia, which was placed in a

Dating	Sites	Used for analysis
early LBK	31	25
late LBK	206	166
Eastern LBK	2	0
Szilmeg	2	0
Želiezovce	265	192
Bükk	22	0
LBK	110	0
Middle Neolithic	1	0
Protolengyel	9	7
Szakalhát	3	0
Lengyel I	29	25
Lengyel II	14	12
early Lengyel	27	0
Tisza	20	0
Stroked Pottery	2	0
Vinča	2	0
Lengyel III	33	32
Late Neolithic	5	0
Neolithic	303	0
Lengyel IV	104	82
late Lengyel	21	0
Lengyel	181	0
Bajč-Retz-Krepice	13	9
Early Eneolithic	20	0
Boleráz	85	49
class. Baden	72	67
unspec. Baden	228	0
Bošáca	11	11
Kostolac	3	3
Kosihy-Čaka/Makó	70	62
Late Eneolithic	18	0
Eneolithic	126	0

Tab. 1. Number of sites assigned to different cultures included in the database. Only finds considered local to our focus area with sufficiently precise localisation and dating were used for further analysis.

4 Based on meteorological data collected between 1931 and 1960.

broader Central European context. The displacement of settlements was studied according to their elevation, soil type, distance to water sources, and climatic fluctuations expected when they were occupied. The most important environmental variables were considered to be precipitation levels and their annual variation (*Pavúk 1976.331–342; 1981a.255–291; 1982.40–48; 1986.213–221; 1990.63–68; Pavúk* et al. *1995.116–124*). The major limitations of these studies lay in the level of information technology of the time and the relatively small archaeological data base.

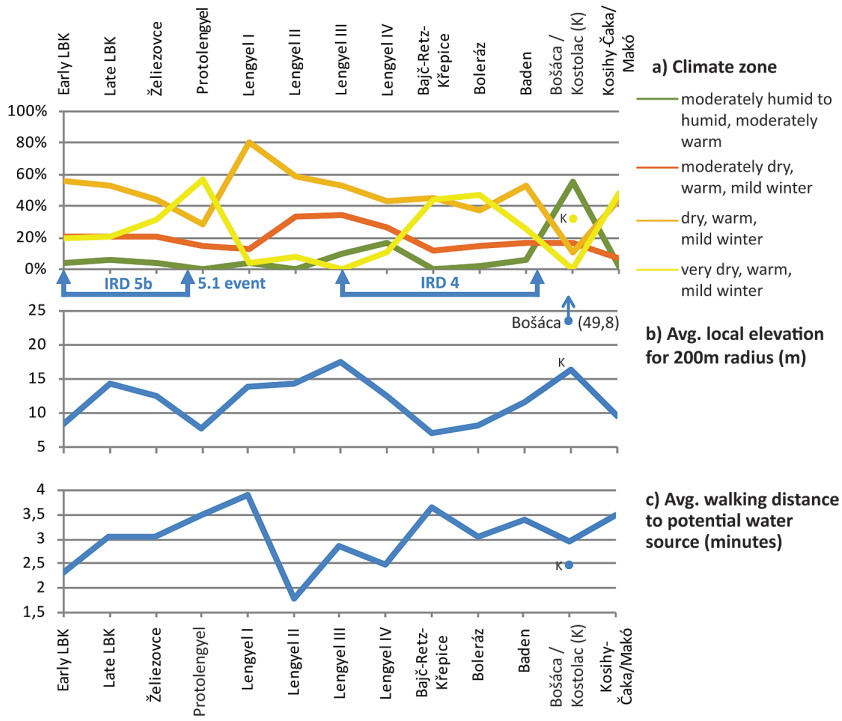


Fig. 1. Development of settlement structure in relation to climatic zones (with marked IRD phases according to* Gronenborn 2009.Fig. 2*), local elevation and distance to water source.

The turn of the millennium saw a surge in research in this field in Slovakia, mainly thanks to the increasing use of geographical information systems and the influx of new archaeological data from rescue excavations. It is now possible to include more environmental variables when studying settlement structure, and process large amounts of data relatively easily. The focus of the studies to date has been on smaller to medium-size regions (*Demján 2009.7–27; Kopčeková 2010; Milo* et al. *2004. 127–150; Tóth 2010a; 2010b. 63–148; in press a; in press b; Wiedermann 2003*).

Environmental factors and settlement distribution

Settlements of early Linear Pottery culture represent the beginning of productive agriculture in southwest Slovakia. The climatic conditions in the European Early Neolithic can be considered optimal (*Květina 2001.684; Pavúk 1990.66*), which is supported by the fact that settlements are situated in dry, warm climatic zones (Fig. 1.a) and dry chernozem soils predominate at these sites (less so in the site catchment areas; Fig. 2.a,b). Settlements are also found on sandy subsoil (*J. Pavúk, personal communication*). The most fertile sites for settlement were chosen (*Hajnalová 2007.297; Pavúk 1976.334*), and are situated at regular distances along larger rivers and less frequently on their tributaries (Fig. 3; *Sádlo* et al. *2008.58*), in lowlands (Fig. 1.b), and close to water sources (Fig. 1.c). In this period, we see the formation of seed areas for the later spread of settlements.

The development of settlement structure during the late LBK and Želiezovce group seamlessly ties in to the trend set in the previous period. Settlements are situated along major rivers, and now more frequently on their tributaries (Fig. 3), occupying more elevated positions farther from water (Fig. 1.b,c). A substantial difference can be seen in the soil cover on and around the sites. The late LBK sites are found on more humid soil types (brown earth and fluvisol) than early LBK sites and the use of chernozem decreases (Fig. 2.a,b) indicating a shift to a dry climate. In the following Želiezovce group, we see again an increase in chernozem areas on sites and in site catchments, and an almost equal amount of brown earth and fluvisol (Fig. 2.a,b). The nearly equal ratio of arid and humid soil types on and around sites during the Želiezovce period coupled with the fact that more arid climatic zones were being settled (Fig. 1.a) could indicate an onset of climatic fluctuations, as well as changes in the economic sphere.

Fluctuations in climate during the late LBK and Želiezovce period can also be followed in the archaeological record. An example of a period of drought at this time is the settlement at Rybník, located in the Slovak Gate area where the river Hron enters the

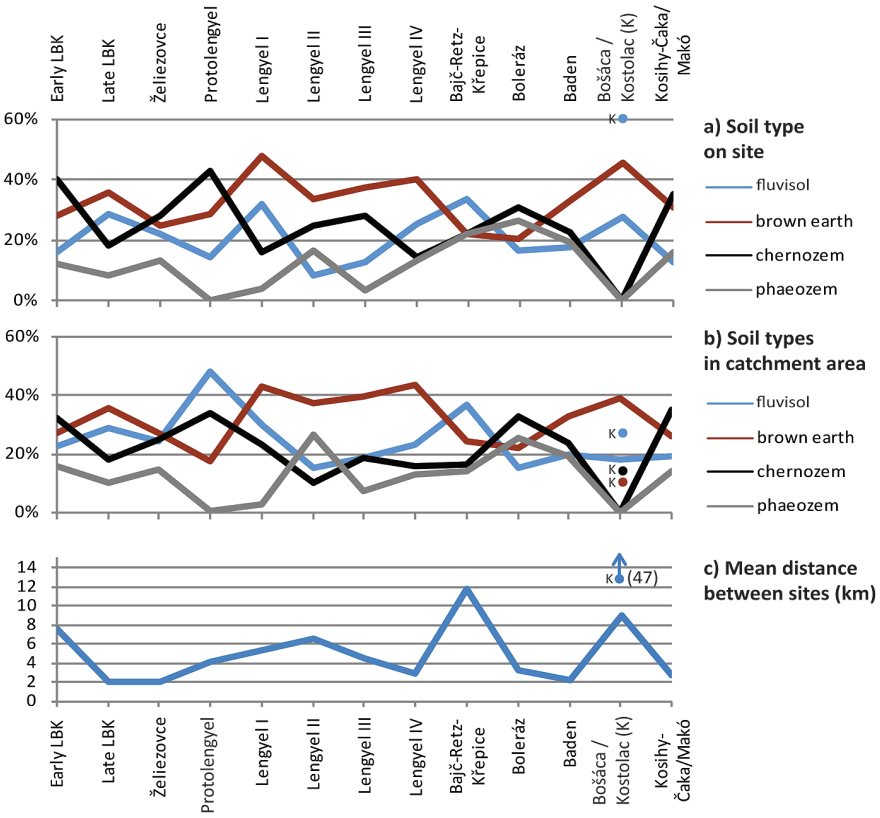


Fig. 2. Development of settlement structure in relation to soil conditions on site and in the catchment area, and mean distance between sites.

lowland – only under such climatic conditions could it have been founded in the inundation area of the River Hron. The discontinuation of the settlement in the Želiezovce period can be linked to a flood, as documented by two strong layers of sedimentation over a settlement feature (*Bátora Rassmann 2006. 32–33; Bátora 2009.140*). Furthermore, it can be observed that several settlements of the classic stage of the Želiezovce group, especially along the Danube, were abandoned, and in the subsequent Želiezovce III stage settlements appear at new, previously unsettled locations (*Pavúk 1976.334; 1990.66*). Apart from climatic influences[5], this development could have been connected with an economic and social crisis (*Pavúk 1986.216*). The evidence of a violent conflict at the late LBK and Želiezovce site in Asparn a.d. Zaya/Schletz (5070–4950 calBC) also points to a crisis at this time, which could indicate a scarcity of food resources resulting from an extended drought (*Gronenborn 2007.85; Windl 2009.192, 195*).

To the east of our focus area, in the regions of the Slovak Karst and northern Tisza valley, settled by the Bükk culture, there are indications of adverse climatic change in this period too. The intensively populated open settlements and caves were being abandoned towards the end of the Bükk culture, not to be repopulated in the following period (*Pavúk 2007b.268*). Several studies indicate that as a result of changes in climate conditions, the local soils could no longer sustain the population (*Pavúk 1982.42; Pavúk* et al. *1995.123; Šiška 1995.10*). A similar ecological-economic crisis can also be assumed in the east Tisza valley region in Hungary (*Šiška 1995.11–13*), eastern Slovakia and in Lesser Poland (*Pavúk 2007b.268*).

In the following Protolengyel period, which represents a transition from the Middle to the Late Neolithic in Slovakia, a clear rupture can be seen in all observed trends. The number of settlements in very dry and warm climatic zones increases (Fig. 1.a), with a preference for lowlands (Fig. 1.b). Arid and humid soil types occur equally frequently at site locations, with a preference for chernozem (Fig. 2.a), while there was a strong preference for humid soils (especially fluvisol) in site catchment areas (Fig. 2.b). The sites are situated mostly along larger streams, mainly in the lower reaches of the Ipel' and Hron and in the surroundings of the city of Nitra (Fig. 4). Settlement density greatly decreased, as did settlement size (*Pavúk 1986.218*). Although some environmental indicators (more arid climatic zones, increasing distance from water) would suggest an abundance of precipitation in this period, the sudden shift in most environmental parameters, the disproportion in the presence of humid and arid soil types at sites and in site catchments, as well as the massive drop in population, lead us to the assumption of unstable climatic conditions, possibly influenced by a shift to a

5 The previously unsettled sites now newly occupied by the Želiezovce group (62% of all Želiezovce sites) are situated in higher elevated areas and in drier climatic zones. The ratio of chernozem soils on site and in site catchment areas also inceases which points to an adaptation to more humid climatic conditions.

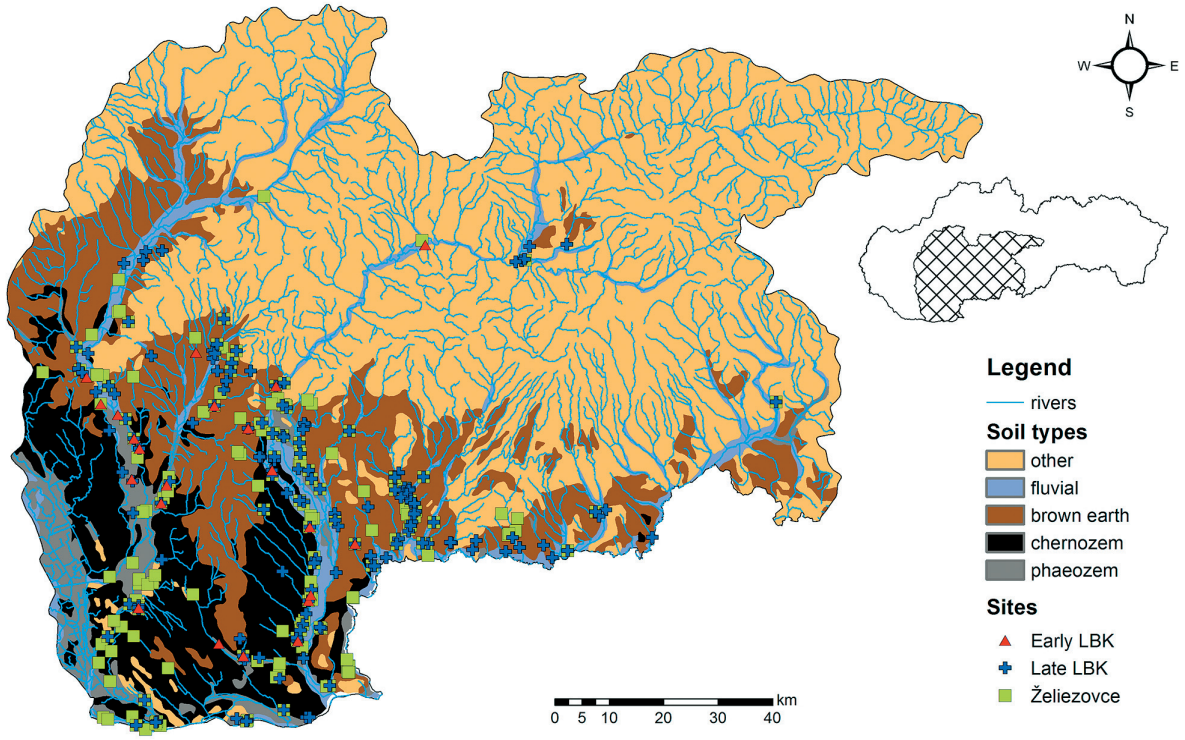


Fig. 3. Distribution of sites of the early and late LBK and the Želiezovce group on various soil types.

dry continental climate[6], which can be more readily observed in the ensuing periods.

The transition from the Želiezovce group to the Lengyel culture in this period is marked by significant cultural-historical changes in prehistoric Europe (*Pavúk 1990.41*). The newly constituted socio-economic structure can be considered a result of an adaptation to changed environmental conditions, as well as intensive contacts with Southeast Europe (*Pavúk* et al. *1995.119*).

A major shift in settlement strategies at this time can also be seen in the regions east of our focus area. The demise of Middle Neolithic cultures (the Szilmeg, Esztár and Szakalhát groups) in the Hungarian middle and upper Tisza valley and in the area west of Tisza marked the end of a relatively dense settlement network of many small sites. It was replaced by tell settlements of the Tisza culture and the Herpály and Csőszhalom groups, situated along major rivers, while the area to the west of Tisza remained depopulated (*Makkay 1982.122, 126; Pavúk 1986. 219; Pavúk* et al. *1995.120; Šiška 1995.11*).

Sites dating to Lengyel culture stages I and II are situated mostly on brown earths (Fig. 2.a), which predominate also in the site catchment area (Fig. 2.b) for the duration of Lengyel culture. This is a result of the shift of settlements to uplands and highlands (Fig. 1.b) with higher precipitation levels[7], covered at the time by forests (*Wiedermann 2003.64*). Connected with the shift to higher areas is the higher number of sites in dry, warm climatic zones, as opposed to very dry zones typical of the lowlands. This shift towards less arid climatic zones can be observed already in the Lengyel I stage, progressing gradually throughout the subsequent Lengyel stages and culminating in Lengyel III (Fig. 1.a). Settlements in uplands were concentrated along smaller streams, in lowlands along the major rivers. The area along the Danube and the sand dunes along the lower reach of the Nitra remained unsettled (Fig. 4; *Pavúk 1986.215*).

While Lengyel I settlements preferred a location farther removed from water sources (the farthest of all Neolithic and Eneolithic cultures in southwest Slovakia), this distance has halved in the Lengyel II stage

6 Other indices of a prevailing arid and unstable climate include the settlement discontinuity when compared to the late Želiezovce period (stage III; *Pavúk 1976.334; 1990.66*), an increased importance of hunting as a source of subsistence (*Ambros 1986. 12–13; Pavúk 1982.46*), and an analogous development in settlement structure in the Tisza valley (*Pavúk 1986.219; Pavúk et al. 1995.120; Šiška 1995.11*).

7 Brown earth areas receive only 100–150mm more precipitation than chernozem areas, but rainfall occurs more often and during the whole vegetative cycle (*Pavúk 1990.66*).

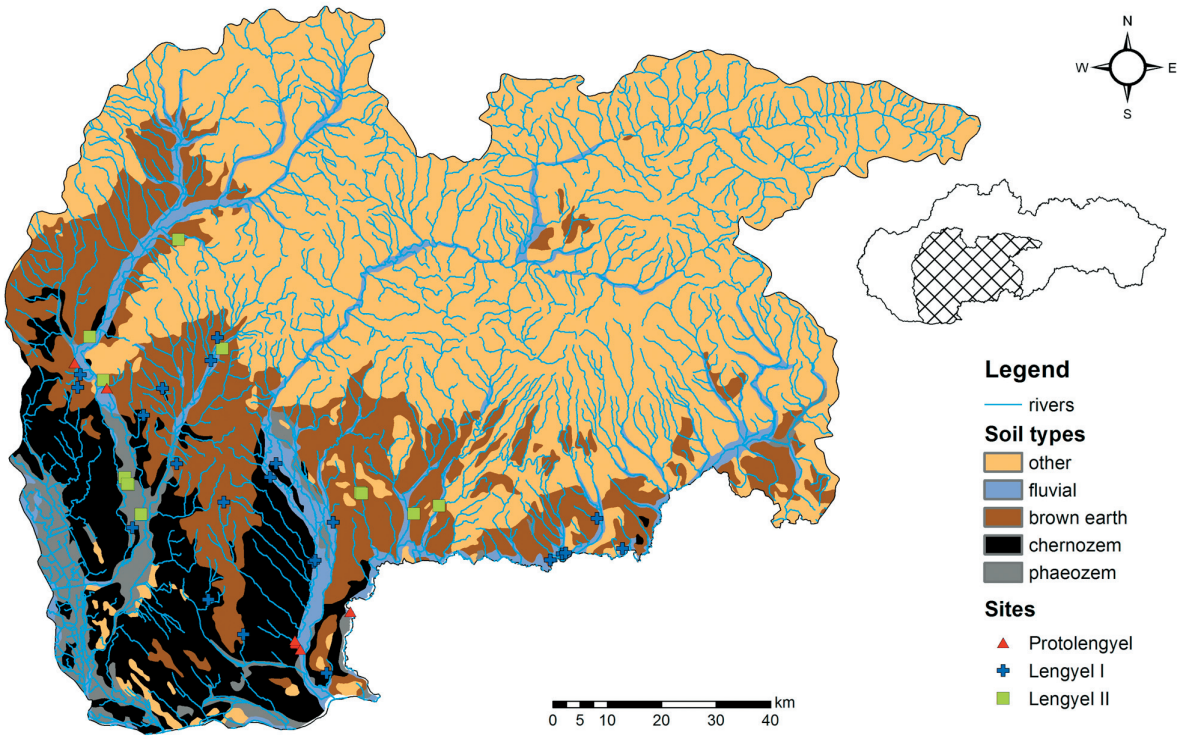


Fig. 4. Distribution of Protolengyel, Lengyel I and II sites on various soil types.

(Fig. 1.c). This coincides with a higher ratio of phaeozem soils in the site catchments (Fig. 2.b). The Lengyel I sites were situated at regular distances from each other, forming a fairly regular network. A certain concentration of sites can be observed on the middle reaches of the Ipel'. The Lengyel II stage saw a further reduction in the number of settlements. Sites from this stage can be found only on the lower reaches of the Ipel' and the middle reach of the Nitra (Fig. 4). It seems that a continuing dry period prevailed in Slovakia at this time.

An important aspect of the settlement patterns of Lengyel culture is the discontinuity of settlements in the lowlands and uplands of southwest Slovakia. There were settlements founded on previously uninhabited locations, never lasting longer than one ceramic stage (*Pavúk 1976.336; 1982.47; 1986. 213–214; Pavúk* et al. *1995.122; Tóth 2010a.tab. 9; Wiedermann 2003.69*). This phenomenon of 'single-stage' settlements begins with stage III of the Želiezovce group and is best observed in the early stages of Lengyel culture (*Pavúk 2009.258*). There are several reasons for this trend of discontinuity. The Lengyel settlements are typically large in extent, with dense populations, more houses and planned development. The construction of monumental rondel enclosures in earlier Lengyel settlements indicates a certain social hierarchy (*Pavúk 1982.48; 1986.216*). Such a density of population places higher demands on natural resources (wood, game animals), which could lead to the gradual devastation of the surrounding natural environment. Deforestation and a reduction in the number of game animals could have led to the abandonment of large settlements at relatively regular intervals, coinciding with the chronological stages determined by ceramic material and possibly related to a worsening of climatic conditions (*Pavúk 1986.220*). The regular abandonment of sites and founding of new, larger ones could also have been connected with a spiritual aspect, reflected in the building of rondels with a calendric function, providing the inhabitants with a relatively precise means of temporal orientation for the whole year (*Karlovský, Pavúk 2002.124*). The building of these structures could also be understood as a response to the need to predict regular flooding, observe weather cycles and estimate the correct time for sowing cereals – all abilities necessary to maintain subsistence from agriculture in adverse climatic conditions (*Karlovský, Pavúk 2002.120; Pavúk, Karlovský 2004. 265–266; 2008.497*).

The more frequently settled upland areas provided sufficient moisture during the growing season, and were better suited for crop cultivation than chernozem areas, which were more prone to desiccation. This also coincides with the structure of faunal assemblages found at settlements. When compared to the previous LBK and Želiezovce periods, where the

bones of domestic animals predominate (up to 95%) we see an increase in game animals (15,6% to 68,9%; *Ambros 1986.12–13; Pavúk* et al. *1995.121*) at Lengyel settlements. A similar change in faunal assemblages in the Late Neolithic can be observed at settlements in Hungary, Moravia and southwest Germany (*Ambros 1986.14; Dreslerová 2006.8, 22*). Animal proteins compensated for the shortage of plant proteins (*Dreslerová 2006.22; Pavúk 1982.46*).

The assumed onset of climate change in the Lengyel I stage is closely related to the phenomenon of migration from the Pannonian Basin to the west into Lower Austria and Moravia. An unbroken sequence of cultural development from Želiezovce III through Protolengyel I, Protolengyel II to Lengyel I can only be observed in southwest Slovakia and Transdanubia. This kind of continuity is absent in Lower Austria and Moravia, where settlements of stage III of the Stroked Pottery culture can be found at this time. We register a sudden cultural shift in this area during the Lengyel I period. In the first phase (IA), the Austrian Weinviertel region was settled by a Lengyel population, and the settlements spread to Moravia in phase IB (MBK Ia and MOG Ia; *Pavúk 1983. 41–42; 2007a.16–17*). The Lengyel settlements occupied mostly other sites than the contemporary Stroked Pottery settlements and settlement density was larger than that in southwest Slovakia (*Kalábková 2009.69–70, graf 11; Kazdová* et al. *1994.149–150, Abb. 1*). This cultural change happened without any signs of continuity in the material or cultural sphere. During the Lengyel II stage, the number of sites in Moravia (MBK II) further increased and settlement density grew (*Kazdová* et al. *1994.Abb. 8*). Lengyel settlement at this stage spread to middle Moravia and Upper Silesia (*Pavúk 2007a.23*).

The settlements of the Lengyel III stage continued to shift into upland and highland regions with higher precipitation levels and a less arid climate (Fig. 1.a,b; *Wiedermann 2003.64*). The average distance to water sources slightly increased (Fig. 1.c). The sites are situated mainly on the southern precipices of the volcanic mountains in the north of the Danubian Lowland. There was an increase in the number of sites compared to the previous period, but the area approximately 25km from the Danube remains unsettled (Fig. 5). Settlements were founded mainly on brown earth soils (Fig. 2.a) which predominate also in the site catchment areas (Fig. 2.b). This suggests the continuation of a period of dry climate. The findings on the Budmerice (*Pavúk 1981b.220–221*) and Sľažany sites, which are situated in the Carpathian foothills, provide evidence for this interpretation of ecological parameters. Both of these Lengyel III stage sites were covered with several metres of alluvial sediment from nearby small streams (*Pavúk* et al. *1995.122*). This indicates uneven rainfall distribution over the year during a dry period, which leads to flash floods from small streams.

The onset of the Eneolithic period, represented in southwest Slovakia by stage IV of Lengyel culture, marks a shift in cultural, social and economic development. The appearance of copper ore mining and copper manufacturing, together with other technological innovations over the whole Pannonian Basin is closely connected with changes in social structure and an increased stratification of the population of prehistoric Europe.

In regard to the studied environmental parameters, Lengyel IV settlements are situated on less elevated sites, still relatively close to water sources (Fig. 1. b,c). Sites are mostly on brown earth soils, which also predominate in site catchments (Fig. 2.a,b), while the ratio of chernozem sites decreases. The number of settlements grew and their size decreased, resulting in higher settlement density (*Balážová 2007.98*). Multicultural sites from the Early and Middle Neolithic as well as the previously desolate Danube bank were resettled, and the finds from several caves are also dated to the Lengyel IV stage (Fig. 5; *Pavúk 2009.260; Wiedermann 2003.54, 72*). Compared to the previous period, there was a further increase in the settling of humid climatic zones (Fig. 1.a) which suggests a continuation of the dry climate, although the resettling of previously depopulated areas and a slight increase in the number of sites in very dry climatic zones could indicate an improvement in climatic conditions during this period (*Pavúk* et al. *1995.122; Wiedermann 2003.64*).

Another major shift in all the observed parameters occured towards the end of the Early Eneolithic in the Bajč-Retz-Křepice group. There was a significant reduction in settlement density compared to the previous period. Sites were situated on flatland and at greater distances from water sources (Fig. 1.b,c) only on the lower reaches of the rivers (Fig. 5). Most settlements were on fluvisols (Fig. 2.a), and humid soil types also predominated in the site catchment areas (Fig. 2.b). There was a high ratio of sites in very dry and warm climatic zones (Fig. 1.a), which could suggest the return of more humid climatic conditions (*Pavúk* et al. *1995.122*).

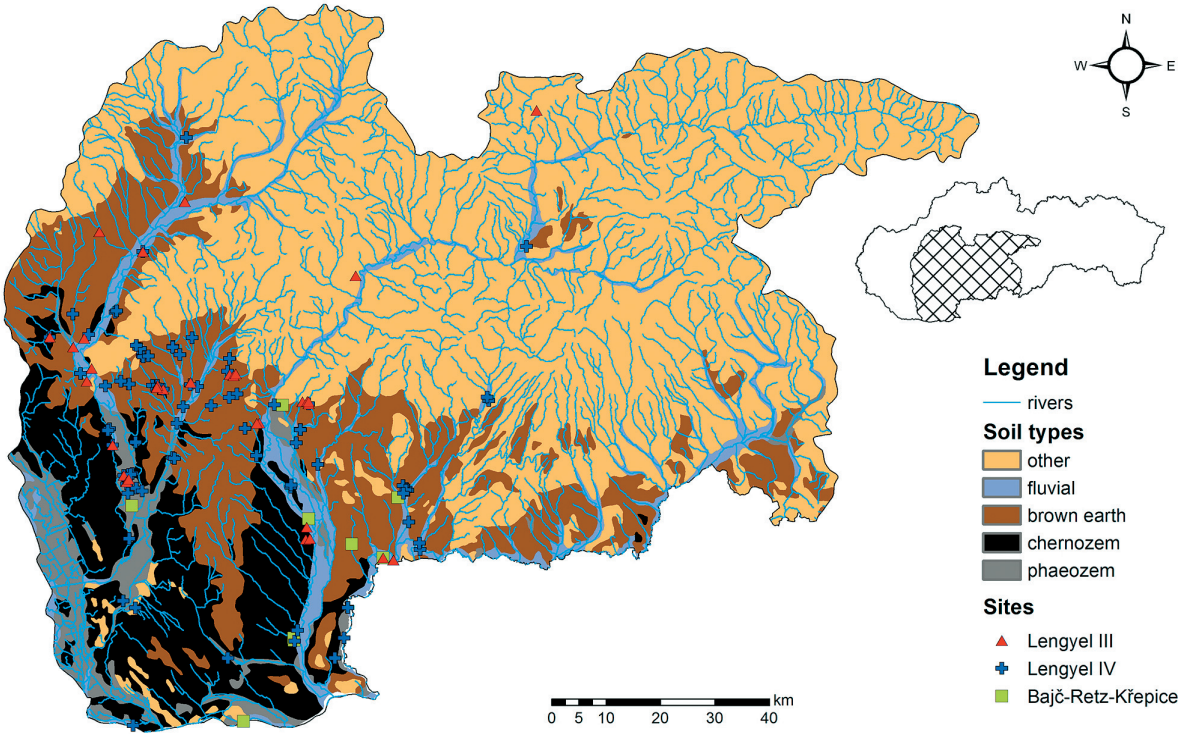


Fig. 5. Distribution of Lengyel III, IV and Bajč-Retz-Křepice group sites on various soil types.

A real contrast to the preceding development is observable with the onset of the Middle Eneolithic Boleráz group and the subsequent Baden culture, which were based on a new socio-economic foundation (*Pavúk 1986.220*). During the Boleráz group, the climate stabilised – as indicated by the large number of sites located in very dry and dry climatic zones (similar to the previous period; Fig. 1.a) and the return to more arid chernozem areas (Fig. 2.a,b). The density of settlements increased and settlement clusters started to form, mainly on the lower reaches of the Nitra and Hron and along the Danube (Fig. 6). The settlements were relatively small (*Pavúk* et al. *1995.122*). Lowlands were preferred (Fig. 1.b) and the distance to water sources slightly decreased (Fig. 1.c). The sites were situated along major rivers, as well as their tributaries (Fig. 6). The role of game animals as a source of subsistence also diminished and remained constant throughout the Middle and Late Eneolithic (*Ambros 1986.13*).

The settlement patterns of Baden culture fully tie with Boleráz development, whilst increasing in density. Previously unsettled sites were occupied, especially in mountain valleys (Fig. 6) (*Pavúk 1982.47*). Similarly to the preceding period, lowlands were preferred (Fig. 1.b) and the distance to water sources increased only slightly (Fig. 1.c). The number of sites on brown earth soils increased and the ratio of soil types in catchment areas also suggests a slight preference for more humid soils (Fig. 2.a,b). This development suggests the return of a drier climate, which is more evident in the following period.

With the onset of the Late Eneolithic post-Baden cultural groups, there was another major shift in settlements. The geographical and demographic changes were accompanied by a significant change in material culture (*Pavúk* et al. *1995.123*).

Settlements of the Bošáca group concentrated in the mountainous regions on the upper reaches of large rivers (Fig. 7), occupying more humid climatic zones (Fig. 1.a). The sites were situated in elevated positions (Fig. 1.b) along smaller streams, while the distance to water sources slightly decreased (Fig. 1.c). Humid soil types, predominantly brown earth, were found in site locations and in catchment areas (Fig. 2.a,b).

A different situation can be seen at the three sites belonging to the Kostolac group which fall into our focus area (Fig. 7). One site is in a very dry climatic zone on the bank of Danube, the other two are in mountainous area with a humid climate (Fig. 1.a). The distance to water is comparably low (Fig. 1.c) and fluvisols are the predominant soil type at the sites and in their catchment areas (Fig. 2.a,b). A major decrease in settlement density (Fig. 2.c) at this time can be observed also in neighbouring regions

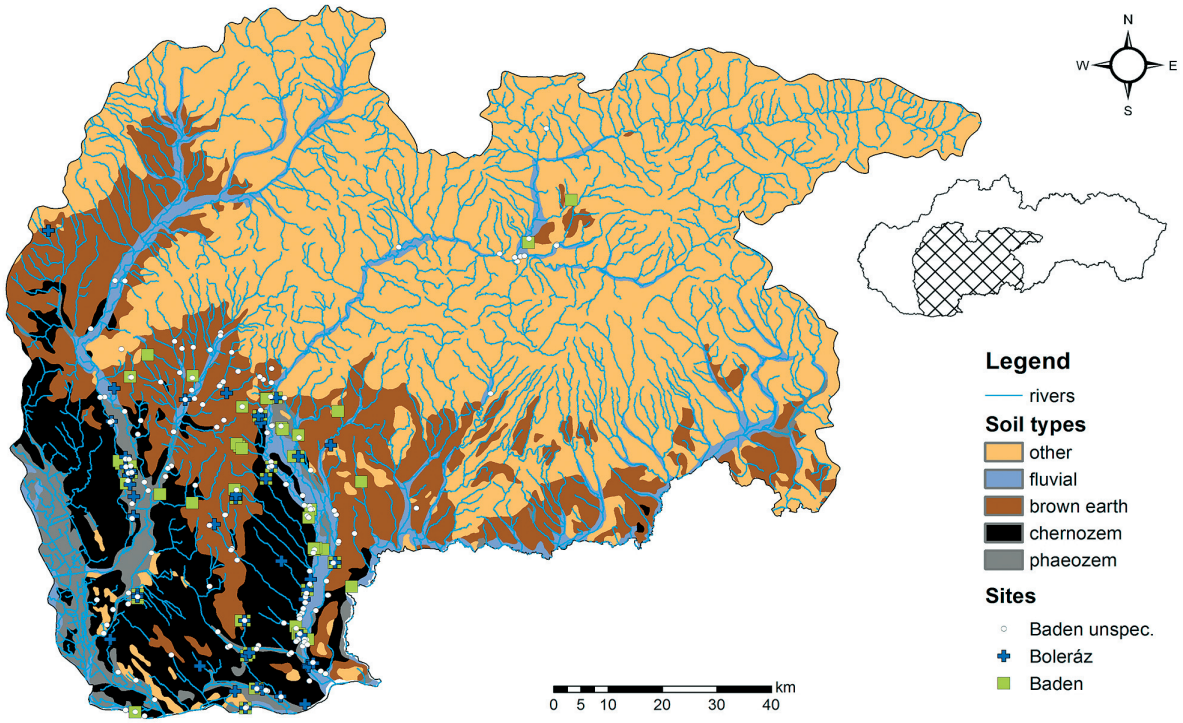


Fig. 6. Distribution of Boleráz group, Baden culture and unspecified Middle Eneolithic sites on various soil types.

and further south as far as Macedonia. It is possible that the climate fluctuation observable already in the preceding period culminated in an extremely dry continental climate at this time, leading to the depopulation of the central part of the Danubian Lowland (*Němejcová-Pavúková 1995.29; Pavúk* et al. *1995.123*).

The final Eneolithic in southwest Slovakia is represented by the Kosihy-Čaka/Makó culture. A high percentage of sites in the dry to very dry climatic zones (Fig. 1.a) often on chernozem soils (which also appear in the site catchments; Fig. 2.a,b) suggests the return of a more favourable, humid climate (*cf. Němejcová-Pavúková 1995.29*). The improvement in natural conditions was followed by an increase in settlement density. Again, we see the formation of settlement clusters, concentrating mainly in the lower reaches of the Hron and Nitra (Fig. 7) along the major streams and their tributaries. Lowland locations were characteristic of the sites (Fig. 1.b), and the distance to water sources does not exceed those observed for the Baden culture (Fig. 1.c). The settlements at this time were usually large, with widely scattered settlement features (*Kulcsár 2009.66*). The preferred environmental parameters in this period indicate trends in settlement strategies observed in the subsequent Early Bronze Age in southwest Slovakia (*Demján 2009.12; Pavúk* et al. *1995.124*; although with a difference in the structure and hierarchy of the settlements; *J Batora, personal communication*).

Discussion: climate vs. culture

Climate fluctuations in the Middle Danubian Neolithic in light of North Atlantic drift ice proxies

In the last decade, several studies have attempted to correlate archaeological data with information from various climate proxies. For our study, the data on ice drift in the sub-polar North Atlantic region (*Bond* et al. *2001*) seem most appropriate, as previous studies by Gronenborn (*2009*) have shown promising results in correlating the socio-economic development of the European Neolithic with fluctuations captured in this climate proxy.

Analyses of settlement structure in relation to environmental parameters indicate a climatic optimum in the Early and Middle Neolithic. A humid Atlantic climate predominated during the early and late Linear Pottery culture and the Želiezovce group, but environmental parameters indicate climatic oscillations during the Middle Neolithic, which would correlate with a sudden drop in ice-rafted debris (IRD) in the North Atlantic at this time (Fig. 8.1–3). This period falls into the IRD 5b phase, which terminated with the IRD 5.1 climatic event identified by Gronenborn (*2009.100*). Following this fluctuation, we

observe a cultural transformation of the Želiezovce group into Protolengyel culture (Fig. 8.4) marking the transition to the Late Neolithic.

Following the Protolengyel, in the Neolithic stages of Lengyel culture, a shift towards a dry continental climate which culminated in the Lengyel III period is indicated by the observed environmental variables. Fluctuations in the IRD proxy during this period correlate with constant shifts in the settlement strategies ('one-stage settlements') of Lengyel culture (Fig. 8.5–8). The stabilisation of a more humid Atlantic climate during the Lengyel IV phase is also reflected in the change in settlement patterns and corresponds with the onset of phase 4 in the IRD record, which spans the period 4400–3200 calBC (*Gronenborn 2009.100*). This climatic optimum continues throughout the Early and Middle Eneolithic.

A period of dry continental climate can be suspected in the Late Eneolithic, triggered by a strong climatic fluctuation during the Bošáca and Kostolac groups (Fig. 8.12, 13). The Kosihy-Čaka/Makó culture saw a shift back towards the more hospitable climatic conditions corresponding with the IRD 3 phase (Fig. 8. 14; *Gronenborn 2009.Fig. 2*).

Cultural and economic adaptation to a changing environment

Major changes in climate conditions result not only in a shift in preferred environmental factors, but are often also visible in changes in settlement structure. There is a remarkable correlation between climate conditions and the distance between sites; distance increases following a deterioration in the climate (Fig. 2.c) which results in a lower settlement density. We also see a decline in the overall number of settlements (Tab. 1, Figs. 3–7), and the size of individual sites also changes. This process is reversed when conditions improve.

Periods with a very low number of settlements, namely the Protolengyel and the Bajč-Retz-Křepice, Bošáca and Kostolac groups are especially interesting. We assume that this situation is not a result of the current state of field research, and that adverse natural conditions during the lifetimes of these cultures played an important role in the observed depopulation. Radical changes in several observed environmental parameters compared to previous periods suggest that natural conditions had changed so much that the existing subsistence strategies became obsolete and could not sustain the population. Changes in the economy must have also affected the social order. Shifts in social hierarchies and political destabilisation can be expected. After the stabilisation of the environment, the society could reorganise and adapt to the new conditions (*Gronenborn 2007.85; 2009.101–102*).

Each of the aforementioned shifts resulted in a consolidation of the settlement structure and in impor-

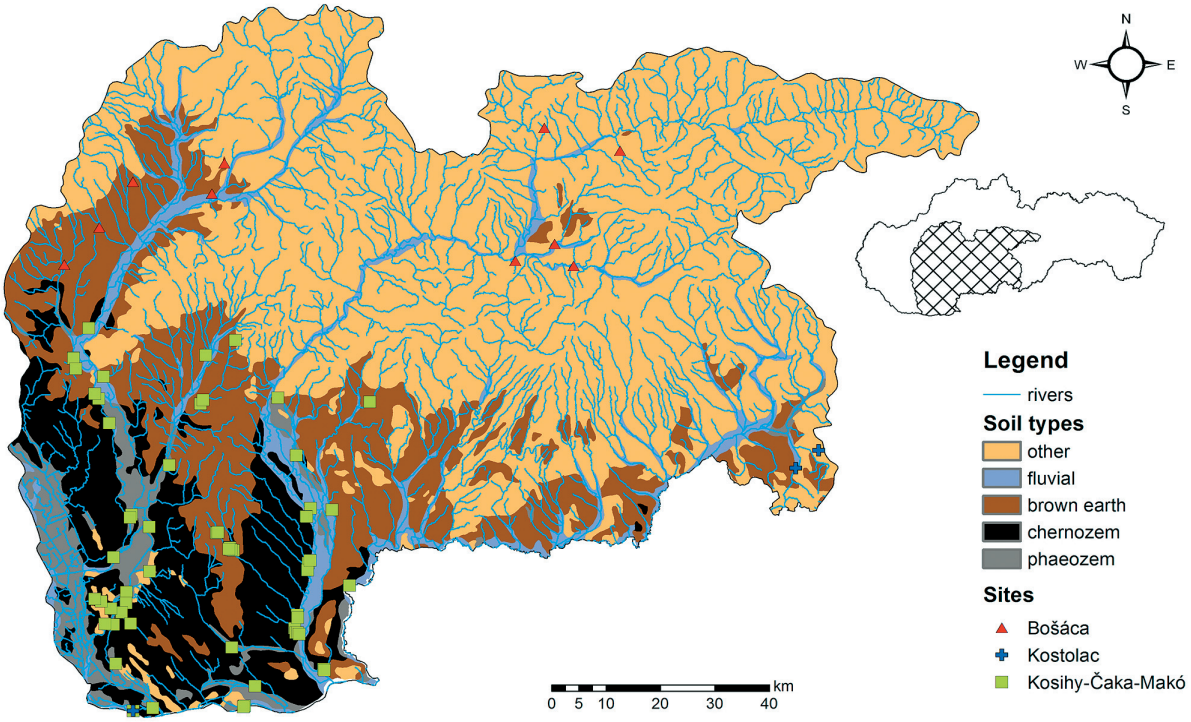


Fig. 7. Distribution of Bošáca and Kostolac group, and Kosihy-Čaka/Makó culture sites on various soil types.

tant changes in the social and economic sphere. After the Protolengyel, the first stage of Lengyel culture followed, with extensive settlements on which planned development and the building of monumental rondel structures can be observed (*Pavúk 1986.216*). Following the Bajč-Retz-Křepice group, our focus area experienced a period of dense settlement by the Boleráz group and the subsequent Baden culture. Strong influences from the Balkans and Anatolia can be observed, and the non-ferrous metallurgy characteristic of the previous Early Eneolithic period declined and was replaced by the manufacture of different prestigious artefacts. After the decline in settlement density in the post-Baden period (Bošáca and Kostolac groups) our focus area was resettled by the Kosihy-Čaka/Makó culture, which cannot be genetically traced to the previous cultural development (*Kulcsár 2009.355–357*). New impulses from the southeast also led to an intensification of non-ferrous metallurgy in southwest Slovakia in this period (*Bátora 2006.37*).

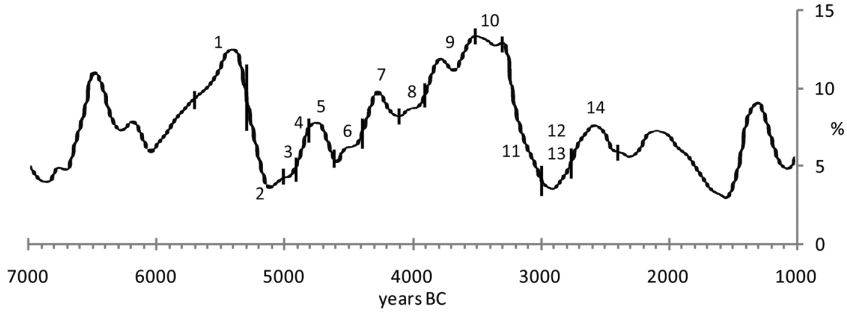


Fig. 8. The stacked record of Holocene ice drift in the North Atlantic (modified after* Bond *et al.* 2001.Fig. 2*) with the chronological extent of archaeological cultures marked on the chart. Higher values can be linked to increased annual rainfall (*Bond *et al.* 2001.2133*). 1 early LBK. 2 late LBK. 3 Želiezovce. 4 Protolengyel. 5 Lengyel I. 6 Lengyel II. 7 Lengyel III. 8 Lengyel IV. 9 Bajč-Retz-Křepice. 10 Boleráz. 11 Baden. 12 Bošáca. 13 Kostolac. 14 Kosihy-Čaka/Makó.

The social and environmental crises in the Protolengyel, Bajč-Retz-Křepice, and post-Baden periods together with the onset of a new Eneolithic economy in the Lengyel IV stage divide early prehistoric development into several distinct cultural-historical periods:

❶ the Early and Middle Neolithic, with early and late Linear Pottery cultures and the Želiezovce group;
❷ the Late Neolithic represented by the Protolengyel and three Neolithic Lengyel stages;
❸ the Early Eneolithic with Lengyel stage IV and the Bajč-Retz-Křepice group;
❹ the Middle Eneolithic with the Boleráz group and Baden culture;
❺ the Late Eneolithic with the Bošáca and Kostolac groups;
❻ the final Eneolithic with the Kosihy-Čaka/Makó culture.

At the beginning of each of these periods, we observe an influx of new cultural impulses from the southeast which, together with local elements, built a new cultural entity. Interestingly, all of these transitions were connected to some degree of climate change, often a strong fluctuation followed by a period of changed climatic conditions which compelled the population to respond with a new social, cultural, and economic order. These observations coincide with the socio-political trajectory laid out for the area of Southeast Europe by Gronenborn (*2009.Fig. 4*). We can assume that development in Southeast Europe at the time was reflected in our focus area. It remains a question as to what degree the impact of climate changes, besides influences from Southeast Europe, and social and economic impulses, played a part in the formation of new, more complex societies which are reflected today in their cultural artefacts.

Conclusion

By studying changes in settlement patterns in relation to environmental variables over a large area and with a broad chronological focus, it was shown that such observations can yield evidence about the adaptation of settlement strategies in reaction to changes in climate. In the Early and Middle Neolithic, a humid Atlantic climate predominated in our focus area. At the end of this period, climatic fluctuations occurred which were later fully manifested in the subsequent Late Neolithic, followed by a prolonged period of dry continental climate. These conditions prevailed until the Early Eneolithic, followed by a shift back to a humid Atlantic climate, which lasted throughout the Middle Eneolithic. Towards the end of this era and more prominently in the Late Eneolithic, a period of extreme drought occurred, as indicated by the depopulation of the central Danubian Lowland. A more humid climate returned in the final Eneolithic. These findings largely agree with previous research in this area (*Pavúk 1982.46–47; 1986.214–220; 1990.66; Pavúk* et al. *1995.116–123; Wiedermann 2003.72*).

The aforementioned climate fluctuations correlate with data collected from climatic proxies in the North Atlantic (Fig. 8) and seem to reflect a similar development in Southeast Europe (*Bond* et al. *2001*). Changes in environmental conditions resulted in a different preference of ecological parameters, changes in settlement density, area and average distance. Periods of crisis brought on by a rapid decline in climatic conditions could also have acted as catalysts for major cultural-historical changes in the Neolithic and Eneolithic in southwest Slovakia, which appears in the chronological division of this era into six major periods.

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An exercise in archaeological demography: estimating the population size of Late Neolithic settlements in the Central Balkans

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ABSTRACT – *This paper reflects on the methodology for estimating population size from settlement data. Archaeologists are faced with a static record of houses, which is the result of dynamic processes of population growth and house use. There is no simple relationship between the total number of houses and population size. In order to produce more realistic estimates of population size, a quantitative model is presented which takes into account population dynamics and the dynamics of house accumulation. The model is used to estimate the population size of three Late Neolithic settlements in Southeast Europe: Gomolava, Divostin and Uivar.*

IZVLEČEK – *V članku razmišljam o metodologiji za ocenjevanje velikosti populacije iz naselbinskih podatkov. Arheologi so soočeni s statičnimi podatki o hišah, ki pa predstavljajo posledico dinamičnih procesov rasti prebivalstva in uporabe hiš. Skupno število hiš in velikost populacije ne predstavljata preprostega odnosa. Predstavljam kvantitativni model, ki upošteva populacijsko dinamiko in dinamiko akumulacije hiš, da bi lahko bolj realistično ocenil velikost populacije. Model je uporabljen za oceno velikosti populacije na treh poznoneolitskih najdiščih v jugovzhodni Evropi: Gomolava, Divostin in Uivar.*

KEY WORDS – *Late Neolithic; Vinča culture; demography; population size; settlements*

Introduction

Population size is considered to be an important variable in most anthropological and archaeological theories. Its role is especially prominent in approaches grounded in processual archaeology and evolutionary archaeology. In the processual perspective, its importance stems from the fact that population size (and density) is highly correlated with socio-cultural complexity and plays a key role in domains related to subsistence and cultural ecology in general (*Binford 2001; Carneiro 1962; 1986; 2000; Ember 1963; Feinman 2011; Johnson and Earle 2000; Johnson 1982; Kosse 1990; 1994; Peregrine* et al. *2004*). In evolutionary archaeology, population size is important because cultural evolutionary theory views culture as a population phenomenon – it deals with processes at the population level (*Boyd and Richerson 1985; O'Brien and Lyman 2000; Richerson and Boyd 2005; Shennan 2002*). Given this great theoretical importance for archaeological research, various methods have been developed to estimate population size and changes in population size from archaeological data (*e.g., Chamberlain 2006; Hassan 1978; Schacht 1980; 1981; Shennan, Edinborough 2007*). One of the most frequently employed methods is to estimate settlement population size on the basis of house floor or living floor area (*Brown 1987; Casselberry 1974; Dohm 1990; Kolb 1985; Kramer 1982; LeBlanc 1971; Naroll 1962; Wiessner 1974*).

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However, very few attempts have been made to estimate population size of late Neolithic settlements in the central Balkans (*e.g. Chapman 1981; Müller 2006; 2007; Porčić 2010*). One reason for this lack of research in the domain of archaeological demography has primarily to do with the fact that the main stream of Balkan archaeology has been dominated by an outdated version of a cultural-historical approach. The other reason is that demographic reconstruction is inherently difficult, given the many factors that need to be taken into account in order to arrive at a sound population estimate. On the optimistic side, very rough estimates (*e.g,.* order of magnitude) of population size are quite sufficient for most archaeological purposes (*Drennan, Dai 2010*). Apart from the methodological problems, the estimation of population size is difficult because data requirements are high. In the central Balkans, very small portions of late Neolithic sites have been excavated. Small-scale excavations produce small and biased samples, and any estimates based on such samples would be unreliable.

In recent times, geophysical surveys have become more frequent in field projects with a focus on the late Neolithic of the central Balkans and Southeast Europe in general (*Crnobrnja, Simić 2008; Crnobrnja* et al. *2010; Draşovean 2007; Müller 2007*). These methods have enabled archaeologists to gain significant insight into the architectural contents of settlements – *e.g.,* number of houses and their spatial distribution. In this way, data is produced at relatively low cost in comparison with large scale excavations.

The first systematic estimates of the size of late Neolithic Vinča settlement populations were made by Chapman (*1981*). On the basis of total site areas, Chapman estimated that populations sizes ranged from 30–300 to 1000–2500 people (*Chapman 1981. 48*). Müller used data from a geophysical survey to estimate late Neolithic Butmir population size in Okolište and the entire Visoko basin – the population of Okolište was estimated to be 1000 people, while the estimate for the entire Visoko basin was 3500 (*Müller 2006; 2007*). These estimates were made on the assumption that the entire site area was used simultaneously (Chapman), or that the houses from one building horizon were mostly contemporaneous (if I understand the procedure presented in *Müller 2007. 26*).

The problem with these procedures is the assumption that the accumulated houses or site space in general were contemporaneous. This is a more or less justified assumption in cases where there is independent evidence that horizon durations were short (*e.g.,* ^{14}C dates), but it is clearly erroneous in cases where settlements lasted for a longer period, not to mention the problem of horizontal stratigraphy. Even with short-lived sites, the question of how short this period needs to be for an approximation of contemporaneity to hold remains. The answer may seem simple: it needs to be less or equal to the average use-life of a house. But the problem is that the average use-life of the house is unknown.

Porčić tried to resolve the contemporaneity issue by applying Schiffer's discard equation (*Schiffer 1976; 1987*) to Vinča houses (*Porčić 2010*). However, this approach is also flawed. It rests on the assumption that the number of houses (and population) was more or less constant during the life of the settlement, and an attempt was made to estimate this average number of houses used contemporaneously. Again, this approach may make sense if the site duration was relatively short and growth rates were very low, but the greatest drawback of this procedure is that the average use-life of a house needs to be estimated. Unfortunately, the estimate of the average use-life of houses is little better than an educated guess in Porčić's case.

To summarise, the methods used so far have not been entirely appropriate for estimating population size because they failed to make a systematic distinction between the systemic and archaeological 'assemblages' of houses (*Schiffer 1972; 1976; 1987*). Even when the distinction was made, as in the case of Porčić's study, the population dynamics model was not realistic.

This paper attempts to contribute to the issue of estimating population size in Late Neolithic settlements in the central Balkans by directly addressing the issue of population dynamics and house accumulation dynamics. It will seek answer to this particular question: how can archaeologists estimate the final population size on the basis of the number of houses present in the archaeological record? The methodology for this problem will be formulated and applied to the following sites: Gomolava, Divostin and Uivar. Even though the quality of the data from these sites is far from ideal and the estimates will be approximate, the methodological insights gained from this study and its potential relevance for future work should justify the effort.

Modeling population and house accumulation dynamics

The first step in trying to develop a method for estimating population size on the basis of house remains is to understand population dynamics. In other words, the question is: how does population size change through time? In the case of the late Neolithic in the central Balkans, we can be fairly certain that the population size grew at both regional and settlement levels (*Kaiser, Voytek 1983; Porčić 2010; Tringham and Krstić 1990*). If the reasonable premise of growing population is accepted (at least, for this particular case), the next question is: how did population grow? This means that we have to determine the form of the population growth model and its parameters. The first part is less difficult, since most human populations obey a logistic growth model in the long run (*Chamberlain 2006.21–23; Schacht 1980*). The logistic model of population growth has the following form (*Schacht 1980.786*):

$$P_t = \frac{K}{1+\left(\frac{K-P_0}{P_0}\right)e^{-rt}} \qquad (1)$$

where P_t is the population size at time t, P_0 is the initial population size, r is the maximum growth rate and K is the maximum population size possible (carrying capacity).

Once the model for population dynamics is formulated, two things remain: 1) to model the link between the current population size and the number of houses, and 2) to model the accumulation of houses in the archaeological record during a certain period.

The first is relatively easy to model. It is assumed that the number of houses depends on household size. Therefore, the equation which describes the systemic number of houses at any moment in time is simply:

$$H_t = \frac{K}{1+\left(\frac{K-P_0}{P_0}\right)e^{-rt}}m \qquad (2)$$

Where H_t is the systemic number of houses in time t, and m is the reciprocal of the household size. The number of houses entering the archaeological record at any time t depends primarily on the house use-life and is equal to:

$$\frac{dH_a}{dt} = H_t\frac{1}{L} \qquad (3)$$

Where *Ha* is the number of houses in the archaeological record at time t and L is the average use-life of a house. This equation provides a direct link between population growth and house accumulation. The total number of houses (H_{total}) accumulated on a site from time t_0 to time t can be calculated as follows:

$$H_{total} = \int_{t_0=0}^{t} H_t\frac{1}{L}dt + H_t = \qquad (4)$$
$$= \left(\frac{K}{rL}\left(\ln\left(\frac{K-P_0}{P_0}+e^{rt}\right)-\ln\left(\frac{K-P_0}{P_0}+1\right)\right)+\frac{K}{1+\left(\frac{K-P_0}{P_0}\right)e^{-rt}}\right)$$

The first term of the formula is simply the sum of all the increments of house accumulation, while the second term represents the final systemic number of houses which instantly enter the archaeological record after the settlement is abandoned. It is assumed that the settlement is abandoned rapidly.

How does this model help us to estimate the population size and the number of contemporary houses in archaeological situations? If all the parameters which appear on the right side of Equation 1 were known, there would be no need for the model presented by Equation 4, since we could simply calculate the population size directly using Equation 1. However, the situation is such that the only variable which can be directly observed in the archaeological record is the number of accumulated houses (H_{total}), while other parameters can only be estimated with more or less certainty. This paper proposes to use different combinations of reasonable parameter estimates in order to project different values for the number of accumulated houses (H_{total}). The parameter combinations which produce the closest fit to the actual Htotal can be used to estimate population size.

Data and methods

Data from the Late Neolithic Vinča culture sites of Gomolava, Divostin and Uivar will be used as an empirical basis (Fig. 1). It should be emphasised that the archaeological culture label is merely that – a technical label – the anthropological reality which stands behind this label should by no means be automatically equated with a single social, political, linguistic or ethnic unit (for general information on Vinča culture see *Chapman 1981; Garašanin 1979; 1982*).

The relevant temporal, spatial and archaeological data for each of these sites are summarised in Table

1. Average household size was estimated by dividing the average house floor area with an average value of floor area per person, which was estimated at 7m^2/person (see Chapter 4 in *Porčić 2010*). The total number of accumulated houses for Uivar was estimated by the original investigator on the basis of the geophysical survey, and this estimate was used in this paper.

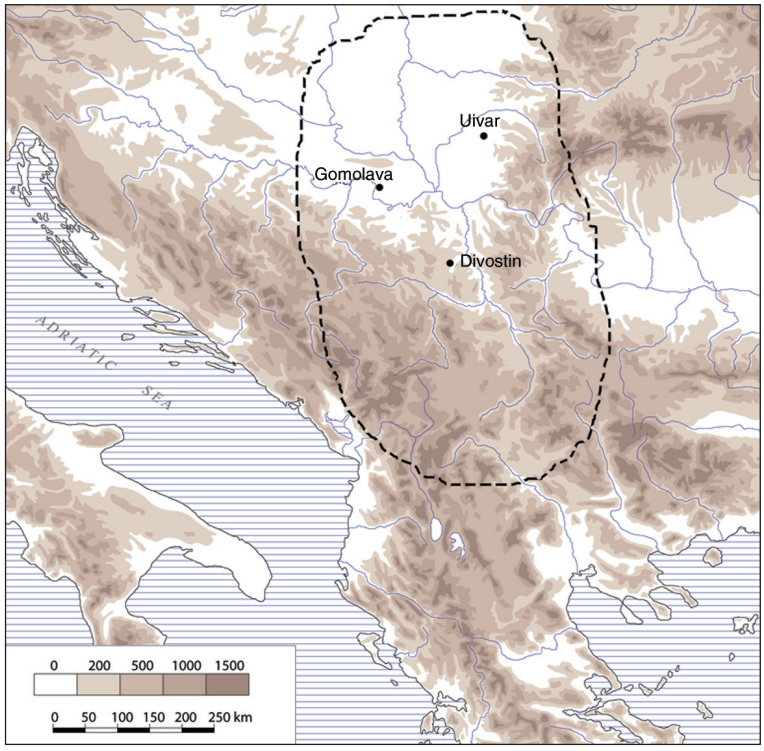


Fig. 1. Sites mentioned in text and the approximate distribution of the Vinča culture (dashed line).

The total number of accumulated houses for Divostin and Gomolava had to be estimated by proportional projection. The total area of the Divostin site was estimated to be 15ha, 2480m^2 (1.65%) of which was excavated (*McPherron and Srejović 1988*). Two Vinča horizons were defined – Divostin IIa and Divostin IIb. These two settlements lasted altogether for about 300 years, from 4900–4650 calBC (*Borić 2009*). A total of 5 Divostin IIa and 12 Divostin IIb houses was uncovered completely or partially (*McPherron and Srejović 1988*). In order to estimate the total number of accumulated houses, a proportional projection was made. If both settlements covered the same area, the estimated total number of accumulated houses is 1028. However, it is unlikely that both settlements covered the same area, so the figure of 1028 should be regarded as the maximum number of accumulated houses. If we assume that the older settlement, Divostin IIa, covered only one fourth of the total site area, then the estimated number of accumulated houses is 801. This should be regarded as the minimum number of accumulated houses.

The total area of Gomolava tell was estimated to be 18 400m^2 (*van Zeist 2002*), of which 5000m^2 (27.17%) was excavated (*Brukner 1988*). There were three Vinča culture horizons: Gomolava Ia, Gomolava Iab, and Gomolava Ib, spanning a period of *c.* 350 years, from around 5000 to 4650 calBC (*Borić 2009*). A total of 31 houses were uncovered at Gomolava. Since Gomolava is a relatively small tell site, and tell sites are usually confined to a specific area, there was no need to assume that older settlements were much smaller in area (although they were certainly smaller in terms of architectural density) than the latest phase. A proportional projection was made, and it was estimated that the total number of accumulated houses should be around 114. Uivar is a Vinča culture tell site situated in Banat in western Romania (*Draşovean 2007; Schier 2006; 2008*). It covers an area of 3ha, which have been surveyed with magnetometer in their entirety. As a result, a complete settlement plan of the last phase

Site	Location	Chronology	Area (ha)	Average household size	Estimated number of accumulated houses	Reference
Gomolava	Srem, Serbia	5000–4650 calBC	1.84	5	114±20	*Borić 2009; Brukner 1988; van Zeist 2002*
Divostin	Šumadija, Serbia	4900–4650 calBC	15	8	801–1028	*Borić 2009; McPherron and Srejović 1988*
Uivar	Banat, Romania	4940–4800 calBC	9.5	6[a]	70–80	*Draşovean 2007; Schier 2006; 2008*

Tab. 1. Temporal, spatial, and archaeological information for sites mentioned in the text. Notes: [a] Based on measurements of house contours from the site plan published in Draşovean (2007).

(dated from 4940–4800 calBC) is available for study. Schier counted more than 70 burnt houses on the plan (*Schier 2008*). In Schier's opinion, this count underestimates the total number of houses, because many did not burn at all. Schier assumes that "*most of the sediment forming the settlement mound consists of transformed building material*", and uses the total volume of the tell to calculate the total number of houses for all phases of Uivar (*Schier 2008.56–57*). The result of this calculation is the figure of 3500–4000 houses. However, in this paper, only the last phase of the settlement along with the count of burnt structures will be taken into consideration. The main reason for this decision is that the count of burnt houses is based on solid empirical data, while Schier's estimate is based on the premise that most of tell's volume comes from transformed building material. In any case, the Uivar population estimate calculated in this paper may be considered a minimum estimate.

The next step in the analysis is to choose the range of parameter values for Equation 4. There has been plenty of research attempting to estimate the growth rate of Neolithic populations (*Bocquet-Appel 2002; Carneiro, Hilse 1966; Galeta, Bruzek 2009*), but most of these estimates were based on the exponential model of growth rather than the logistic model. The main difference between these two models is that the growth rate in the exponential model is constant, while in the logistic model the effective growth rate is a function of the current population size (*Mooney and Swift 1999*). Therefore, the *r* parameter in the logistic model should be interpreted only as the maximum possible growth rate. Galeta and Bruzek review some of the estimated growth rates from the literature and provide their own estimates for the exponential model. The estimated rates range from 0.001–0.03 (*Galeta, Bruzek 2009*). Given that the model used in this paper is logistic, it is reasonable to take into consideration even higher growth rates. Therefore, the range of possible growth rates which will be used in this analysis would be 0.0025–0.07 in increments of 0.001.

The next parameter is carrying capacity. Carrying capacity for Vinča culture sites in central Serbia was estimated at around 1400 people for the 3km catchment zone (*Bankoff, Greenfield 1984*). Therefore, the range for the *K* parameter will be between 1000 and 4000 people in increments of 200.

The remaining parameter for the model is house use-life. Estimates of the average use-life for Central European Neolithic houses range from 20–50 years (*Gerritsen 2008; Whittle 2003.140–141*). Perhaps the best solution is to tie house use-life to the human generation length. The average human generation length is 28 years (*Fenner 2005*). Therefore, 3 discrete values will be used for the *L* parameter: 28, 56 and 86 years. The initial population parameter will be in the following range: 10–500 people in increments of 20.

All combinations of parameters are used to calculate the expected totals of accumulated houses via Equation 4. For each site, 81 600 different parameter combinations will be used to project the expected number of accumulated houses. Models that have the best fit of the projected to the observed number of accumulated houses will be used to estimate the population size. The criterion for the best fit depends on the method used to estimate the total number of accumulated houses on the site. It may be assumed that these estimates are the most precise for sites where a geophysical survey was conducted (such as Uivar). Therefore, the best fit interval for Uivar is 70–80 houses. For Gomolava, the proportional projection is based on almost 30% of the site; therefore, the interval around the estimate should not be great, around ±20 houses. For Divostin, a very large interval has to be used – between 801 and 1028 houses.

Results

For Gomolava, there are 148 combinations of parameters which predict the observed number of accumulated houses (within the best fit criterion limits). Each of these models is based on a combination of the parameters presented in the previous section. Final population size estimates range from 69–285, with a mean of 153 people, standard deviation of 52.41. 95% of estimated population sizes are between 70 and 258 people. The distribution of estimates is shown in Figure 2.

There are 8496 models which predict the accumulated number of houses to be within the best fit interval for Divostin. The final population size estimates generated by these parameter combinations range from 633–3713. The mean and standard deviation of population estimate values are 1740 and 495.52, respectively. 95% of population estimates are between 868 and 2842 people (Fig. 3).

There are 333 models out of 81 600 which predict the accumulated number of houses within the specified interval for Uivar. Estimates range from 90–

325 people (Fig. 4). The mean is 194; standard deviation is 55.68; and 95% of estimates are between 92 and 309 people.

Discussion and conclusion

The methodology used in this paper makes it possible to reduce the number of potential population growth models and to arrive at a set of population size estimates by introducing the constraint that the candidate model must produce the observed number of accumulated houses. The precision of the estimate depends directly on the ability to determine precisely the total number of houses in the archaeological record. Moreover, estimates depend directly on the range of input values which are used as parameters. The ability to constrain the range of possible values is directly related to the precision of the estimate – more constrained ranges will produce more precise estimates.

Many of the parameter values used in this analysis may be regarded as *a priori* unlikely. For example, given that this is a deterministic model, a house use-life value of 84 years is very improbable. Moreover, initial population is not likely to be 100, 300 or 500 people for sites such as Divostin and Gomolava. For example, if we constrain the initial population at Divostin to between 10 and 50 people, assume that the most probable use-life value of houses is 56 years, and use a single estimate of carrying capacity of 2000 people – the result would be a narrower interval estimate (95% of estimates would be between 1926 and 1997 people, Fig. 5). Likewise, initial population is not likely to be 10 people for the latest Neolithic settlement at Uivar, where there is clear

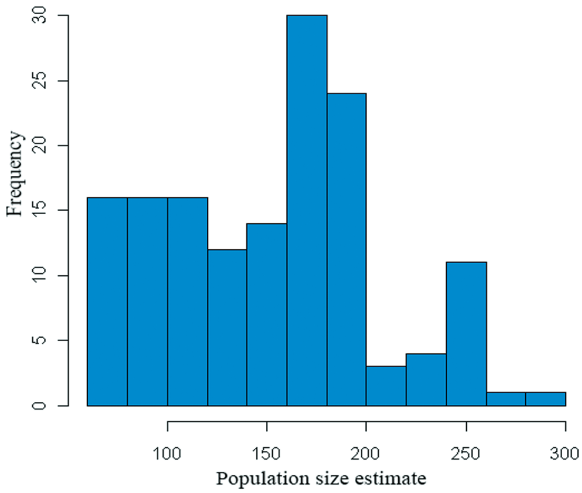


Fig. 2. Distribution of population size estimates for Gomolava.

evidence of earlier occupation. Therefore, population estimates based on models which assume higher initial population size are more probable for Uivar. For example, if only the initial population size for Uivar is constrained between 100–200 people (which is a more realistic estimate), the resulting population estimates would range between 136 and 221 people. Carrying capacity can be estimated with greater rigor if there is good environmental data. Growth rates can be estimated independently from skeletal data (*Bocquet-Appel 2002*). All this information can be included to enhance the precision of the estimate. One way to do this would be to build a stochastic model – a numerical simulation where parameter values would be randomly generated from pre-specified probability distributions.

How different are the estimates from this study from estimates based on other procedures? It is clear that

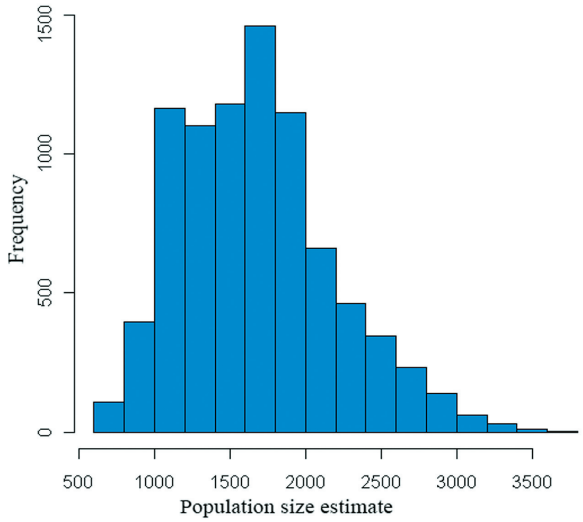


Fig. 3. Distribution of population size estimates for Divostin.

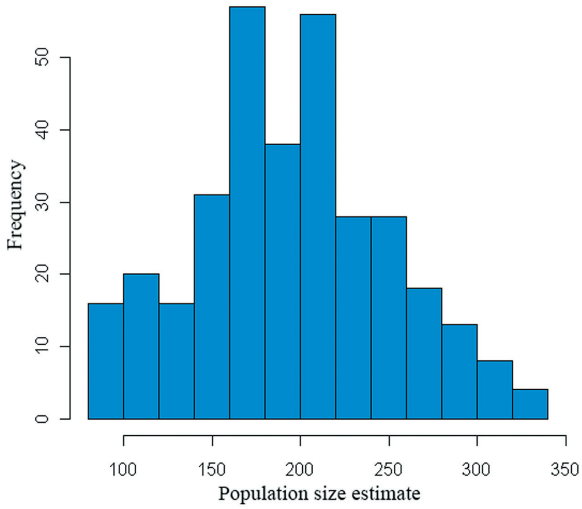


Fig. 4. Distribution of population size estimates for Uivar.

they are much lower than estimates based on the assumption that most of the houses from one horizon were contemporaneous. For example, it is estimated here that in its final phase, Neolithic Gomolava was inhabited by approximately 150 people, 250 people at most. If the proportional projection was made on the basis of Gomolava Ib record, this estimate would be about 350–400 people (24 houses were excavated in the Gomolava Ib, and the excavated area is approximately one third of the entire site area). The error would even be greater in the case of Divostin. On the assumption that all or most Divostin IIb houses were used contemporaneously, one would reach estimates that would range between 5000–6000 people. On the other hand, estimates made using the model from this paper are usually higher than estimates calculated by Porčić (*e.g.,* final population sizes for Gomolava Ib and Divostin IIb were estimated at 50 and 1000 people respectively, see *Porčić 2010. 342, Tab. 7.6*). This is because Porčić estimated the average number of inhabitants during a certain period, while this procedure estimates the final (maximum) population size. The latter figure makes more sense than average population size. The average population size estimates would make sense only in cases where growth rates are very low, or when the population is not monotonically increasing – *e.g.,* when the end of the settlement was not abrupt.

This leads to the final and most important question: are there ways to test the population growth model? The most straightforward way to test the model would be to have independent data on demographic trends (*e.g.,* from skeletal data) or to have a great number of dates from a single site (*e.g.,* from a single horizon). If the growth model is correct, the number of samples from appropriate time periods should follow the logistic curve. The problem that may arise is that ^{14}C dates are difficult to distinguish on time scales at which the settlement dynamic operates (*e.g.,* 50–100 years for a single building horizon). One possible solution to this problem would be to use seriation (*e.g.,* seriate house or pit assemblages), perhaps in combination with ^{14}C dates, in order to achieve a fine-grained relative chronology.

The most important lesson to be learned from this exercise in archaeological demography is that population size estimation from settlement data is far from straightforward. The situation faced by archaeologists looking at a deceptively clear settlement plan produced by a large scale excavation or magnetometer survey is actually a textbook case of equifinality (see *Rogers 2000*). The same number of houses could indicate very different population sizes, depending on the demographic scenario which actually took place. Fortunately, not all scenarios are possible or equally likely; therefore, some can be eliminated. The remaining scenarios can be used as a basis for making population estimates. The need for high quality data is a constant imperative that needs no special elaboration. In this context, it is more important to stress the need for better models and better parameter estimates.

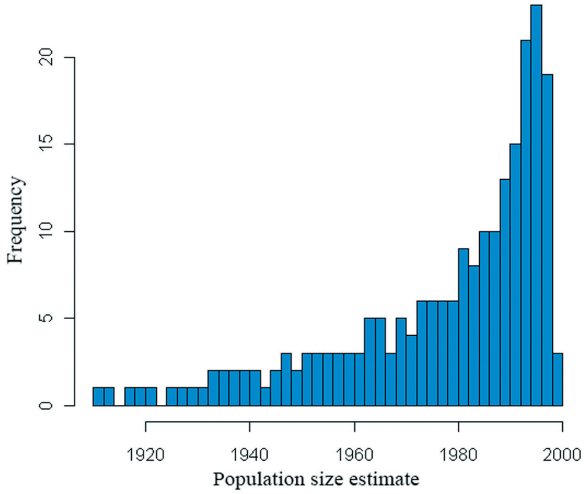


Fig. 5. Distribution of population estimated for Divostin when the range of parameters is constrained to more realistic values.

ACKNOWLEDGEMENTS

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Architecture of Lasinja culture settlements in the light of new investigations in northern Croatia

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ABSTRACT – *The site of Beketinci, Bentež, stands out among Lasinja settlements as the site of the largest uncovered surface – the excavation at 30 900m² revealed a portion of a Lasinja culture settlement. Its western part (covering 24 700m²) was dedicated to working activities (working features: clay-extraction pits, working pits, self-standing partitions, pottery kilns, and wells), while in the eastern, residential, part (extending over 6200m² of excavated surface) we uncovered a cluster of 5 rectangular above-ground houses, two residential pit-houses, and five residential or working pit-houses. Absolute dates for this settlement span the period between 3900 and 3300 BC, dating it to the late phase of Lasinja culture.*

IZVLEČEK – *Najdišče Beketinci, Bentež izstopa glede na druga najdišča kulture Lasinja kot tisto z največjo odkrito površino – izkopavanje 30 900m² velike površine je odkrilo le del najdišča z lasinjsko kulturo. Na zahodnem delu (izkopna površina je znašala 24 700m²) so bile odkrite sledi dejavnosti, povezanih z delom (kot so jame za izkopavanje gline, delovne jame, samostoječe pregrade, lončarske peči in vodnjaki), medtem ko je bil v vzhodnem, bivalnem delu (izkopna površina je znašala 6200 m²) odkrit skupek petih pravokotnih nadzemnih hiš, dveh bivalnih jam in petih bivalnih ali delovnih jam. Absolutni datumi naselje datirajo med 3900 in 3300 pr.n.št., kar najdišče postavlja v zadnjo fazo lasinjske kulture.*

KEY WORDS – *above-ground houses; Lasinja culture; Beketinci; northern Croatia*

Introduction

The Lasinja culture was named after the village of Lasinja on the Kupa River, south of Zagreb, in northern Croatia (*Dimitrijević 1961*). Settlements of this culture were discovered in the entire territory between the Sava, Drava and Danube rivers, from Vukovar in the east to Velebit Mountain in the southwest. Its distribution area covered northern and central Croatia, northern Bosnia, western Hungary, Slovenia, and Austria, and in recent times its elements were discovered also in western Serbia. It was formed in a peaceful way as a result of autochthonous development, which is manifested in many of its features, which preserve traditions from the Late Neolithic in spite of the fact that it chronologically belongs to the Middle Eneolithic.

In Austria, Lasinja culture was discovered in the 1950s by Richard Pittioni (*Pittioni 1954.208*), and in Slovenia and northwestern Croatia by Josip Korošec (*Korošec 1958*) in texts about individual sites. In Hungary, it was distinguished by Nándor Kalicz (*Kalicz 1974*), and in Bosnia by Alojz Benac (*Benac 1964*). In northern Croatia, the first investigations of Lasinja culture were carried out in the mid-20th century by the amateur archaeologist Vjekoslav Dukić and the Varaždin archaeologist Stjepan Vuković. Stojan Dimitrijević was the first to identify, systematise, and name this culture as an independent Eneolithic phenomenon (*Dimitrijević 1961; 1979a; 1979b*) for northern Croatia, Slovenia, and Bosnia. In Transdanubia in Hungary, this culture is known as Balaton-Lasinja.

Dimitrijević (*1979a.146*) divided this culture into three developmental phases, including the site of Vis I Modran near Derventa and some other sites in the

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first phase. His II–A phase comprised the sites of Ždralovi and Velika Mlinska, as well as most other sites in Slovenia. The developed phase (phase II–B) is represented mainly by the finds from Beketinci and Pavlovac near Križevci, while the third phase consists mostly of sites in the Požega Basin and the finds from Koška, as well as from the sites in Hungary *etc*. (*Dimitrijević 1979a.151–158*). However, it was later established that the bulk of the Slovenian sites in fact belong to the so-called Sava group of Lengyel culture (*Guštin 2005.7–22*). Regardless of what one thinks about a classification of the Hungarian sites within a single phase, this division is still accepted today.

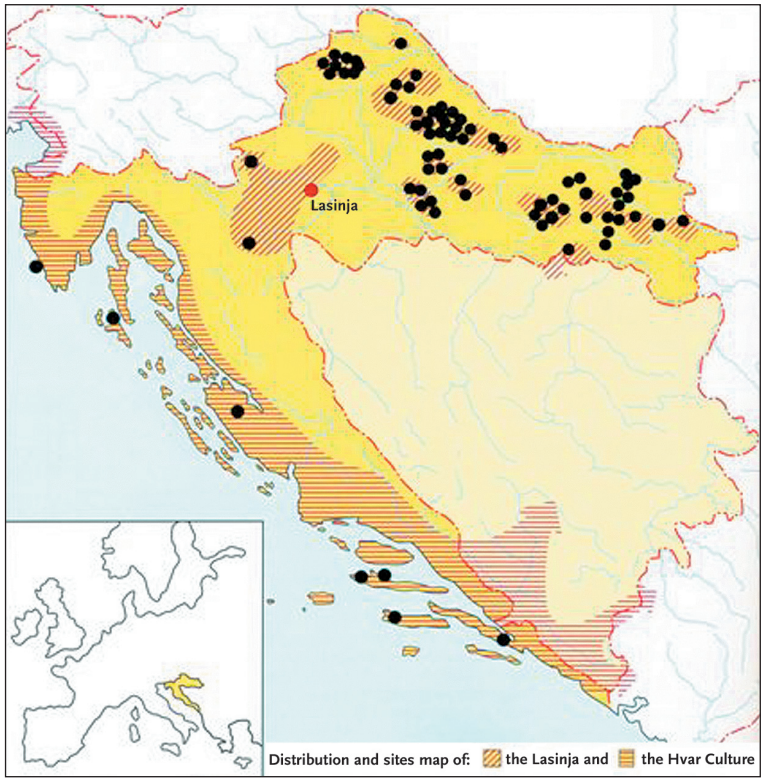


Fig. 1. Distribution map of Lasinja culture.

Kalicz looks for the origins of the Balaton-Lasinja culture in the Balkans (*Kalicz 1995.40*). Dimitrijević at first believed that the Sopot and Baden cultures formed the substrate for Lasinja culture (*Dimitrijević 1979a.166*), while he later suggested that the substrate consisted of the Sopot, Vinča and Lengyel cultures (*Dimitrijević 1979a. 168–169*). Zorko Marković proposed that the substrate for the Lasinja culture consisted of three basic elements: 1) Sopot and Lengyel cultures, 2) Vinča and Butmir cultures, 3) Hvar-Lisičići culture (*Marković 1994.95*). In this, one has to bear in mind that it is today generally held that all these cultures continued their existence into the Early Eneolithic, *i.e.* phases Lengyel 3, Sopot 4, Vinča D–3, Early Eneolithic phases of the Butmir and Hvar cultures (*e.g. Kalicz 1995.Abb.2*). It is also now thought that to these one should perhaps add the Krivodol-Sălcuţa-Bubanj Hum complex, which certainly influenced the emergence and formation of the Lasinja culture (*Kalicz 1995.40, Abb. 2*).

Dimitrijević mapped Lasinja sites in Croatia, northern Bosnia, Slovenia, western Hungary and Austria (*Dimitrijević 1979a.139–142*). It should be emphasised that the finds from Slovenia are currently divided into those from the Lengyel culture and those attributed to Lasinja culture proper (*Guštin 2005*). In Hungary, the data on the Lasinja and Retz-Gajary cultures – initially considered as a single entity with three developmental stages – are likewise being continually supplemented (*Kalicz 1974; 1991; Somogyi 2000; Straub 2006 etc.*). It should be pointed out that it is presently accepted that Lasinja culture belongs to the Middle Eneolithic, *i.e.* after phases Lengyel 3 and Sopot 4, which date to the Early Eneolithic (*Marković 1994.28– 29*). In absolute dates, this is the period from around 4300 to 3900 BC.

The recently obtained dates for Lasinja sites in Croatia allowed a fine-tuning of the position of this culture in absolute and relative chronological schemes.

The dates for Lasinja culture in Croatia range from 4350 to 3950 BC (*Balen 2010.25*):

- Tomašanci, Palača 4340–3950 calBC;
- Jurjevac, Stara Vodenica 4320–3940 calBC;
- Đakovački Selci, Pajtenica 4350–3710 calBC;
- Jakšić, grave 4320–4050 calBC;
- Potočani 4250–4040 calBC.

All these dates can be attributed to the earlier phases of Lasinja culture, phases I and II:

- a Lasinja site at Čepinski Martinci, Dubrava is dated to the second quarter of the 4th millennium BC (*Kalafatić 2009.22*);
- a Lasinja site at Bentež near Beketinci yielded the following dates for the late phase of the Lasinja culture:
  - storage next to above-ground house 1 (pit 7183/7184), 3960–3770 calBC;

- NE foundation of house 4 (SJ 9119), 3810–3640 calBC;
- SE foundation of house 4/N foundation of house 5 (SJ 9835), 3770–3360 calBC.

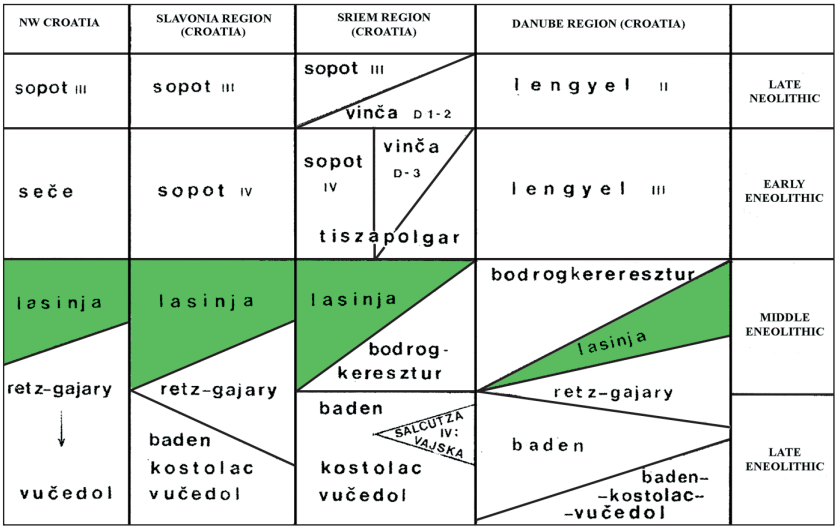
Lasinja sites in central Croatia near Varaždin yielded the following dates:
- Blizna 4208 calBC (*Bekić 2006.95*);
- Gromače 4293 calBC (*Bekić 2006.22*);
- Gornji Pustakovec 3569 and 3461 calBC (*Bekić 2006.184*).

Balen (*2010.26*) finds the dates for Gornji Pustakovec too low, considering that they already match those for the Boleráz and Retz-Gajary cultures.

The recent dating of these Lasinja sites has contributed to a more precise fixing of this culture in the Eneolithic periodisation and ascertained the chronological priority of Lasinja culture in relation to Baden culture, proving the dating of the latter into the Early Eneolithic untenable, placing it instead in the Late Eneolithic.

Considering that the surfaces uncovered in previous archaeological investigations were very small, our picture of Lasinja culture settlements was incomplete. In the 1950s a portion of a long house (or semi-pit-house in the opinion of S. Dimitrijević) was discovered at the site of Cerje Novo – Draguševec (NW Croatia). The house was 30–40m long, 2.28m wide, and 0.30m deep. The post-holes along the edge of the house indicated that it had a gable roof (*Dimitrijević 1979a.148*). In addition to these data on the distribution of Lasinja culture, we correct here the attribution of the horizons from the Pepelana tell near Virovitica (*Minichreiter 1990.29–37*): three residential horizons attributed at first to the Retz-Gajary culture are, in fact, late Lasinja, which also features elements resembling those of Retz-Gajary culture, which was the reason for the initial inaccurate attribution. Portions of house bases were also discovered in northern Bosnia at the Vis-Modran site (*Belić 1964*).

The most recent excavations on the route of the international highway Budapest–Ploče, Osijek–Đakovo– Sredanci section have revealed – in addition to other cultures – the remains of Lasinja settlements at 10 sites. Three of these sites on which a large area of Lasinja settlements was excavated yielded pit-structures as well as above-ground houses. Absolute dates showed that the settlements in Tomašanci, Palača and in Čepinski Martinci, Dubrava date to the middle-developed phase of Lasinja culture, while the settlement at Beketinci, Bentež dates to the late phase. These new data definitely establish that Lasinja culture employed not only pit-dwellings and working pits, but also above-ground houses for dwelling, which is a tradition that can be traced back to the Neolithic Starčevo culture (Slavonski Brod, Galovo and Vinkovci), through the Sopot and Vinča cultures to the Eneolithic. A number of investigations of prehistoric sites in eastern Slavonia have shown that the tradition of pit-house dwelling was maintained until the arrival of the Romans (Kupina, east of Slavonski Brod, a Late Iron Age – La Tène settlement).



BEKETINCI – BENTEŽ			
Z–Lab. No.	**Sample description**	**^{14}C age (BP)**	**Calibrated age**
	Prehistoric settlement of Lasinja culture		
Z–4373	Pit 7183/7184, kv. a44, U–687, #1	5057±81	3960–3770 calBC (68,2%)
Z–4375	NE fondation of House 4, 9119, kv. f51, U–785, #3	4954±108	3940–3870 calBC (14,8%) 3810–3640 calBC (53,4%)
Z–4376	SE fondation of House 4, 9835, kv. e51, U–794, #4	4787±168	3770–3360 calBC (68,2%)

Fig. 2. Chronological tables of Lasinja culture.

Tomašanci, Palača

An above-ground residential structure measuring 15 x 9m, oriented NW-SE, was discovered in a part of a Lasinja settlement at the site of Tomašanci, Palača, located 12km south of the site of Beketinci, Bentež. The house had a rectangular ground plan with two rooms of different sizes. The foundation rows for the wall were reinforced by a series of uprights (perhaps a narrow porch), while a large load-bearing post stood in the centre of the larger room. Two semi-circular trenches for a fence (presumably a stock pen) abut the house on the northwest. Another room measuring 5 x 5m abuts on the house on the south. A similar arrangement was discovered at Beketinci, Bentež (house 4 and house 5). A large pit-house filled with Lasinja pottery was discovered southeast of the house. All the dates obtained from this pit-house are Late Bronze Age, suggesting that this space had served for the disposal of refuse over an extended period (*Balen 2010*).

Čepinski Martinci, Dubrava

The Lasinja settlement at Čepinski Martinci, Dubrava consisted of above-ground structures on a small elevation, while working pits and wells were located in the lower ground. This working zone (in the opinion of the director of the excavation, H. Kalafatić) points to seasonal use, considering the high groundwater level during winter. This settlement yielded a number of above-ground structures, which can be divided into two types. The first type (similar to Tomašanci and Beketinci) had a rectangular ground plan, a NW-SE alignment, was up to 15m long, and generally consisted of several rooms, sometimes with a porch. The second type had a square ground plan and was around 11m long. Smaller square structures were built adjacent to larger rectangular structures. It is possible that this was a combination of residential structures (larger) and smaller farm buildings (*Kalafatić 2009*).



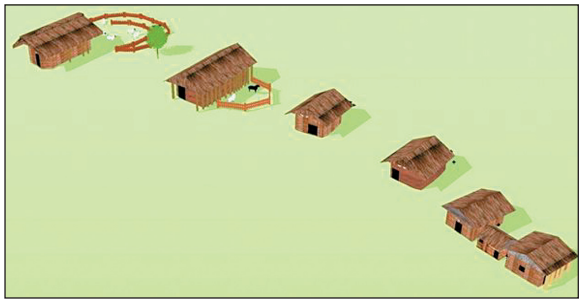
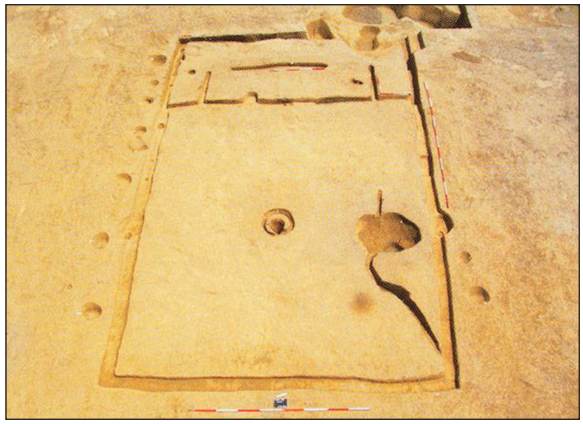


Fig. 4. Čepinski Martinci, Dubrava. Lasinja settlement.





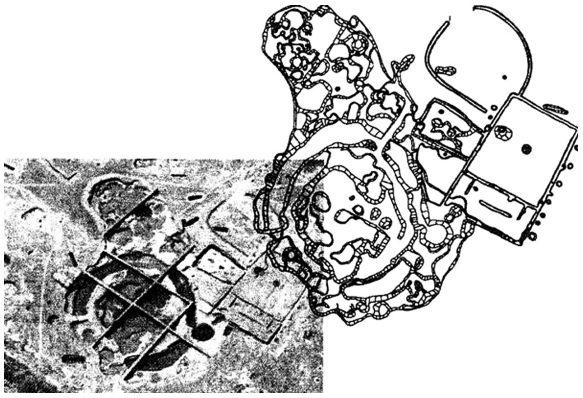


Fig. 3. Tomašanci, Palača. Lasinja settlement (after* J. Balen 2008*).

Beketinci, Bentež

The site of Beketinci, Bentež, stands out among Lasinja settlements as the excavation site with the

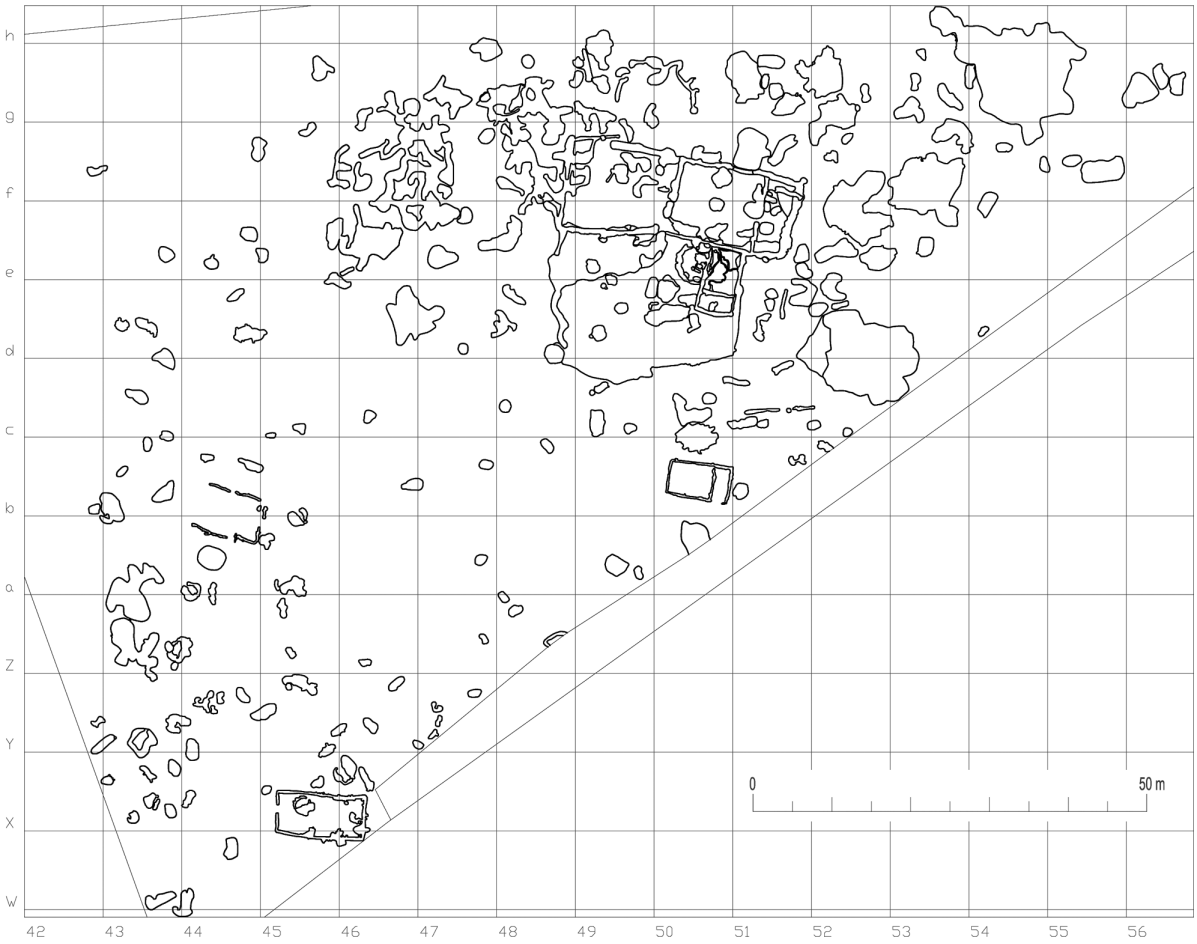


Fig. 5. Beketinci, Bentež. Plan of the Lasinja settlement (drawing: Arheo plan d.d.).

largest uncovered surface – 30 900m² – which revealed a portion of a settlement. In its western part (24 700m²), the site contained a working area (structures of working character – pits for clay extraction, working pits, self-standing fences, pottery kilns, and wells), while the eastern part (6200m²) was residential, with 5 houses of rectangular base, 2 residential pit-dwellings and 5 residential or working pit-dwellings. Among the houses, mostly 5x10m large, house 4 (12 x 30m) stands out as the biggest above-ground structure of Lasinja culture so far discovered in Croatia. Radiocarbon dates ranging from 3900 to 3300 BC place this settlement in the late phase of the culture (*Minichreiter 2009.141–148*).

Above-ground house 1

Above-ground house 1 was erected in the west part of the residential area of the settlement. It had a rectangular plan with bedding-trenches with sill-beams into which vertical timber posts were recessed at regular intervals. The northern, eastern and southern walls had timber foundations, whereas the western side of the house contained only four earth-fast timber posts at uniform intervals. The house was 8.5m long west-east, and 5.80m wide north-south. The layout of posts within the house suggests that it was divided into two rooms: the western – larger – one measuring 6 x 5.5m and the eastern – smaller – one measuring 2 x 5.5m. An entrance one metre wide opened in the centre of the south wall, protected by a small porch supported by posts recessed into a short timber beam projecting at a right-angle outward to the house foundations. Thick wooden posts, 30–40cm in diameter, were deeply sunk into the ground at all four corners of the house. Pairs of posts of similar size were set at regular intervals along the north and south walls, so that together with the corner posts on the outside of the timber foundations there were four posts in a row. In addition to several stakes within the larger room, a hole from one of the main load-bearing uprights was found in the centre of the room. Not a single pottery vessel was found within this or other above-ground houses. Movable household inventory – shards of coarse round and biconical vessels and pots, as well as fragments of fine small bowls and jugs – was found in the large circular pit (measuring 3.5 x 3m, 80cm deep) south of the house, which presumably served for storage.

Above-ground house 2

Above-ground house 2 was built around 35m south of house 1. Its alignment and ground plan were the same as those of houses 1 and 3. Compared with the other two houses, house 2 was the longest. Its rectangular plan consisted of the north and south walls, which were 11.5m long; the east wall was 5.4m long; while the west wall was 5m long. The foundations consisted of large timber sill beams (up to 40cm in diameter) on all four sides. Posts 50cm in diameter were set at all four corners of the house, with another pair of posts along each wall on the outside, set at uniform 4m intervals. These posts supported the roof, which was probably gabled. The foundation beams in the eastern side of the house were larger and sunk more deeply, suggesting that the house may have had an upper floor on that side. Unlike house 1, which had two rooms, house 2 was divided into three rooms. The largest (western) room measured 6.7 x 4.8m, the central one was very narrow with 1.20 x 4.8m (this may have been a staircase leading to the upper floor), while the eastern room was somewhat wider with 2 x 5m (possibly a storage room). There were other rows of posts within the house, and the entrance to the house – *i.e.* to the large room – opened in the west side of the house at the point where the timber foundations break off and where a massive door post was sunk into the ground. A shallow pit of irregular shape measuring 2 x 1.5m was dug in the centre of the western room. The house was discovered next to the southern boundary of the trench, so it was not possible to investigate the auxiliary features on the southern side of the house. There were indications of a pit – a storage space similar to those adjacent to house 1 and house 3 – south of the house in the form of ceramic shards in dark soil, presumably marking a peripheral segment of an uninvestigated pit in the zone south of the house.



Fig. 6. Beketinci, Bentež. House 1 of the Lasinja settlement (photo: J. Sudić).

Above-ground house 3

Above-ground house 3 was built 50m east of house 1. It had the same orientation and shape as the other two, but was slightly smaller: 8 x 4.5m. Each of its four walls had timber foundations. The interior of this house was not partitioned with posts like the other two houses, but with a solid foundation – a timber beam like those of the exterior walls. There were two rooms in the house: the larger was in the west, measuring 5 x 4m, and the smaller in the east, measuring 2 x 4m. House 3 was entered from the south through the smaller eastern room. The roof was supported with timber uprights on the outside set at all four corners, with an additional post in the centre of the north and south walls. The interior of the house was reinforced with several rows of posts in the interior of the large room. A large pit of irregular cir-



Fig. 7. Beketinci, Bentež. House 2 of the Lasinja settlement (photo: J. Sudić).



Fig. 8. Beketinci, Bentež. House 3 of the Lasinja settlement (photo: J. Sudić).

cular plan, 2m in diameter, was recessed 50cm into the virgin soil adjacent to the house on the east. It was probably used as a storage pit because it resembles the pit next to house 1 in terms of position, form and inventory. The pit yielded a number of fragments of coarse and fine pottery of different types: bowls, buckets, jugs, small pots and pots with beak-shaped handles, as well as grips and handles with small horns. The fine pottery assemblage consisted of fragments of jugs, bowls, footed cups and jugs with handles decorated with linear motifs with stabs. The pottery assemblage also included four pans and several spoons. An above-ground house with an identical ground plan and similar dimensions with two rooms was found in the neighbouring settlement of the Lasinja culture at Palača near Tomašanci (*Balen 2008.29–30*).

Above-ground houses 4 and 5

A compound consisting of a large house (4) with a smaller house (5) and their common courtyard – large pit-house 3 was built northeast of houses 1 and 2, and north of house 3. Taking into consideration the size and nature of these structures, it can be presumed that this was the centre of this settlement. The purpose and function of such a large structure remains unclear. Above-ground house 4, oriented west-east, with its size – 30 x 12m – is so far the largest known Eneolithic house in these areas. The foundations, dug up to 1m deep into the virgin soil, consisted of timber beams recessed deeper on the eastern than on the western side (like the foundations in house 2). The walls were reinforced on the outside at irregular intervals with densely packed vertical posts. The interior of house 4 was partitioned with timber sill beams into three rooms with a layout identical to those of houses 1, 2 and 3. The largest room, measuring 14 x 12m, was located in the west, where one entered the house. The middle room was smaller – 10.5 x 12m – and the eastern room was the smallest of the three at 4.40 x 12m. A distinctive feature of this house was the fireplace, in a pit 1.80m in diameter situated in the centre of the middle room. It seems that fire did not burn freely in the fireplace, but that cinders were introduced and maintained, because the quantity of charcoal and ashes is relatively small, while the earth nevertheless shows signs of burning. The layer of clay and gravel below this burnt layer may have served to facilitate the preservation of warmth and prevent further burning. In certain structures, such a central recess is interpreted as the base of the upright supporting the roof. Here, however, the recess is very large, and there are no traces of a burnt or decayed post. A shallow pit of indeterminate function, measuring 5 x 3.5m, abutted on the north on the central room. On the



Fig. 9. Beketinci, Bentež. Houses 4 and 5 of the Lasinja settlement (photo: J. Sudić).

opposite, southern side, the rectangular above-ground house 5 was built adjacent to it, aligned north-south perpendicular to house 4, with which it formed a single complex. House 5, measuring 9 x 5m, was built in the same way as the remaining houses in the settlement – on timber sill beams. It was divided into two rooms: the larger, northern one, measuring 6 x 5m, and the smaller, southern one, measuring 3 x 5m. It did not have an entrance on the outside, so it could presumably be entered only from large house 4. A large – storage – pit measuring 4 x 5m was recessed 1.5m into the ground where house 5 abutted at the right angle on house 4. The interiors of houses 4 and 5, like the other houses, did not yield any pottery finds. Two smaller pits south and west of house 5 in the courtyard (pit-house 3) of this complex contained numerous fragments of coarse and fine pottery: round and biconical bowls with a tongue-shaped handle, footed bowls, pots with handles, miniature footed bowls, decorated bowls, amphorae with two handles, and spoons. A few pottery shards were found also in the shallow pits near the entrance to large house 4 on its west and north sides. A large fenced working area in the form of a shallow pit-house – which had a well on its south-eastern side – extended along the south of the large house 4 and house 5 with the storage pit. This working area – pit-house 3, sunk up to 40cm deep, 25m long and 20m wide, was fenced along its length with a double row of alternating timber stakes. This fence continued on the outside of the well, breaking off at one point to allow access to the well not only from the working area, but also from this, western (exterior) side. The well, 2.5 in diameter, was investigated to a depth of 2m, at which point groundwater appeared.

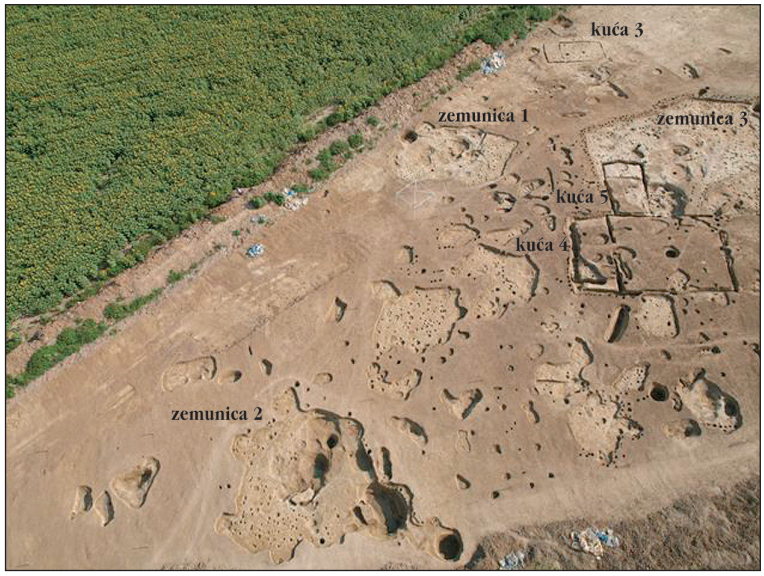


Fig. 10. Beketinci, Bentež. Houses and pit-houses of the Lasinja settlement (photo: J. Sudić).

Pit-houses, bread ovens and pottery kilns

Two large pit-houses with wells were located in the eastern part of the settlement. Their function is not entirely clear, *i.e.* whether they served a residential or working purpose. There was a bread oven in the interior of pit-house 2, while there were another two bread ovens in the open air outside pit-house 1. There were four smaller working pits, a number of smaller pits with various functions, and 12 self-standing partitions in the zone between the two large pit-houses.

Above-ground houses of rectangular plan were first built in northern Croatia in the Sopot culture, where such houses were discovered at settlements in Otok and Sopot near Vinkovci, at Hermann Vineyard in Osijek (*Dimitrijević 1979b.270; Dimitrijević, Težak Gregl and Majnarić Pandžić 1998.88, sl. 16; Krznarić-Škrivanko 2006.11–15, sl. 1 and 2*) and in Krušević near Slavonski Šamac (*Miklik-Lozuk 2005.37–38, 2006.51–53*). The tradition of building timber above-ground houses of rectangular plan continued through the Neolithic and the Eneolithic, as corroborated by the most recent discoveries of five Lasinja settlements: Bentež in Beketinci; the site of Dubrava in



Fig. 11. Beketinci, Bentež. Pit-house 1 of the Lasinja settlement (photo: J. Sudić).

Čepinski Martinci, located 3km to the north (*Kalafatić 2009.21–22, sl. 5 and 6*), and Palača near Tomašanci, situated 12km to the south (*Balen 2008.29–31*); rows of posts, presumably belonging to above-ground structures, were discovered at the sites of Stara Vodenica near Jurjevac Punitovački (4km to the south) and Pajtenica near Đakovački Selci (23km south of Beketinci). Furthermore, identical rectangular above-ground houses were found at Eneolithic settlements in Hungary: Győr-Szabadrétdomb from the Balaton-Lasinja/Ludanice phase (*Virág, Figler 2007. 352, Fig. 2, 5–11*), Veszprém from phase IIb–III of the Lengyel culture (*Regenye 2007.Fig. 2, 3, 4*), Zalavár-Basasziget, a Balaton-Lasinja settlement (*Virág 2005.sl. 1*), Szombathely, a late Lengyel settlement (*Ilon, Farkas 2001.55–60, Fig. 3a, b, 4*), and Zalaegerszeg-Andráshida, Gébárti tó (II) from the Balaton-Lasinja phase (*Barna, Kreiter 2006.48–50, 61: Fig. 1, 14, 15.1, 16.1, 17.1*). In Austria, above-ground houses were found at settlements of the Bisamberg-Oberpullendorf group, which is analogous to the Lasinja culture, at Unterradlberg and Pottenbrunn (*Ruttkay 1995.125, Abb. 7*), and in Slovenia at the Lasinja settlement at Sodolek (*Kavur, Tomaž and Mileusnić 2006.122–123, sl. 3*). The only known find of an above-ground house with a fenced courtyard from the site of Wetzleinsdorf in Austria (*Neugebauer-Maresch 1995.Abb 42*) can be mentioned as a remote analogy for house 3 with a fenced courtyard from Beketinci.



Fig. 12. Beketinci, Bentež. Pit-houses 4 and 5 of the Lasinja settlement (photo: J. Sudić).



Fig. 13. Beketinci, Bentež. Pit-houses 6, 7 and 8 of the Lasinja settlement (photo: J. Sudić).

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The supply system of siliceous rocks between the Drava, Sava and Danube rivers during the Starčevo culture

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ABSTRACT – This paper analyses the production processes of chipped stone artefacts from ten Starčevo culture sites in the area between the rivers Sava, Drava and Danube. The aim was to compare the results of assemblages analysis from individual settlements to reconstruct the existence and extent of relationships between settlements and their inhabitants. The results showed that in the area between Sava and Drava during the early Neolithic period, a system for acquiring and processing raw materials and the production and exchange of stone tools among the settlements developed. The Starčevo culture population was familiar with the environment and resources, and had developed a system of procurement and distribution of raw material and intermediate goods.

IZVLEČEK – *V članku analiziramo produkcijske procese odbitkovnih kamnitih orodij iz desetih najdišč kulture Starčevo na področju med rekami Savo, Dravo in Donavo. Namen raziskave je bila primerjava rezultatov analiz skupkov iz posameznih najdišč za rekonstrukcijo obstoja in obsega odnosov med naselbinami in njihovimi prebivalci. Rezultati kažejo, da se je na področju med Savo in Dravo v obdobju zgodnjega neolitika razvil sistem za pridobivanje in obdelavo surovega materiala ter produkcijo in izmenjavo kamnitih orodij med naselbinami. Prebivalci kulture Starčevo so poznali okolje in naravne vire, in tako so razvili sistem pridobivanja in distribucije surovin in polizdelkov.*

KEY WORDS – Slavonia (Croatia); Starčevo culture; lithics; distribution; sites; raw material

Introduction

In this paper, the organisation of lithic production at Starčevo sites in the area between the rivers Sava, Drava and Danube is analysed. Material originates from the sites Slavonski Brod-Galovo, Zadubravlje, Ivandvor, Tomašanci-Palace, Virovitica, Šagovina Cernička, and several locations in Vinkovci (they all probably belong to the same large settlement). Since material originates from excavations of varying scope and methodology, these factors also influenced the final composition of the assemblage. The range of artefacts per site ranges from 1 to several thousand, as in Slavonski Brod-Galovo and Zadubravlje. For these reasons, it is hard to draw firm and comprehensive conclusions about aspects of the chipped stone industry. Some sites were excavated on very large surfaces, using precise methodology, so information on the quantity of artefacts can be considered realistic. Although the methodology of excavation and data collection was different, recently investigated sites in each group justify the division of the settlements. This enabled conclusions about the production of chipped stone artefacts between the Sava, Drava and Danube during the Starčevo period. According to the established site typology, each settlement was classified into one group based on the amount of production types in the assemblage. Austro-Hungarian maps were used to approximate walking distances in hours between settlements and mutual 'availability' depending on natural obstacles. Given the highly altered landscape due to Austro-Hungarian and modern land reclamation, the construction of embankments and canals for drainage, for information on wetlands and flood areas were used from 'Croatia on 18th secret Military

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Maps', and 19th Century – 'Brod Regiment' and 'Gradiška Regiment' Military Maps published by the Croatian Institute for History (*Buczinsky* et al. *1999a; 1999b*). Based on the available data, we found that in the Early Neolithic in the area between the Sava, Drava and Danube, there was a choice of raw materials, and a system of raw materials procurement, production and distribution between settlements as in other parts of Europe in this period.

Settlement types according to the production of lithic artefacts

Irrespective of the distance and availability of sources of raw material, it was necessary to insure quantities which would satisfy the needs of the whole community. Also, irrespective of distance, the final stage in the production of tools occurred in the settlement itself. The place of use could also be partially confined to the settlement itself, but some objects moved with their owners. Rejected pieces and some lost pieces could be found again in association with the settlement, because personal property was safer inside the settlement. Storage (utilitarian and symbolic) and graves were special cases, since objects were kept for later use, or in the other world. Artefacts could take a rather simple route from the source of the raw material to the settlement, or to the place of use, which did not necessarily have to be in the same location. Different stages of workshop activity could occur between these locations (*Balcer 1995*). We could recognise specific 'industrial zones' in different periods and for different raw materials, such as regions of exploitation of chert and radiolarite in the Bakony Mountains (*Biró, Regenye 1991*). The reconstruction of the movement of objects presents a significant challenge. Different members of a community would have exploited, produced and used different types of artefact, which potentially reflected the social structure. The position of the artefacts depends on geological and geographical characteristics, as well as the division of labour and their passing through many different hands during their lifespan – from raw material to discarded and worn out artefact, which then became waste to be removed for security reasons. One and the same block of raw material could end up in different ways, in the hands of different people, in different stages of production simultaneously, and during the long period in which the artefact was remodeled and modified several times for various uses. One person could transfer one pre-core to different places and distribute it among various users, without the necessary context of sophisticated forms of social contact and exchange systems. The finished tool did not have to remain in the community whose member made it. It was common for products to be transported to other communities of the same cultural group. Distance from the source can be tracked from the level of use of almost all artefacts, as well as re-modeled tools, while at production sites there was some profusion, since even larger and still useable segments of cores were used as tools. The distribution of regional raw material sometimes corresponded with the borders determined by other elements of material culture. The rules of access to the raw material still remain unclear. We can only draw conclusions on the basis of the relationship between the amount of waste and number of tools at specific locations. Obviously, the pattern changed, depending on the raw material and chronological period. This relationship between the amount of raw material, waste and tools at specific sites has enabled the differentiation of several types of Early Neolithic settlement: (1) extraction/exploitation, (2) production, (3) distribution, (4) consumption, (5) self-sustained, (6) no procurement, but production present, (7) tool production and use.

The linear path of raw material in systematised groups of settlement is 1–4. The path can, of course, be shorter or different, depending on the type of raw material and the usual means of transportation. Of course, we frequently find in one settlement an overlap between certain groups. In addition to the *chaîne operatoire* for determining the type of settlement, we have found very useful the scheme of the 'life-cycle' of the object from extraction from the rock to discarding, created by M. de Grooth (*1997*). The scheme was originally devised for chipped stone material, but is applicable to almost all artefacts. According to this scheme, we can determine respectively for every site which activities linked to production occurred there, and whether the settlement had contacts (and of what kind) with other settlements. It is very difficult to determine the origin of some objects – exchanges sometimes leave a very limited number of traces, which is obvious from ethnographic analogies (food, spices, textile, cattle), and we can detect only those objects that are not prone to deterioration. The cooperation which had to exist between the first alochtonous agriculturalists and the autochthonous settlers of the Trans-Danube region was also conducted through patterns of exchange. Indigenous settlers were familiar with sources of Szentgal radiolarite, raw material crucial for farmers, and hence they exchanged it for skills such as house building and plant cultivation, or for provi-

sions, such as meat and salt (*Banffy 2004*). Settlement typology was adapted to the area between Sava, Drava and Danube rivers according to Lech (*1981; 1983; 1989*) and Matetiucova (*2008.99–102*).

● The first group includes settlements or system of settlements the activity of which was exclusively or mostly linked to raw material extraction from a quarry. These settlements were situated in the close vicinity of the quarry and contained numerous traces of processing of raw material into cores and other products, and little or no trace of occupation or dwelling.

● The second group refers to production settlements with large amounts of waste material, blanks, discarded and worn out cores, core rejuvenation flakes, overshot blades, and unfinished tools. These were large settlements the basic function of which was handling and processing raw material.

● The third group is the hardest to detect and was probably the rarest. In regions situated far from primary sources of raw material, some settlements were detected which served as secondary distribution centres of raw material.

● The fourth group comprises settlements which exclusively used final products obtained through exchange for other products such as wheat, pottery, or meat. On occasion, in times of shortage or disrupted supply, the settlers produced certain ad-hoc tools themselves from locally obtainable material. Due to the developed system of exchange in the Early Neolithic, there was a large number of such sites, such as Vörs, Devavanya, Golokut (*Kalicz* et al. *2002, Kaczanowska, Kozłowski 1985*).

● The fifth group consists of settlements which produced enough for their own needs, and neither obtained raw materials and cores and/or blanks from others, nor distributed their own products. Such settlements appear in the Late Neolithic (for example, the Sopot Culture). In some cases, we can demonstrate an independent supply in certain communities, whose members undertook acquisition expeditions to quarries or mines for the raw material they required. Individuals came here from distant settlements situated in regions suitable for early agricultural communities, and returned home with the necessary amounts of raw material, without processing the raw material at its source (except perhaps the basic separation of material of evidently poor quality).

● The sixth group includes settlements which obtained raw material from someone else, while performing the ensuing stages of production themselves – these were settlements which participated in a specific system of exchange (such as Bylany in eastern Czech, Skroszowice, Niemcza, Stráchow – all three in southern Silesia). These sites confirmed the group specialisation of certain settlements for exploitation, preparation, and distribution as early as the second half of the 5th millennium BC.

● The seventh group procured raw material already processed into blanks, and, if necessary, additionally processed these into tools. The existence of the sixth and seventh groups was frequently determined by the type of raw material used, and equally by the skill of specific settlers. In regular settlements, some stages of tool processing were also present, but the concentration of waste material was much smaller. The difference between a settlement and a workshop was observable in the inversely proportional relationship between the number of tools and the amount of waste.

The analysis of the production process has proven the existence of intensive production in all the stages at the sites of Zadubravlje and Slavonski Brod–Galovo. The production of blades and flakes from already prepared cores has been confirmed at Virovitica–Brekinja, Ivandvor, Vinkovci–Zvijezda, Vinkovci–Nama and Vinkovci–Hotel. Traces of production were not found on the sites at Tomašanci– Palača and Šagovina Cernička.

Table I shows the quantity of finds per m^2 on the sites. These figures, although quite significant, might in some cases not reflect the real situation due to the large gaps between objects on certain sites, as well as the lack of data for an accurate estimate of the settlement size. However, they do point to functional differences between the settlements.

On the basis of the structure of the lithic assemblage in the settlements, we can make two different settlement divisions. The assemblages can be divided into groups based on several factors. Firstly, we could determine the type of settlement depending on the structure of the assemblage, *i.e.* the proportion of categories of the '*chaîne operatoire*'. These data have enabled the reconstruction of production stages in certain settlements. Taking them into account, we could assume that the settlements communicated among themselves and supplied each other. Thus we have confirmed that all production phases were

present on certain sites, only some on other sites, and that on some sites stone tools were not produced, but only used.

Types of settlement depending on phases of production between the Sava, Drava and Danube rivers. Production and distribution settlements

Zadubravlje and Galovo

To the sites of Zadubravlje and Slavonski Brod–Galovo, the raw material was transported, and then processed into cores in the settlement. Blades and numerous corticated flakes, even up to 100%, proved that un-manufactured raw material was shaped into cores in the settlements. Pre-cores were not found at Zadubravlje, but the completely corticated debitage indirectly confirmed their presence. Some prepared cores were used for the production of blades and flakes, and some were most probably distributed to other settlements. The assemblage displayed a small quantity of chunk which testified to (i) the skill of the producers and (ii) the quality of the raw material. The two settlements functioned as distribution centres for the raw material, more precisely the silicified limestone that settlers collected in Northern Bosnia, material that comprises 70% of the assemblage. These settlements undoubtedly had numerous other functions, but one of the most important was the production of cores, primarily, blade cores, which were (most probably) collected during periodic expeditions to Northern Bosnia. The settlers were very selective in their choice of raw material. Even though the Sava river-bed was rich in siliceous rocks pebbles and the Ophiolite, and Sava-Vardar zones (*Hrvatović 2006*) were abundant in radiolarite, the primary choice for these people was silicified limestone of excellent chipping quality. The factors for the selection could be various – knowledge of the source, tradition, good chipping quality, distinctive and attractive appearance, suitable size, the possibility of easy exploitation. Besides, they were not tectonised like some other radiolarites in the Ophiolite zone. The River Sava flooded several times a year, and hence the river-bed could not be approached nor the river crossed (*Rubić 1953*). It was assumed that during those periods, between two expeditions, the settlers used raw material they could collect locally, in the river-beds of smaller rivers and brooks, as well as on the surface. The alluvial drifts of the River Sava carried chert and radiolarite pebbles which could be collected on the surface. So far, it has been difficult to establish whether the cores and other products made of river pebbles were also distributed to other settlements, since the raw material appeared very similar and was available from different sites. In the settlements, silicified limestones were manufactured into cores and blades and distributed to the north, west, and east. The range of distribution has yet to be established. So far, we could have established that there was a system of supply, but not the details. What the exact tradable currency was can also not be determined, but, based on analogies, we could suppose that it was wheat, clothes, meat, or other produce. In Hungary, salt was exchanged for stone material (*Bánffy 2004*). Here, it is difficult to make such an assumption, since salt deposits were present in the same regions as the raw material, *i.e.* close at hand. According to the range of their movements, the same people had access to salt and stone material. Control over the sources of these raw materials meant a significant strategic advantage for the communities in the valleys of the rivers Sava and Bosna. Hence the small number of sites discovered in this area is rather surprising. According to the above data and the absolute dating

Percentage of tools in total assemblage on analysed sites	
Sites	**Percentage of tools**
Zadubravlje	7.9%
Virovitica-Brekinja	15.6%
Ivandvor	16.2%
Tomašanci-Palača	29.0%
Šagovina Cernička	38.0%
Slavonski Brod – Galovo	7.3%

Tab. 2. Percentage of tools in total assemblage on analysed sites.

Sites	Excavated area/m²	Number of finds	Distribution of finds/m²
Galovo	200	2746	13.7
Zabubravlje	6200	4276	0.68
Vinkovci Hotel	2100	77	0.03
Vinkovci Nama	2680	37	0.01
Vinkovci Zvijezda	332	60	0.18
Vinkovci Duga Ulica 23	76	2	0.02
Vinkovci Varteks	360	1	0.002
Vinkovci Jugobanka	3660	35	0.009
Cernička Šagovina	50	41	0.82
Ivandvor	8000	896	0.11
Tomašanci Palača	4000	58	0.01
Virovitica Brekinja	5400	255	0.04

Tab. 1. Excavated area and number of chipped stone artefacts per m².

for the region of the Northern Balkans, we could assume that the sites in the valley of the River Sava and what is today Bosnia and Herzegovina were contemporary, and henceforward perhaps even question the direction of Neolithisation of the valley of the River Bosna.

According to current analyses, we could establish that people returned to the Zadubravlje and Galovo sites several times and hence that these were occupied for prolonged periods. Returning to the same place, especially if it was in a good position, near a river or major communication route, was quite frequent among Early Neolithic populations, which also displayed a certain respect for ancestors, *i.e.* avoidance of their potential remains during the erection of new settlements. Locations of settlements, even though they became invisible after being abandoned, (unlike settlements of the tell type), could still be preserved in oral history (*Chapman 1989.39*).

On a number of objects in Galovo, the assemblages could be characterised as workshops. Besides Galovo, this type of assemblage was documented only in Zadubravlje. A workshop assemblage is a term used for assemblages containing more than 500 artefacts in one object (*Balcer 1995.75*), and could refer to material directly linked to the workshop, as well as to material which originated in the workshop, with the pit being its secondary location. The material from the workshop was frequently swept into a pit, which left no evidence of the existence of the workshop on the surface (*Balcer 1995.78*). It seems logical to assume that it was much more practical to place workshops outside and not inside pits. Chips remaining after production in workshops presented a danger both to humans and livestock, because of their sharp edges, and hence were probably removed from the walking surface and deposited in abandoned objects, partially buried objects, or objects dug especially for that purpose. Workshop residue was probably transferred on clothes or animal skins which were spread around during the work (*Balcer 1995.78*). Due to the distribution of the finds inside the object, as well as the structure of the assemblage, it appears more likely that the pits were not locations where production was undertaken, but that the residue from the near-by workshop, which was probably situated on the surface, was swept into it. The sites at Zadubravlje and Slavonski Brod had all the typical characteristics of sites of extensive production. The number of tools in the total assemblage was relatively small (7% and 7.9%, see Table II). Raw material was transferred to the site as extracted from the bedrock, was there manufactured into cores, and then the blades and flakes were chipped off the cores. Some of the prepared cores were stored for later use and prepared for transportation to settlements which were participating in the exchange scheme. The blocks of raw material were of greater size than the commonly found river pebbles, which is visible in the dimensions of the flakes and blade-like flakes, some of which were up to 15cm long. In that first phase of removing corticated debitage, there was a large number of blade-like flakes with cortication which marked the phase in the preparation of cores for chipping off blades. The dimensions of the blades followed the reduction of the cores; hence there were blades of different dimensions. This did not point to irregularities in production, but to the efficient exploitation of the raw material. In the stages when the cores were larger, larger blades were chipped off; as the size of the cores grew smaller, so the size of the blades also diminished. The dimensions of the blades followed the reduction of the cores, but the length-width ratio remained the same. The quantity of cores was also important, with the most numerous being blade cores. Some of the cores were 'exhausted', while some could still be chipped. The latter were probably used as preserved stock by the inhabitants of Galovo and Zadubravlje, or were perhaps cores which, for various reasons, never made it to their end-users. Especially significant were finds of flakes left after the repair of the platform, *i.e.*, rejuvenation of the core, which proves there was extensive production and not only chipping of flakes according to demand. In confirmation of this, there were cores with changed orientation, *i.e.* changed platform, or, in other words, cores on which a new platform was formed after the old one could no longer be used. The cores were carefully prepared, and if they were used for the production of blades, were mostly conical or wedge-shaped. As a local feature, being a result of the raw material used, we could single out 'laminar' cores. Laminar cores were found in Zadubravlje, Galovo and Ivandvor. These were of significantly greater width than thickness, covered with cortication on two sides, with chipping marks visible on lateral sides. Cores of all types were frequently found in the completely exhausted stage, without cortication, especially at sites which we considered not to be production sites, but places where the cores were used several times.

Settlements of partial production

The assemblages of chipped lithic material at the settlements of Ivandvor, Virovitica Brekinja, Vinkovci

Na-Ma, Zvijezda and Hotel displayed different characteristics. There were no pre-cores, and the quantity of corticated flakes and blades was very small. Cores were present, as well as some unworked flakes and blades, and a small number of platform renewal flakes. Already prepared blade cores were arriving from the area around the River Sava or some other areas, depending on the position of the settlement, and the settlers were chipping them off according to need. There was a very small number of corticated flakes and blades, as well as crested blades and blade-like flakes, which meant that the preparation stage was minimally present. From the analogies with Starčevo culture, we could conclude that the cores were not exhausted in one chipping session, but that the settlers chipped off as many blades as needed at a given moment, and stored the core for later use. This means that blades were not 'goods' stored and saved for future use, but cores. Such a practice was made possible by the good quality of the raw material, which was easily chipped off. Virovitica–Brekinja, even though it belonged to this group according to the structure of the assemblage, was not in the system of exchange. The raw material from Virovitica, even though macroscopically similar, was completely different from the raw material found at other sites, and hence Virovitica–Brekinja had to belong to some other system of exchange. The settlers of Virovitica, just like the settlers of other settlements from this group, sometimes prepared cores themselves from locally available raw material. The assumption is that their production was based on regionally available pebbles, but in minimal quantities, according to need. Traces of such production were found in all the settlements from this group. It is important to mention that, even though core preparation was not the primary activity of the inhabitants of these settlements, all the cores, those obtained from exchange and those they made themselves, were very carefully processed and effectively used. The conclusion on the effectiveness of core use was confirmed by the platform renewal flakes.

Consummation settlements

The percentage of tools in the assemblage was highest at settlements from which cores, as well as material linked with the different stages of shaping and knapping cores were almost completely absent, These settlements include the sites at Tomašanci–Palača and Šagovina Cernička. At the Šagovina Cernička not a single core was found, while three were found in Tomašinci. In the assemblages of both settlements, the dominant products were blades. The blades were also the most numerous among tools. The types of tool and the raw material used indicate that these two settlements were typical Starčevo sites situated between the rivers Sava, Danube and Drava.

Communication between settlements

The distances between sites were such that they suggest their mutual accessibility. In some regions, communication could be difficult due to the marshy land, but the settlers were probably familiar with routes by which they could surmount these obstacles. For calculating distances in kilometres (air distance), we used Goggle Earth, which is commonly used for the purpose. The presumed travel time on foot between two sites was calculated from Austro-Hungarian maps outlining the distance in hours between two separate sites, and the passability of specific routes during dry or rainy weather. The sites of Slavonski Brod–Galovo and Zadubravlje were very close to each other, only 15km apart. Ivandvor by Đakovo and Tomašanci–Palača are 7.5km apart, and Ivandvor is 25km away from Slavonski Brod. Šagovina Cernička is situated 55km to the west of Slavonski Brod. The distance between Slavonski Brod and Stari Perkovci is 26km, and from Stari Perkovci to Ivandvor 11.2. Ivandvor and Vinkovci are 30km apart. The easternmost site analysed in this paper was Vinkovci, and the westernmost were Virovitica–Brekinja (NW) and Šagovina Cernička (SW). The distance between any two sites of Starčevo culture was never greater than one day's walk. The settlements in Posavina were 30 to 50km distant from a region with raw material (silicified limestone), which is between a one and two-day walk in one direction. Of course, between these sites there are also sites not addressed here, or possibly not yet discovered, and they can make the maximum distance between the two sites. In some regions the terrain was certainly more difficult for walking, or even impassable, and hence in some areas, despite the relatively small distances, communication was somewhat difficult due to swamps and flooded areas, especially at certain times of the year.

The distances between sites suggest simple and relatively rapid communication. The route from Vinkovci to Mikanovci was dry and passable, but the route through the woods from Mikanovci to Vrpolje was passable only in very dry weather, and the maps did not even specify the distance in hours. It was much easier to travel from Đakovo to Vinkovci than from Vinkovci to Vrpolje. The optimal communication route would thus be: Vinkovci–Ivankovo (2h 45min); Ivankovo–Vođinci (1h 45min); Vođinci–Novi Mika-

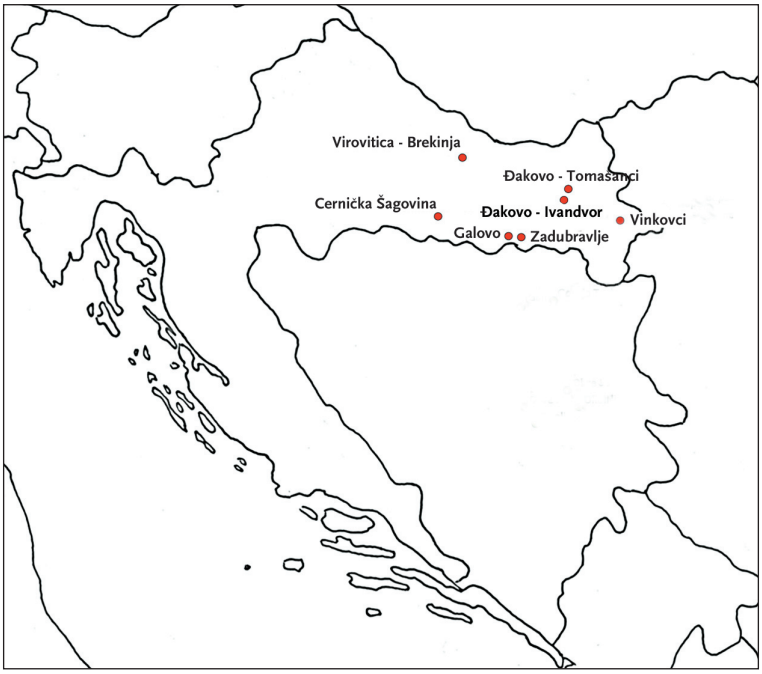


Fig. 1. Map with sites analysed in the paper.

novci (30min); Novi Mikanovci–Đakovo (2h 45min). The walking time from Vinkovci to Đakovo could thus be calculated to 8h 30min, and from Stari Perkovci it would take approximately 9 hours. Half an hour's walk would cover the distance between Stari Perkovci and Čajkovci. From Čajkovci, the two possible routes were to Slavonski Brod or Zadubravlje.

The trip from Brod to Đakovo could have followed one of the following routes: Brod-Bukovlje (1h 45min); Bukovlje-Vranovci (15min); Vranovci-Trnjani (1h); Trnjani-Selna (15min); Selna-Garčin (15min); Garčin-Andrijevci (1h 30min); Andrijevci-Čajkovci (2h). From Brod to Čajkovci was a seven-hour walk, and to Vrpolje an additional 45 minutes. The strategic position of Vrpolje is already evident in this period. On this route, the journey from Vinkovci to Brod could be completed in 16 hours, which is definitely too much for one day, so travelers probably stayed overnight in one of the villages along the route. Andrijevci, Čajkovci, Vrpolje, Perkovci or other settlements in the vicinity of Đakovo could have been ideal travel stops, and were easily accessible both from Galovo and from Zadubravlje. From Čajkovci to Sredanci was a two-hour walk. A half-hour walk would cover the distance between Zadubravlje and Trnjani, and hence the journey from Zadubravlje to Đakovo was significantly shorter than to Brod, while Stari Perkovci could be reached in 5 hours. The sites in Perkovci were situated immediately on the border of the swamp region, at somewhat higher elevations (*Makrović, Botić 2008*), and they could also have belonged to the system of settlements due to their very convenient strategic positions. The absence of sites between Vrpolje and Vinkovci was also the result of thick forests and swamps, and probably due to difficult passability, this area was not even used as a communication route. The transportation of cattle and goods through Posavina, and further towards Banat, was optimal by waterways because of the numerous swamps (*Sić 1975*).

Šagovina Cernička was situated between the highland and lowland regions of Slavonska Posavina. The route from Šagovina to Galovo could be crossed in 15 hours. Other settlements of Starčevo culture were situated along the way, so we could safely assume that it was not necessary to make the journey in one leg, unless absolutely necessary, but in stages with rest stops in between.

After Starčevo culture

During the Late Neolithic in the broader region of Central and Southeastern Europe, the dominant practice was the use of exclusively local resources, while a system of exchange has not been documented (*Kaczanowska, Kozłowski 1997.31*). The transition from good quality raw materials to that of bad quality, and from global to local, can also be followed on Croatian sites. During the period of Starčevo culture, in the regions between the Sava, Drava and Danube the selection of raw material was rather varied, but red silicified limestone was absolutely dominant. There was a well-established exchange system and so-called production settlements, as well as settlements engaged in processing, modifying and using the raw material. The dominant raw material originated from the Ophiolite zone, 30 to 50km to the south of the settlement. Neogenic post-volcanic siliceous sediments have been documented for the whole period of Starčevo culture, but in very small quantities. Only after the disappearance of Starčevo culture from the Balkan Peninsula did this raw material become dominant (together with radiolarites from secondary sources). We could logically presuppose loss of control over sources of raw material. This loss need not have been the consequence of conflicts between populations, but only of changed 'political circumstances'. The assumption is that the

occupants of Starčevo settlements to the north and south of the River Sava were acquainted and considered themselves 'the same'. Vinča and Sopot culture people were undoubtedly 'others' to each other. If there was no immediate demand for the raw materials, and there was none, since enough could be collected in the nearby area, and there was no demand for the selection of raw material as in earlier periods, there was no need for the establishment of an exchange system which would have additional consequences. The Sopot culture people kept away from the mountainous regions, were restricted to the narrow lowland region next to the right bank of the Sava, and perhaps were completely unfamiliar with the existence of that raw material. Sopot culture underwent significant changes. The number of blades decreased, *i.e.* the percentage of blade tools, while the number of end-scrapers increased. Significant changes also occurred regarding the raw material (even though the beginning of these changes was detectable already at the end of Starčevo culture). The red silicified limestones disappear from general use. Instead, river pebbles and neogenic post-volcanic siliceous sediments were used. A break in communication was possible; Sopot culture was present only on the northernmost regions of the right bank of the Sava, and so far there is no evidence of its having spread to southern regions. Thus far, analyses have been conducted only for a small number of the sites, but a significant change is still noticeable in comparison to earlier periods.

Central and Eastern Europe lithic material in the first Neolithic communities compared to Starčevo lithic material between the Sava, Drava and Danube

Raw material procurement

The LBK complex is very well investigated in terms of lithic material and raw material procurement and behaviour, since there has been quite a long tradition of related research. By observing distances from sources to sites, one notes a significant difference between the Eastern and Western complex. While in the Western part, the average distance was 100km, in the Eastern part this was only 40km. These differences reflect the conservatism and social conservatism of the Eastern LBK, as compared to the more open system of complex social networks of the Western LBK (*Kaczanowska 2003.9*). A very popular raw material in the Western complex was Szentgal radiolarite. At some sites, even up to 230km distant from the source, it comprised 50% of the assemblage (*e.g.,* sites at Rosenburg and Strögen), and the same situation has been documented for some sites in Moravia (sites Vedrovice and Kladniky) (*Mateiciucová 2001.289; 2002.186; 2008*). In the later periods of LBK, Szentgal radiolarite was used as a raw material only regionally (*Gronenborn 2003.48*). Many LBK settlements used raw materials from very distant sources and procured them through direct or indirect exchange. The network of multi-directional contacts and indirect exchange was not repeated to the same extent in the periods of the Late Neolithic. Thus the highly developed system of exchange among early agriculturalists of the Danube region was linked to the low level of adaptation of LBK settlements to the various conditions of procurement of siliceous rocks in Central Europe. In other words, this would mean that weak adaptation to exploitation resulted in good adaptation to exchange. Unfortunately, we do not have as much data for Starčevo culture as we have for the LBK, but the available data nevertheless point to some general conclusions. Lithic finds from Starčevo culture *senso stricto* have been documented in Serbia and the Transdanubian region. The most common materials in use by the Starčevo culture in the Transdanubian region were Balkan flint, Szentgal radiolarite, Mecsek radiolarite, Tevel flint and obsidian (*Kaczanowska, Kozłowski 2008*). Flake tools were much more common than blade tools, unlike at Transdanubian LBK sites (*Biró 2005.247*). Raw material analysis of Starčevo culture sites in Serbia has shown significant variations in the use of raw material. At Lepenski Vir, for example, in the early Neolithic horizons, Balkan flint predominated, while in earlier periods, this was not the case, since it comprised only around 3% (*Kozłowski, Kozłowski 1983.267*). At some other sites, like Blagotin, only local raw material was used, regardless of its quality (*Šarić 1999*). Even though variations of chert predominated, there were also significant quantities of quartz and quartzite. Šarić claims that the amount of quartzite might have been larger if adequate attention had been paid to the collection of artefacts made from it (*Šarić 1999*). From the presence of obsidian and Balkan flint, we can conclude that Starčevo culture used raw material from distant sources and in different ratios through direct procurement or exchange (*Tripković 2003.171*). Körös culture displayed similar characteristics. The most popular raw material was Carphatian obsidian, siliceous sediments from the Matra Mountains and white opals, while Balkan flint was in use, but in much smaller quantities. It seems that the system was much more elaborate during the Early than in the Middle Neolithic (*Kaczanowska, Kozłowski 1997; 2008*).

Lithic assemblage composition and core reduction

Carefully prepared cores, especially for blades, were characteristic of early LBK and Körös culture (*Kaczanowska, Kozłowski 2008*). In these systems, the prepared cores were brought to the site, where no more than a few blades were chipped from them, according to need, and the cores themselves stored somewhere in the settlement. The preliminary processing of the raw material (preparation of platform, formation of crest, removal of cortication) took place outside the settlement. Blocs of raw material or cores were brought to the site. We can presuppose the existence of workshops near the source, but a very small number have been documented (*Kaczanowska, Kozłowski 2008; Starnini, Szakmany 1998*). The system presupposed very economical management of the raw material, where hardly anything was discarded and even chips were stored for later use. Blade production was probably done by skilled and specialised workers. This is observable from the straight blade edges, ridges and proportionality. The usage of 'external' raw material undoubtedly influenced the economical use and preservation of cores, artefacts and tools (*Kaczanowska, Kozłowski 2007. 243*). Both in Starčevo and in Körös culture, complete reduction was not done during one episode, but in a process that extended through time and space. Various episodes were interrupted by repairs and renewals, not only of the platform, but also of the bottom and of lateral sides. Cores were discarded only in the final stage of production, when they were completely used up (*Kaczanowska, Kozłowski 2007.243*). On Serbian Starčevo culture sites, such regularities in the preparation and use of cores did not occur. Even though in majority of cases the cores were well prepared, at some sites such as Banja, a lack of precision was noted together with signs of non-economic use (*Odell 1988.257*).

Long blades

Most of the Early Neolithic industries in Central and Eastern Europe can be characterised as blade industries. Transdanubia can be regarded as the single exception to that rule. Where long blades are concerned, the situation is somewhat different; alhough they were characteristic of Early Neolithic, and, according to some, part of the 'Neolithic package' (*Kozłowski, Nowak 2007.107*), long blades were absent from the assemblages of many sites. On the territory of Serbia, both sites with long and average size blades are present. At sites such as Divostin, long blades were completely absent, but Divostin can nevertheless be characterised as a blade industry site (*Tringham* et al. *1988.223; Šarić 1999*).

The existence of long blades, unlike at central Balkan sites, was not common in the Transdanubian Neolithic, nor in neighbouring regions which were not inhabited by the Körös culture (*Bacskay, Siman 1988.126*). The absence of long blades is also characteristic of Croatian sites, with the exception of the find of several fragmented blades at Tomašanci–Palača and Ivandvor.

Balkan flint

One of the most characteristic features of the lithic industries of Early Neolithic complexes was the use of non-local raw material distributed over a wide area (*Kaczanowska, Kozłowski 2008.12*). Among these materials, the most important was so-called 'Balkan flint'. Products made from Balkan flint were found in the region from Tračka valley to the upper flow of the River Tisa (*Kaczanowska, Kozłowski 2008.12*). On the territory covered in this paper, Balkan flint occurred rarely, but was present. So far, only three examples have been found at three sites (Vinkovci Na-Ma, Tomašanci Palača I, Kaznica–Rutak (Fig. 2; assemblage not analysed in this paper). It is worth noting that all these are blades.

Conclusions

During the Starčevo culture period there was a certain change in tool typology. Towards the end of Starčevo culture, the number of end-scrapers and flake tools increased. Larger blades appeared in statistically quite irrelevant quantities, and at a limited number of sites. This was the first significant difference in comparison to the assemblages in other areas of Starčevo culture. The appearance of longer blades was a basic characteristic of Starčevo culture and was linked to specific processes in the advancement of agriculture. These blades, in different numbers, appeared at almost all Starčevo sites. What approach should we employ to explain the lack of longer blades in the Croatian Early Neolithic? Kozłowski and Nowak (*2007*) classify the Early Neolithic long blades under the 'Neolithic package'. The lack of long blades pointed either to an incomplete Neolithic package in the settlements between the three rivers, or to another strategy of tool use. At present, we cannot offer a conclusive answer.

Another important difference between the Starčevo lithic material found in the region between the rivers and the material found in the 'central' region of distribution of Starčevo culture is in the use of raw material, such as Balkan flint and obsidian. The raw materials which on the global level were important not only for Starčevo, culture but for the Early

Neolithic complex in general, are almost completely absent from sites in the interfluvian region. The reasons for this are unknown. However, the presence, even though minute, of obsidian and Balkan flint could be evidence of a need to preserve tradition and maintain links with neighbours. However, it is certain that both raw materials, irrespective of their (non)availability, had symbolic as well as practical meanings for their owners. They were of specific and memorable appearance and could serve as signs of affinity or identity, and as memories or bonds with the 'old country' (*Kaczanowska 2003*). In the context of the Early Neolithic, obsidian could have served as one of the symbols of the new way of life, while the ownership and use of obsidian could have expressed an attitude to novelties and other cultures. At the onset of the Neolithic, obsidian was not simply a tool; it also carried within itself a sign of allegiance, allegiance to the 'agricultural way of life' (*Tripković 2003.122*).

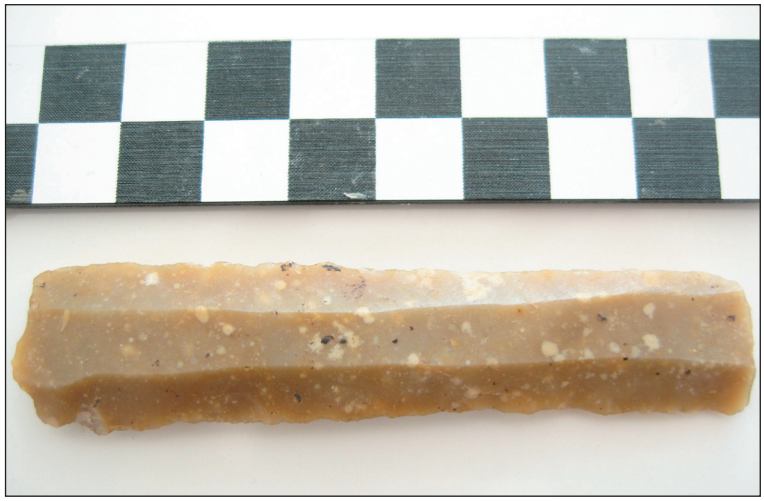


Fig. 2. Balkan flint blade from Kaznica-Rutak

Obtaining raw materials for everyday use was in accordance with familiar models of exploiting raw material in the regions populated by cultural groups of the Early Neolithic. The Starčevo culture settlers in the interfluvian region were very familiar with their surroundings and the resources it offered, and had developed systems for the supply and distribution of raw materials and semi-products. Their selection depended on quality and not availability, and possibly on some other factors which could not be presupposed on the basis of the existing data. The settlers of interfluvian settlements undoubtedly communicated with each other. The reasons for this communication could have been multiple, but the procurement of stone artefacts was among them. The inhabitants of certain settlements obtained raw material, produced blades and cores and distributed them to other settlements. In some settlements, blades were distributed which were later used or additionally processed, and in some other settlements, the distribution pattern was centered on cores which were stored and chipped off according to need. What the core and blade distribution centres received in return is still impossible to determine.

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Late Neolithic cultural elements from the Danube and Carpathian regions of Precucuteni – Trypillia A culture

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ABSTRACT – *The relations of Precucuteni – Trypillia A cultures with the cultures of the Late Neolithic/Early Eneolithic of South-Eastern Europe were primarily determined by two factors: origin and cultural contacts. Ideas about Precucuteni – Trypillia A formation appeared sixty years ago on the basis of typology and stratigraphy. The first part of the twentieth century was marked by numerous investigations of Neolithic cultures in South-Eastern Europe and excavations of Trypillia A sites in Ukraine. First, we present these materials. Precucuteni-Trypillia A complex was a multi-component formation which included components of different Southern and Western components originating from different cultures from the wide Balkan-Carpathian area. At different stages of Trypillia, some directions of contact became more important than others.*

IZVLEČEK – *Odnosi med kulturami Precucuteni – Trypillia A s kulturami poznega neolitika/zgodnjega eneolitika v jugovzhodni Evropi se določajo predvsem na podlagi dveh faktorjev: izvora in kulturnih stikov. Ideje o oblikovanju Precucuteni – Trypillia A so se pojavili pred 60 leti na osnovi tipologije in stratigrafije. Za prvo polovico 20. stoletja so bile značilne številne raziskave neolitskih kultur v jugovzhodni Evropi in izkopavanja najdišč obdobja Trypillia A v Ukrajini. Najprej predstavljamo ta material. Precucuteni – Trypillia A kompleks je večkomponentna formacija, ki vključuje različne južne in zahodne komponente, ki izvirajo iz različnih kultur iz širšega balkansko-karpatskega področja. V različnih stopnjah kulture Trypillia so nekatere smeri kontaktov postale bolj pomembne kot druge.*

KEY WORDS – *Precucuteni – Trypillia A; intercultural relations; pottery; figurines; metallurgy; burnt houses*

Basic concepts of the problems of the origins of Precucuteni – Trypillia A

In archaeology special attention was paid to the origins of Precucuteni – Trypillia A culture, which is still quite controversial. Materials from Precucuteni culture were discovered in 1936 at Izvoare (level 1). Radu Vulpe supposed that the main role in the formation of Precucuteni was played by Bojan-Giuleşti culture, and this event was connected with the area between the Carpathians and the Dneister (Floresti I site) (*Vulpe 1957.111–120*).

Ion Nestor attributed a primary role in the formation of Precucuteni to LBK traditions (*Nestor 1951. 22–23*). Excavations in Carpathian Moldova were of special importance in this problem (Traian-Dealul Viei, Traian-Dealul Fintinilor) in the 1950's. After it Vladimir Dumitrescu divided Precucuteni culture into stages I, II, III, and considered that Precucuteni I appeared as result of a connection of a few cultural components. The main component, he thought, was LBK (Linear Band Pottery) with the participation of Boian-Giuleşti culture; he also mentioned the Hamangia and Bug-Dnister cultures (*Dumitrescu 1963*). Later, he wrote about the assimilation of the BDC (Bug-Dniester Culture) population by Precucuteni III tribes to the East (*Dumitrescu 1973.304*).

Hortensia Dumitrescu supposed the relations of the late LBK with Precucuteni, based on materials from

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Traian-Dealul Fintinilor (*Dumitrescu 1960.36–37*). She considered the figurines at Precucuteni and anthropomorphic reliefs on pottery to have come from Criş culture. At the same time, she wrote that some types of incised decoration and flutes on pottery from Traian-Dealul Viei were similar to decoration on Vinča A and Vinča-Tordoš pottery. This would mean that Precucuteni I appeared in Moldova from the west, from Transylvania, via the Muresh valley. This route and relations with Boian-Giuleşti culture are marked by finds from Tordos and Traian-Dealul Viei of pottery with specific decoration. According to Dumitrescu, such cultures as LBK, Boian, Criş, and Vinča-Tordoš formed a substratum for Precucuteni (*Dumitrescu 1960.38–41*).

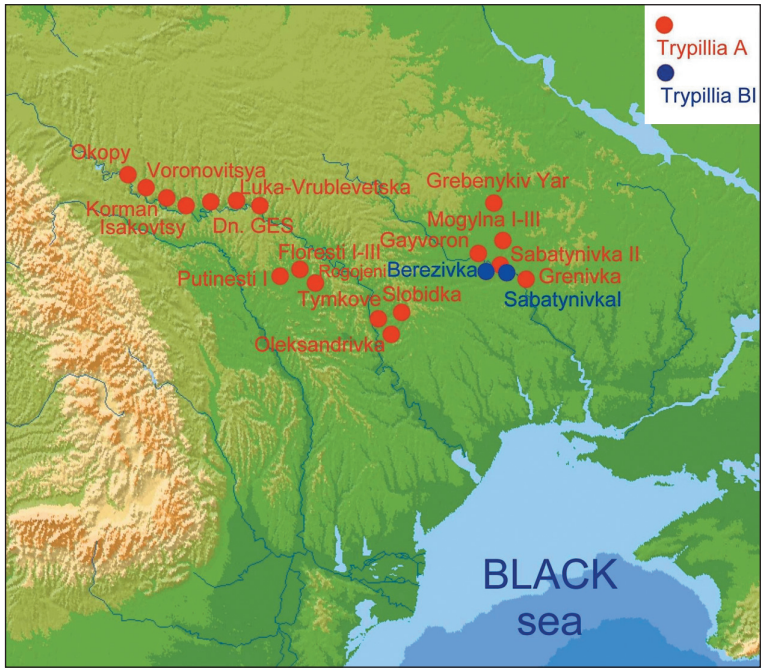


Fig. 1. Sites of Precucuteni-Trypillia A at Moldova and Ukraine.

Eugen Comşa supposed that the main element of Precucuteni formation was Boian culture, which moved north and came into contact with LBK. Later, he wrote that Trypillia A in the East appeared on the basis of the Bug-Dneister culture (*Comşa 1973.20–21*).

According to Silvia Marinescu-Bilcu, Precucuteni I appeared after Boian culture had moved to Moldova and come into contact with the local LBK; some traditions of Vinča, Tordoš, and Hamangia were also assimilated (*Marinescu-Bilcu 1974. 125–126*).

Valentin N. Danilenko suggested that Precucuteni ('Western habitat') and Trypillia A ('Eastern habitat') formations had different geneses. He wrote of the specific 'local Neolithic substratum', which was 'in interaction' with 'South-Danube cultures'. Precucuteni – Trypillia A and Boian, on the one hand and LBK on the other, he supposed, were independent phenomena (*Danilenko 1948.212–213*). In his opinion, the "*...formation of Trypillia ethno-cultural unity, on the one hand, took place on the basis of BDC, and on the other, on a special Balkan-Danube Eneolithic culture which appeared under a progressive Anatolian influence and belonged to the circle of Tordoš-type cultures*." (*Danilenko 1969.224*). Among the cultures which had an influence on Precucuteni – Trypillia A, he mentions Boian, Criş and Hamangia (*Danilenko 1974. 13–18*).

After excavations at Floresti I in 1950s Tatiana S. Passek believed it belonged to Boian culture and considered it the 'missing link' in the problem of the origin of Trypillia culture. She wrote that Boian culture played a major role in this process, but Criş and

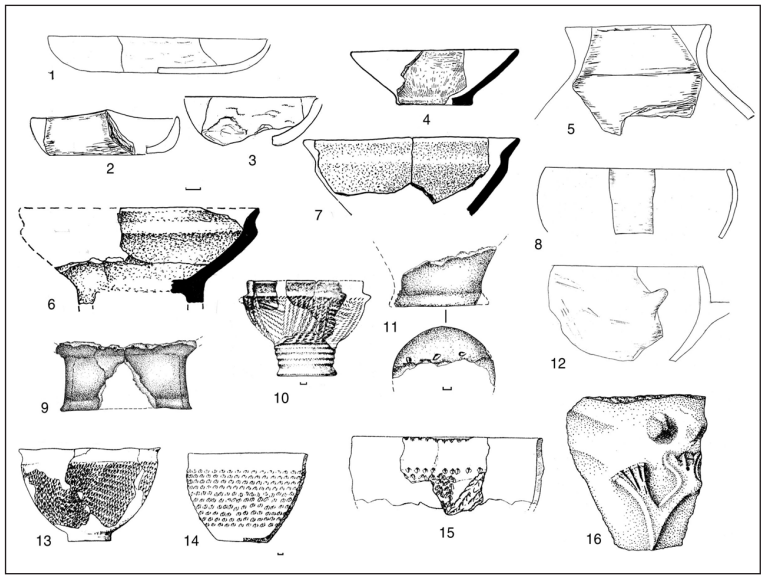


Fig. 2. 'Crude' or 'kitchen' ware of Precucuteni II – Trypillia A sites. 1–9, 11–12 Bernashivka. 10 Voronovitsa (after* Zbenovich 1989*). 13–15 Rogojeni. 16 Floreşti III (after* Bodean 2001*).

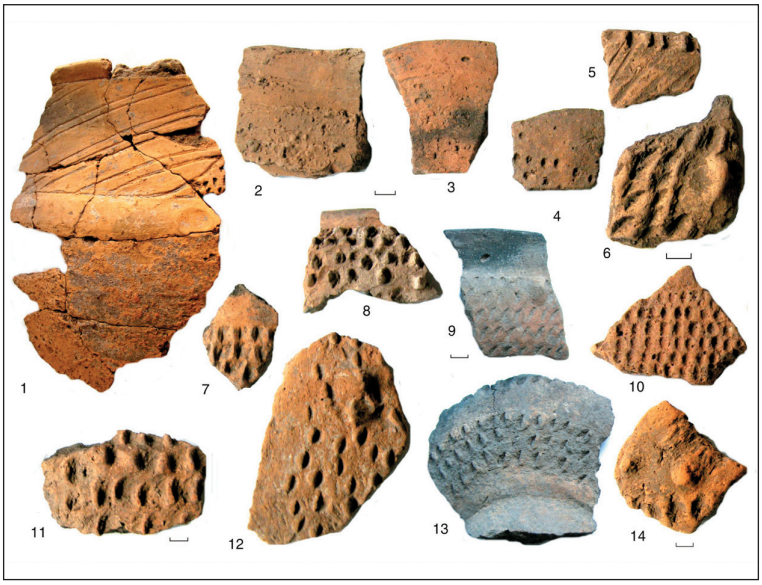


Fig. 3. 'Crude' or 'kitchen' ware of Precucuteni II – III – Trypillia A sites. 1–3, 7–8, 11–12 Bernashivka. 4–6, 10–14 Gayvoron. 9, 13 Grebeniykiv Yar.

Bug-Dnister cultured were also involved (*Passek 1962.17*).

The origins of Precucuteni – Trypilia A are considered by different archaeologists as a synthesis of different cultural traditions. This tradition is presented by several archaeological cultures (LBK, Boyan, Vinča, *etc*.) which existed in the Neolithic in the Danube-Carpathian area. Southeastern Transylvania was the area in which contacts between the above-mentioned cultural traditions were observed, so it was the most probable area in which the earliest Precucuteni – Trypillia A settlements appeared. At the same time, archaeologists focused on different cultures as the most probable ancestors of Precucuteni – Trypillia A (*Sorokin 1992; Burdo 2001a; 2001b*). The most indicative information could have been obtained from the study of pottery from the Precucuteni – Trypillia A sites.

Pottery of Precucuteni – Trypillia A

The most explored sites of the Precucuteni II – Trypillia A in Moldova are Rogozany, Putinesti I, Floresti I and III; and in Ukraine, Bernashivka and Okopy (*Bodean 2001; Tbenovich 1981; 1989*) (Fig. 1). The pottery found at Precucuteni – Trypillia A sites can be divided into two groups: the first – 'crude' or 'kitchen' ware; the second – 'dining pottery'.

The first group – 'crude' or 'kitchen' ware, represents up to 50% of all finds at Floresti I and Bernashivka. This pottery was mainly fired in a reducing atmosphere. Most of the ware is without decoration. There were bowls, bowls on bottoms, pots with cylindrical mouths (Fig. 2.1–9, 11–12), sometimes decorated with sculptural details (Fig. 2.12–16) or pinches (Fig. 2.13–14), and the two combined in different compositions (Fig. 3.7–8, 11, 13), and barbotine (Fig. 3.2–3). Sometimes different kinds of decoration were used on one pot (Figs. 2.10; 3.1; 6; 9; 13–14). This group of pottery looks similar to materials from the Starčevo-Criş horizon.

The second group – 'dining pottery' with different kinds of incised decoration, supplied by white or, sometimes, red incrustation and red painting in different combinations with flutes and punch. Sometimes all or some kinds of decoration are observed on one vessel. The combination of red paint, white incrustation, and the black surface creates an impressive polychrome effect.

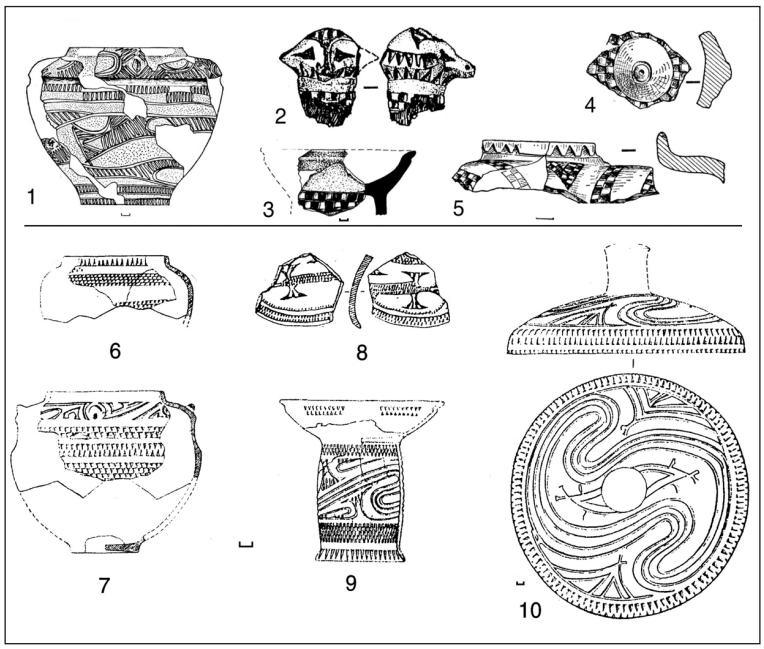


Fig. 4. Pottery with incised decoration from Precucuteni II – Trypillia A sites. 1– 5 Bernashivka (after* Tbenovich 1981*). 7–10 Rogojeni (after* Bodean 2001*).

Vessels with incised decoration comprise up to 10% of the vessels found at Precucuteni II – Trypillia A sites. The main forms with such decorations are fruit vessels (Figs. 4.3, 9; 7.9–10; 9.2), pear-like vessels (Figs. 4,.4–5; 7.11–12; 9.3), lids with large handle (Figs. 4.10; 7.1, 4; 8.2–4, 6). Some elements of incised decoration are present on large pots (Fig. 5).

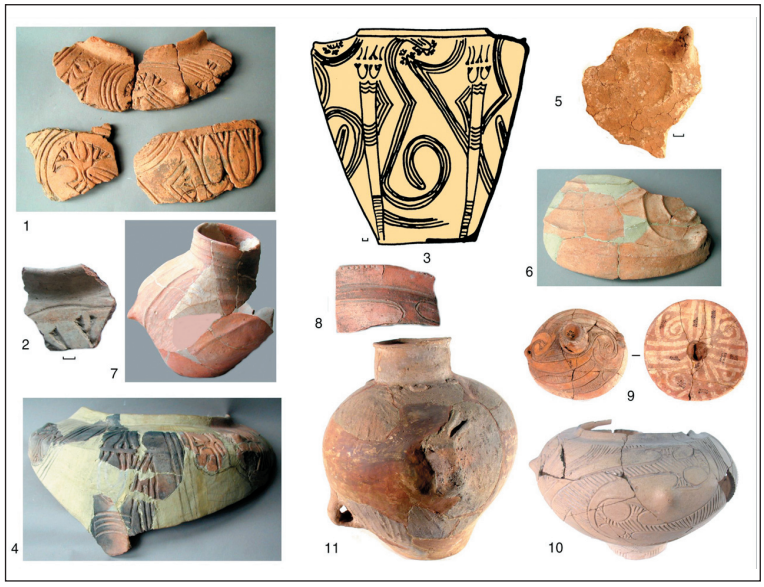


Fig. 5. Pottery from Precucuteni II, III – Trypillia A sites. 1, 3 Slobidka-Zakhidna. 2, 10 Tymkove. 4, 6–9, 11 Oleksandrivka. 5 Bernashivka.

The incised composition, such as sections of lines, circles, ovals (Figs. 6. 3–4; 7.9), zigzags (Figs. 6.5; 7.1, 4), 'chess board' (Figs. 6.6–7, 9, 12; 7. 6), 'wolf's teeth' (Figs. 6.2; 4.5) are usually created with spiral-like lines or ribbons with the imprints of stamp (Figs. 6.2; 4.9). Meander compositions are rare. At the Bernashivka site, a fragment of a vessel with a meander composition is similar to decoration of the Boian-Giuleşti culture (Fig. 6.1) (*Garvan* et al. *2009.67*).

Stylised images of a snake with a body in the form of spiral bands and a head in the form of 'fliers' from the tie-triangles are widely distributed among the incised decoration of Precucuteni II – Trypillia A (Fig. 7.5, 11), but also known from Precucuteni III – Trypillia A sites such as Oleksandrivka (Fig. 5.4), Tymkove (Fig. 5.2–3), Slobidka-Zakhidna (Fig. 5.1). At Bernashivka, a fragment of pottery with a snake image of another type was found (Fig. 8.4).

Similar images of snakes are seen on Boian-Giuleşti pottery (*Comşa 1974.Pl. 16, 9*), as well as double spiral ribbons (*Garvan* et al. *2009.67*).

Various prominent details are characteristic of ceramics with incised ornamentation (Figs. 6.3; 7.8; 4.4). At Bernashivka, a clay head of an animal (possibly from the cover handle) with incised decoration was found (Fig. 4.2). Such handles are known from sites of the Marica, Sava III, and Gradešnica cultures (*Todorova 1986.125, drawing 46, 5*).

At the same time, forms of pottery with incised decoration from Precucuteni II – Trypillia A sites (Bernashivka, Okopy, Floresti, Rogozani) look different from the pottery found at Boian-Giuleşti sites. Only covers with large handles are similar (*Garvan* et al. *2009.66*). Only the technology for creating the ornaments and some elements of decoration, such as the 'chess board', 'wolf's teeth', zig-zag, double-spiral ribbons, and a white incrustation of incised decoration appear common.

Incised decoration and such elements as the 'chess board', 'wolf's teeth', zig-zag, double-spiral ribbons,

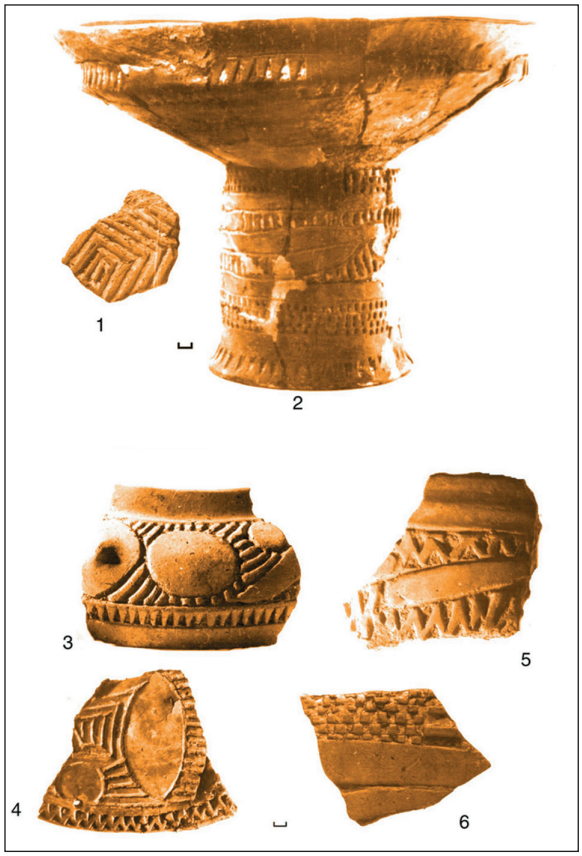


Fig. 6. Pottery with incised decoration from Bernashivka (after* Zbenovich 1981*).

and white incrustation were widespread among such cultures of the Low Danube region as Vadastra, Dudeşti, Sava III, Polanica III, Gradešnica. For example, the fruit-vessels from Precucuteni – Trypillia A are similar to those found at Vadastra and Gradešnica (*Todorova 1986.125*). At the same time, pottery with incised decoration from Precucuteni – Trypillia A has some special features (*Burdo, Kovalyoh 2001– 2002b.155–158*).

Ornamentation with thin lines, usually filled with white paste, typical of Boian-Giuleşti was found mainly at Precucuteni I sites, where the pottery also had Precucuteni and Boian-Giuleşti features.



Fig. 7. Pottery with incised decoration from Bernashivka.

It was also found at Precucuteni II – Trypillia A sites (Fig. 9.5–8, 13–14). Such decoration was typical of pots, fruit-vessels, bowls, pear-like vessels (Fig. 5.10) and covers (Figs. 5, 9). Lines with incrustation are formed by red paint between ribbons (Fig. 5.8). In exceptional cases, the patterns are applied with white paint inside the lid of the pear-like vessel (Figs. 5, 9). Lines form spiral tracks or patterns of circles, and ovals with groups of parallel line segments. There are also vessels ornamented with grids (Figs. 8.7–8; 9.1–2).

The stylised image of a snake is widely seen on pottery from Bernashivka (Fig. 8.2–6) and Okopy (Fig. 8.7–8). Different compositions with stylised images of snakes were typical of Precucuteni – Trypillia A 'dinner' ware (Fig. 5.10).

Vessels with complex ornaments found in Bernashivka (Figs. 4.1; 9.12) and Rogozany (Fig. 4.7) are similar to the pottery of the following cultures: Sava IV (*Todorova 1986.117, Fig. 40, 14*), Kodjadermen-Karanovo-Gumelniţa II (*Todorova 1986.117, Fig. 32. 13*), and Varna (*Todorova 1986.119, Fig. 41.7*).

Pottery decorated with ribbons filled by stamp imprints of different forms (with white incrustation) is typical of Precucuteni II – Trypillia A (Fig. 9.3–4, 9–12). This decoration was used for pear-like vessels (Fig. 9.10–11), covers (Fig. 8.1), bowls, and the bottoms of 'fruit-vessels' (Fig. 9.9). Very often, imprints of stamps formed incised lines and flutes (Fig. 10.2, 9), or lines used in combination with stamps and flutes (Fig. 10.1–4, 9). Such decoration was known at Vinča and Sava (phase Varna), where it was used in combination with flutes. The combination of incised lines, flutes and red paint in one spiral composition was widespread at Precucuteni III – Trypilla A, and at the same time is notable at Boian-Vidra (*Comşa 1974.Pl. 21*).

Pots with cylindrical necks were found at Floresti I, Rogozany and Bernashivka. The top part of these pots was decorated with horizontal flutes (Fig. 10. 3–4); they are similar to pots from Boian-Giuleşti (*Garvan* et al. *2009.65–66*).

Pottery decorated only with flutes was very rare at Precucuteni II – Trypillia A phase and later. There are flutes mainly on the bottom of the vessels, pots, or decorative sculptural elements on the bodies. At Bernashivka, mainly small and rounded pots are decorated in this way (Fig. 10.5). At Precucuteni III – Trypillia A, this decoration occurs on pots (Fig. 10.7), pear-like vessels and jugs (Fig. 10.10), and rounded pots (Fig. 10.8).

This category of pottery, in my opinion, demonstrates the influence of Varna cultural traditions. The use of flutes to decorate pottery is also known from the Sava III – Sava IV sites and Gradešnica (*Todorova 1986.foto 37, 87*).

At Bernashivka (Fig. 5.5), Oleksandrivka (Fig. 5.6) and Grebeniykiv Yar, fragments of large pots decorated with flutes were found. Large vessels covered by wide flutes are known from sites at Sava IV (*To-*

dorova 1986.foto 36) and Kodjadermen-Karanovo-Gumelniţa II (*Todorova 1986.109, drawing 32, 13*).

The bird-like vessels decorated with flutes from Oleksandrivka (Fig. 5.7) look similar to finds from cultures such as Criş, Vinča, Gumelniţa, and Bolgrad-Aldeni.



Fig. 8. Pottery from Precucuteni II – Trypillia A sites. 1–6 Bernashivka. 7–9 Okopy.

Signs of a 'Danube script'

Interesting sort of finds presented by signs, which corresponding with 'Danube script' (*Videiko 2004. 459–460*). Such signs can be seen on covers (Fig. 11.1–3), bottoms (Fig. 11. 4–6, 10) (Fig. 11.10, 12), clay model thrones (Fig. 11.7–8) and figurines (Fig. 11.9). During the first period (phase Trypillya A), a rich collection of signs can be observed on pottery and clay figurines; most are in ornamental compositions, but some are outside. Compositions and signs are mainly curved on the surface of pottery and figurines. Sometimes paint (white or red) was used. It seems that the colour of the paint was also important for understanding signs.

Some signs (cross, groups of parallel lines) were placed outside the ornamental compositions. A unique sign is inscribed on the lower part of a pot from Bernashivka settlement, dated up to 5400– 5300 BC, found during excavations by Zbenovich (*Videiko 2004.460*). It seems that this sign consists of four simple signs similar to the 'ligatures' in the 'Vinča script' (*Merlini 2007*). The single signs on the bottom parts of the pots are similar to signs from Vinča and Gradešnica cultures (*Todorova 1986.208*).

Another linear inscription was found on the clay figurine from Ruseshti Noi (Moldova, excavations by Markevich). A group of 'combs' and parallel lines was placed on the upper part of the figurine. Pogozheva found some fifty-six different signs, such as circles, spiral images, crosses, *etc*. (*Pogozheva 1983. tabl. 7–12*) on the clay figurines of the Trypillya A period (Moldova and Ukraine territory).

Some signs dating from the Trypillya A period (5400/5300–4700/4600BC) were found on pottery and figurines. Most have analogues in the Vinča, LBC, Karanovo, and other cultures (*Merlini 2007. 113–136*). The signs on pottery and figurines were connected with the older tradition of a religious script. The background to this tradition can be found in the Danube region (*Winn 1981; Haarmann 2001*).

Anthropomorphic figurines

Anthropomorphic figurines are typical of Precucuteni – Trypillia A culture from the first phases of development. A large collection of more than sixty statuettes was found in the dwellings of the settlement at Bernashivka. Typically predominant for Precucuteni II – Trypillia A were schematic figurines without decoration and with elaborate steatopygia (Fig. 12.2, 5, 7, 10). Figurines were probably painted, or even painted after firing, as evidenced by traces of white lining on some figures from Bernashivka (Fig. 12.7). Figurines were constructed from two vertical parts (Fig. 12.10). The practice of making figurines from two parts is found at such cultures as Criş, Boyan, Bolgrad-Aldeni, Petreşti, and many other cultures of the Copper Age. No male figurines from Precucuteni II – Trypillia A have been found.

Female figurines depict standing figures, often imitating the pose of birds (ducks). Seated figures (Fig. 12.5) and clay models of chairs are less common (Fig. 11.7–8). Such figurines are similar to those in Criş culture. With rare exceptions, hands are not shown, while heads and faces are modelled schematically (Fig. 12.7). The treatment of heads of Trypillia A figurines have analogies in the plastic art from the Usoe culture (*Todorova, Vaisov 1993.205, drawing 86*), and the Casolt site of Petreşti culture (*Paul 1992.Pl. LI, 4–5*). In Bernashivka, two fragments of



Fig. 9. Pottery from Bernashivka (Precucuteni II).

anthropomorphic figurines with incised decoration were also found. They are larger than the other figurines. One of them represents the upper part of the schematic figurines with well-developed facial features (Fig. 12.4). The bottom part of this figurine was decorated with an incised composition unknown at Precucuteni – Trypillia A. At Bernashivka, several fragments of clay legs likely to have come from tables, altars, or vessels on legs were found. One of these legs – with three toes – probably imitates a bird claw (Fig. 12.1).

Predominantly schematic figurines without decoration and with elaborate steatopygia are typical at Precucuteni III – Trypillia A (Fig. 13.1–2). At the same time, large figurines with incised decoration with white incrustation and red paint (Fig. 13.5) or on a grey ground were found in houses (Fig. 13.6). Stylised snake images can be seen on the abdomens of the female figures (Fig. 13.3, 5). At Oleksandrivka, a fragment of a figurine with realistic facial features was found (Fig. 13.4).

The Precucuteni – Trypillia A figurines have different morphological and stylistic features, although some elements are similar in the cultures of the Neo-Chalcolithic.

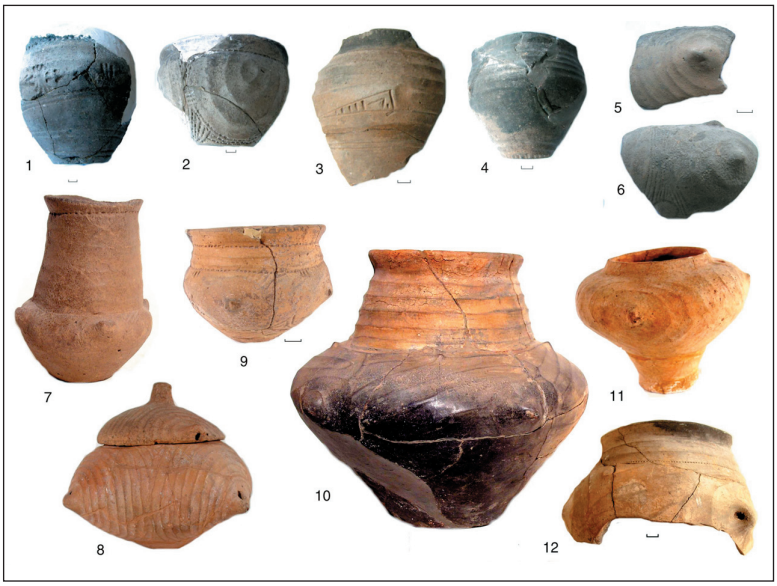


Fig. 10. Pottery, decorated by flutes from Precucuteni II – Trypillia A sites. 1–6, 12 Bernashivka. 7 Gayvoron. 8–9 Oleksandrivka. 10 Sabatynivka II. 11 Tymkove.

Deliberate house-burning

The largest number of Precucuteni – Trypillia A culture sites (nearly 200) are concentrated in the region stretching from the Carpathian Mountains to the South Bug and Dnieper interfluves. Their locations are marked by finds of burnt clay fragments – the remains of dwellings. At the same time, cemeteries of Precucuteni – Trypillia A are unknown.

It must be emphasised that the cultures of LBC, Boian, Criş, Vinča, Hamangia, usually considered as ancestors of Precucuteni culture, are characterized mainly by inhumations, and in some cases, extended burials. It seems that the Precucuteni – Trypillia A culture dwellings in the form of 'platforms' and the absence of burials are interrelated factors. Many archaeologists conclude that Trypilian dwellings were burned and became ritual sites indirectly related to funerals (*Burdo 2003*).

Precucuteni – Trypillia A culture dwellings were reconstructed as houses with a garret or houses with two floors (Fig. 14). The 'platforms' explored during excavations are the remains of the garrets and ceilings of burnt houses. Sometimes these remains show traces of high temperature burning (up to 1000°C or higher), which is clearly seen on samples of pottery from such ob-

jects (Fig. 15.1). Tens of broken pots and other kinds of pottery, figurines, and tools were found during excavations under the remains of such burnt houses (Fig. 16). Burnt houses were found on most of more than 170 Precucuteni – Trypillia A sites (*Burdo 2003a; 2003b*), so this event was probably connected with a sacred cycle (Fig. 17). It seems that traces of the same sacred practice have been found at excavations on sites of some other archaeological cultures in the Danube-Carpathian region.

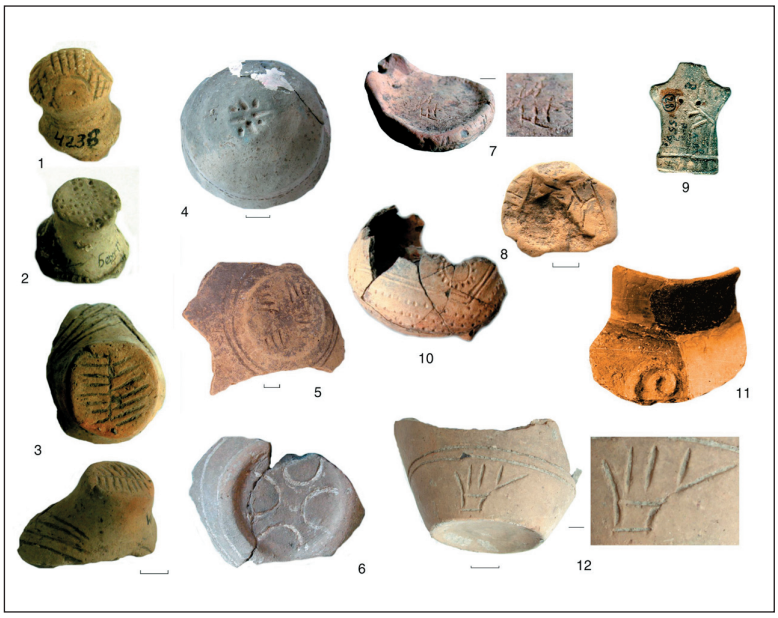


Fig. 11. Signs from Precucuteni II, III – Trypillia A sites. 1–3, 6–7, 12 Bernashivka. 4 Okopy. 5, 11 Oleksandrivka. 8 Mogylna–III. 9 Luka-Vrublevetska. 10 Slobidka-Zakhidna.

The problem of the so-called deliberate house-burning in the Neolithic and Copper Age in Central and Eastern Europe has frequently been discussed (*Tringham 2005*). Chapman believes that burnt houses were a widespread occurrence in the Neolithic and the Copper Age of Central and Eastern Europe. He reviewed the various 'popular' explanations of these events and considered that the most realistic explanation was that they were ceremonial (see *Raczky 1982–83; Stevanović 1997; Chapman 1999*).

According to Tringham, the earliest examples of house burning were connected with the late stages of Starčevo-Criş and the Early Neolithic in Bulgaria, and later at Vinča-Tordoš, Szakhalkat, Tisza, Boian, Gumelniţa, Vinča-Pločnik, Krivodol, in the Middle, Late Neolithic and Eneolithic of Bulgaria, and all phases of Precucuteni-Cucuteni – Trypillia (*Tringham 2005.102*).

Iuliu Paul supposed that this tradition of deliberate house-burning of Cucuteni culture came from Petreşti culture. As we know, the beginning of Petreşti culture (Petreşti A stage) corresponds with Precucuteni I and II (*Paul 1992.31*). On the other hand, Gheorghe Lazarovici considered that the large houses with clay floors of Petreşti culture show a Vinča C influence, and he noted that houses with a wooden platform and thick layer of clay appeared only in the Petreşti A2 stage (*Lazarovici and Lazarovici 2007.402*).

The closest analogues to the Precucuteni – Trypillia A situation – with burnt houses and rich finds in the remains of dwellings – are the Banat culture in Parta (*Lazarovici and Lazarovici 2006.235–291*), the Tisza culture in Herpaly (*Kalicz, Raczky 1987.110*), in Gorzsa (*Horvath 1987*), the Vinča cultural group of Balta-Sarata, Bucovat, Dudeşti-Vinča culture, Vadastra culture (*Lazarovici and Lazarovici 2006. 172–178, 382, 398– 399, 512–514*), from Obre II (*Gimbutas 1991.60*), and Boian-Spancov culture in Radovanu (*Comşa 1974. 159–164*). Such remains were also typical of Bolgrad-Aldeni sites (*Dragomir 1983*).

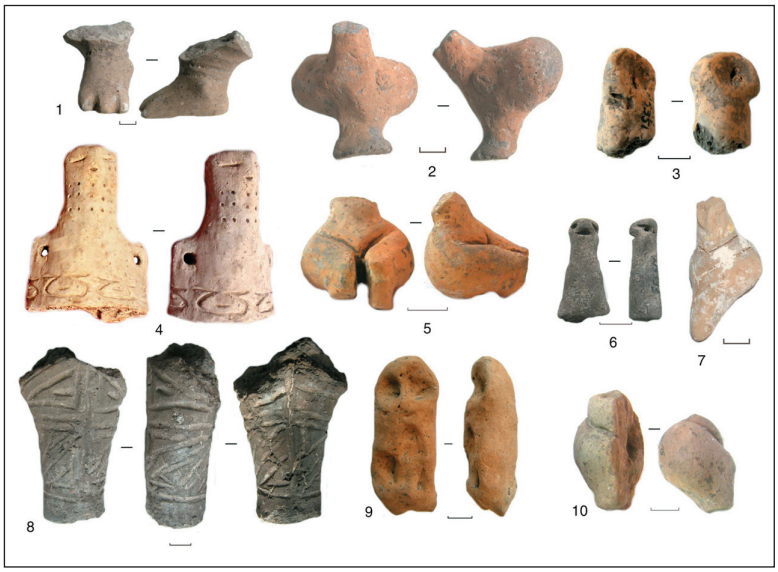


Fig. 12. Figurines from Bernashivka (Precucuteni II).

But I believe that few of these analogues are connected with the origin of the house-burning tradition of Precucuteni – Trypillia A, since they are either contemporary or later. The most probable assumption is that this custom was associated with the traditions of the chronological horizon of the Early Neolithic in Europe, as represented by such cultures as Starčevo, Criş and Karanovo I; for example: the remains of the burned house at the Kovačevo site in South-western Bulgaria (*Lichardus-Itten* et al. *2002. 108–110*), the burnt clay constructions at the Muldava tell (Karanovo I) (*Gimbutas 1991.30*), and houses burnt at Criş culture settlements in Romania (*Lazarovici, Lazarovici 2006.77–100*).

The tradition of deliberate burning appeared in the Precucuteni – Trypillia A stage. It continued later in the Cucuteni – Trypillia culture for more than 1500 years. Most of more than 4000 settlements of this culture were burnt in a similar way.

Metallurgy and metalwork at Precucuteni – Trypillia A

Relations with other regions were important for the development of Precucuteni – Trypillia A metallurgy and metalwork. The first finds of copper objects date from excavations at Bernashivka (*Chernovol* et al. *2009.464*) and Okopy (Fig. 18.8) (*Zbenovich* 1989. 74). Both sites are dated to the Precucuteni II stage.

The small copper awl discovered at Okopy was studied by Nataliia Ryndina; it was made from native copper, with some natural admixture of silver. The same copper was used for making the awl found at Luka-Ustinska and the copper strip from Gaivoron (both sites – Precucuteni III phase). This type of copper is typical of Transylvania and differs from the copper from Marica – Karanovo V.

Ryndina writes that the chemistry of the copper objects from Okopy and other Precucuteni – Trypillia A sites is the same as that of the copper objects found at Starčevo-Criş sites. She also assumes that the tradition of processing native copper at Precucuteni – Trypillia A culture appeared under the influence of Tordoš culture, which was connected with Starčevo-Criş cultural complex (*Ryndina 1998.37*). The first stage of the development of Precucuteni – Trypillia A culture metalwork, which is represented by the copper awl found at Okopy, is characterised by primitive skills and represented "*the first steps in working in metal*" (*Ryndina 1998.32–36*).

A Trypillian centre metalwork centre begins to form at the Precucuteni III – Trypillia A stage. This period is characterised by further developments in knowledge and technology. The copper ware demonstrates a close relationship with copper objects from Kodjadermen-Karanovo VI.

Ryndina singles out a special centre of metalworking for Precucuteni – Trypillia A – Trypillia BI – Cucuteni A. It was in the Dniester River basin and Dniester-Bug interflow. The development of this centre was connected with raw materials in Thrace and North Transylvania, and led to the export of large quantities of copper objects (*Ryndina 1998.32–38*).

Ryndina collected information on over 600 copper objects found at Precucuteni – Trypillia A sites (Fig. 18.1–7). The biggest batch – 444 items – was found at Moldova ('Karbuna Hoard'), which was published by Valentin Dergachev (*Dergachev 1998*).

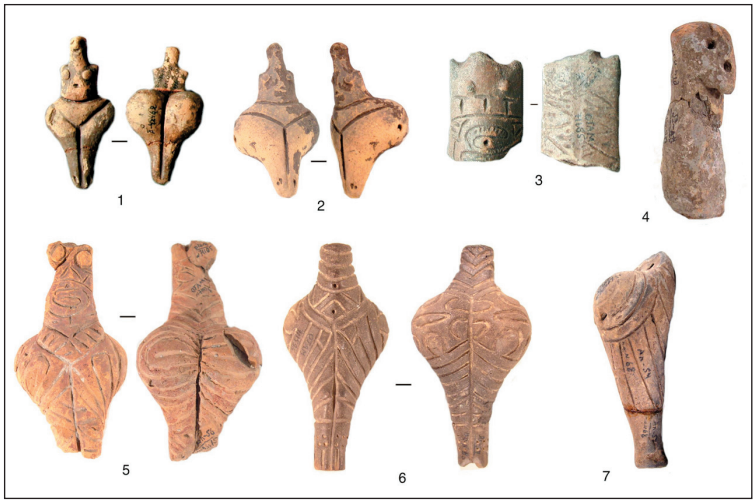


Fig. 13. Figurines from from Oleksandrivka (Precucuteni III).

The pottery from the Karbuna site is similar to finds from Oleksandrivka, which date to Precucuteni III – Trypillia A, and not to the transition to Cucuteni A1–A2, as Ryndina (*1998. 127*) supposes.

The copper axe from Karbuna (Fig. 18.6) is of the Pločnik type, which resembles a copy of axes from Vinča and Tordoš cultures. At the same time, the technology of this object studied by Ryndina is different: the axe was forged at a temperature of 900–1000° C, and a special hole punch technology. All these suggest a local production.

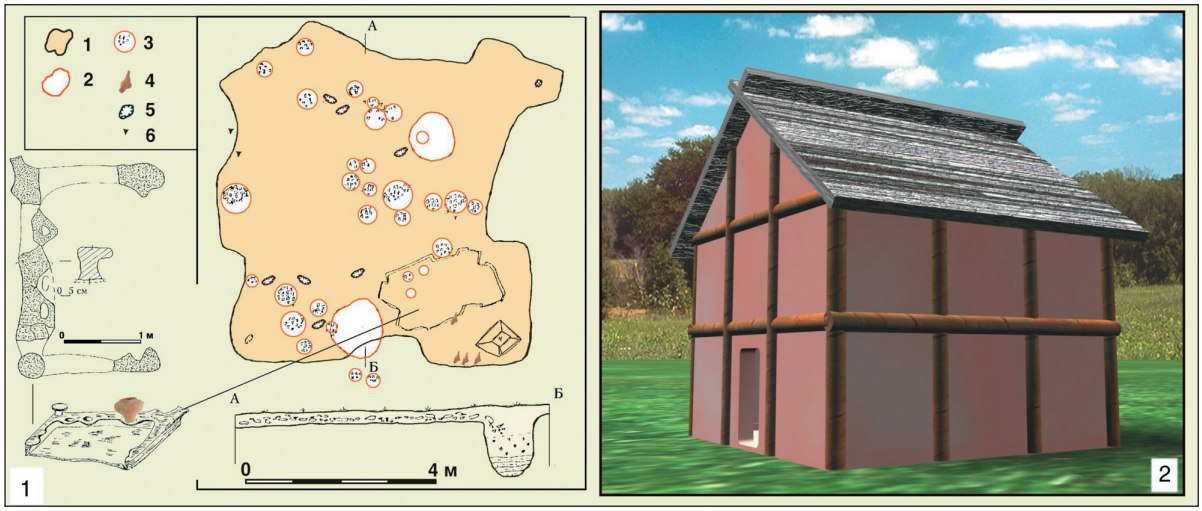


Fig. 14. Dwelling from Tymkove. 1 plan (1 burnt clay, 2 pit, 3 pottery, 4 figurines, 5 stones, 6 stone tools). 2 reconstruction, based on excavations.

The flat axe from Karbuna (Fig. 18.7) is similar to such tools from Kodjadermen-Karanovo VI. The chisel from Oleksandrivka (Fig. 18.9) also has prototypes in the Kodjadermen-Karanovo VI and Varna cultures, but employs a different technology: it was made from two pieces of copper, rather than a single moulded prefabricate, which is typical of the cultures mentioned above (*Ryndina 1998. 129–131*).

The copper anthropomorphic and disc-like plates (Fig. 18.1–3, 5) specific to Precucuteni – Trypillia A and Cucuteni A1 – Trypillia BI (*Dergachev 1998. 21–22*), and also known from Oleksandrivka (Fig. 18.10c) and Rusesti Noi, are very interesting. The typology and raw material of the Precucuteni – Trypillia A copper objects on the one hand correspond to Karanovo-Gumelnița and Varna, and Transylvanian metalworking traditions. On the other hand, this does exclude the identity and full independence of the development of the Precucuteni – Trypillia A centre of metallurgy and metalwork. Traces of it have been found in several places – Oleksandrivka, Vytylivka, Luka–Vrublevetska, Rusesti–Noi, and some others (*Ryndina 1998.127–129, 134–135*). Ryndima supposes that knowledge of metallurgy and metalwork came to Precucuteni – Trypillia A directly with a tribal group which took part in the creation of Precucuteni – Trypillia A culture (*Ryndina 1971.98–99*).

Direction of communication and contact zones

Only a few sites of phase Precucuteni I – Trypillia A are known in the south and south-east of Transylvania. The settlements of the Precucuteni II – Trypillia A phase were located to the east of the Carpathians and the Dniester River basin. According to Gheorghe Lazarovici, all the ceramic finds with incised ornamentation referred to Precucuteni I–II, outside south-east Transylvania, is an import at sites of the other cultures (*Lazarovici and Lazarovici 2007.399*). These finds mark the direction of relationships with the Vinča Culture and relate to cultural groups in Transylvania, Banat, and Oltenia.

Near the region of the Precucuteni formation in south-east Transylvania, in present-day Romania, the Vinča culture had spread to Banat, West Oltenia, South Transylvania, and Crisana.

Lazarovici noted significant migrations during the periods of Vinča A1–A3 and C1, C2 from areas of Macedonia to south-western Transylvania. The ex-



Fig. 15. Pottery from Oleksandrivka with traces of burning up to 1000°C.

pansion of Vinča B2–C was a result of the emergence in the Banat and Transylvania of a variety of new cultural groups genetically related to the culture of Vinča. The emergence of such cultures, such as Vadastra, Gradešnica, and Petreşti in the Banat and Transylvania probably related to the same processes. Lazarovici suggests that this was connected with some 'southern elements' and Lumea Noua culture. Excavations at settlements in the Banat region prove the southern origin and dating of this group (*Lazarovici and Lazarovici 2007.401*).

Thus, the emergence of Precucuteni culture in southeast Transylvania can be seen as a result of complex migration processes and the interactions between communities of different cultures and cultural groups in the Carpathian-Danube region in the Neolithic (*Lazarovici, Lazarovici and Ţurcanu 2009*).

Transylvania is a region rich in natural resources, with good lines of communication along the valleys of large rivers such as the Tisza and Mures and their tributaries. This led to the existence in this region of a contact zone between the Middle and Lower Danube, the Carpathians and the Balkans during the Neo-Chalcolithic period. Cultural diversity and the relative overpopulation of Transylvania were the probable reasons that the new emerging culture Precucuteni II – Trypillia A culture shifted outside of Transylvania and occupied territory to east of the Carpathians (from Carpathian Moldova to the Dniester).

Certain features of the chronological horizon of Starčevo-Criş-Karanovo are clearly visible in the Precucuteni – Trypillia A materials. This phenomenon demonstrates the stability and conservatism of the ancient traditions. They could be obtained by Precucuteni – Trypillia A only as a heritage of cultures from the chronological horizon of Karanovo IV, preceding the formation of Precucuteni – Trypillia A (*Comşa 1962; Burdo 2005; Burdo, Kovalyoh 1998*).

In southeastern Transylvania there are sites at which the ceramic complex is distinctly mixed. Here we can see some features typical of Precucuteni and Bojan cultures. Such settlements as St. Gheorghe, Bancu, Eresteghin, and Eugen Comşa refer to Boian-Giuleşti (*Comşa 1974.33–35*), but Silvia Marinescu-Bilcu refers to Precucuteni I (*Marinescu-Bilcu 1974*). In the ceramic complex of Bernashivka (Precucuteni II – Trypillia A), specific items associated with Boian culture are rare (some kinds of incised ornamentation). But at the same time, pottery from many cultures has been found in the lower Danube: Vadastra, Dudeşti, Polanica, Sava. In these cultures, the forms of vessels with incised ornamentation and typical ornamental compositions of Precucuteni II – Trypillia A are similar. This suggests that Precucuteni II – Trypillia A culture can be attributed to a chronological horizon of cultures on both banks of the Lower Danube corresponding to Karanovo IV–V.

The appearance of Precucuteni II – Trypillia A culture in the region between the Carpathians and the Dniester can be considered as the spread of Bojan cultural traditions to the north-east across Transylvania. The features of the cultures on the right bank of the Lower Danube could have arisen in the ceramic complex of Precucuteni II – Trypillia A as a result of population movements along the rivers flowing into the Danube – the Olt, Siret and Prut.

Vladimir Slavchev suggests communication in a north-south direction between Precucuteni II – Trypillia A and Sava III cultures and Hamangia III (*Slavchev 2005.39–54*). He identifies a number of similar shapes and ornamental motifs in the ceramic complexes of Precucuteni III – Trypillia A, Sava IV, and Hamangia IV cultures. Slavchev (*1997.1–14*) suggests

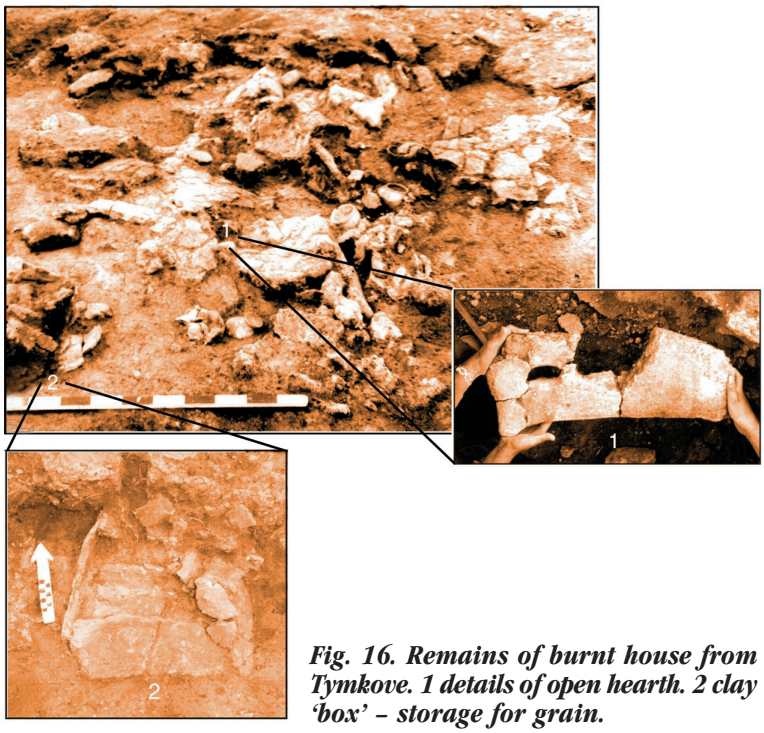


Fig. 16. Remains of burnt house from Tymkove. 1 details of open hearth. 2 clay 'box' – storage for grain.

that contacts between the populations of Precucuteni II – Trypillia A culture and Sava III culture and Hamangia III culture could have travelled along waterways.

In the west-east direction, contacts could have been made along the Tisza and Mures. Direct contact between Precucuteni II – Trypillia A communities with those of central Transylvania are indicated by finds of copper objects made from Transylvanian raw materials. Thracian copper probably becomes more significant from the Precucuteni III – Trypillia phase.



Fig. 17. 3D reconstruction of settlement burning (Oleksandrivka).

Later, the territory of Precucuteni III – Trypillia A expands to the north and south and especially east, to the watershed of the Southern Bug and Dnieper. During this period, we can observe interconnections between the communities of Precucuteni III – Trypillia A and Hamangia IV, Sava IV, Polyanitza IV, and Gradešnica cultures. The similarity of copper products from Precucuteni III – A Trypillia to copper items of the Karanovo VI culture complex suggests the partial synchrony of Precucuteni III – Trypillia A and Karanovo VI. This synchronisation is supported by finds of copper products originating from regions in Northern Thrace and decorations from spondilus that comprise the Karbuna treasure. However, the same hoard contained copper objects, which shows the continuity of contacts with Central Transylvania.

There is much evidence of direct links between Precucuteni III – Trypillia A and the cultural groups of Bolgrad-Aldeni II. Among the imported items at the Precucuteni III – Trypillia A settlements, especially in the southern zone, there are fragments of pottery and anthropomorphic figurines (Fig. 13.7) and flint from Dobrudja.

Among the common Precucuteni III – Trypillia A and Bolgrad – Aldeni II types of pottery are large jars with asymmetrical handles (Fig. 5. 11), ornithomorphic vessels (Fig. 5.7), pots with fluted necks, bowls with double conical projections, ladles, and censers. The lower regions of the Siret and Prut rivers were probably the contact area between the populations of the Precucuteni III – Trypillia A, Hamangia IV cultures, and later with the Karanovo-Kodjadermen-Gumelniţa cultural complex.

Pottery from the 7th level of the Durankulak settlement (Hamangia IV Culture) demonstrates forms and decoration similar to Precucuteni III – Trypillia A (*Slavchev 1997*). On other hand, there is a visible influence of Vinča culture. This means that some si-

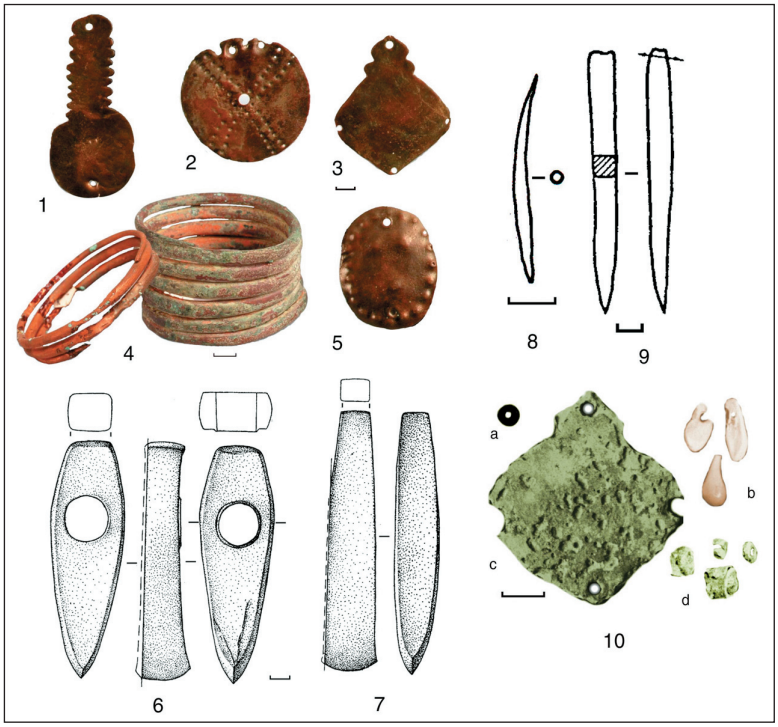


Fig. 18. Copper objects from Precucuteni II, III – Trypillia A sites. 1–7 Karbuna (after* Lazarovici C.-M., Lazarovici G.-C., Turcanu S. 2009; Dergachev 1998*). 8 Okopy. 9 Oleksandrivka (after* Ryndina 1998*). 10 Oleksandrivka (a jet (?) bead, b bone pendants, c copper pendant, d copper beads).

milarities between Hamangia IV and Precucuteni – Trypillia were possibly connected with Vinča traditions. Some vessels from Precucuteni phases II and III are very similar to the pottery of the Sava III and IV complexes. The relations between these cultures (copper, spondilus) were perhaps accomplished through the mediation of Bolgrad-Aldeni II and Hamangia IV.

The final sites of Trypillia A on the Upper Dneister, contemporary with the beginning of Cucuteni A1, also demonstrate relations with Carpathian traditions (*Burdo 2001a; 2001b*).

It should been noted that many of the features of the ceramic complex from phases II and III of Precucuteni – Trypillia A are common to such cultures as Boian, Gradešnica, Vedastra, Sava, Hamandgia (from latest phases), Bolgrad-Aldeni and Vinča (from the earliest phases). We can assume that this was due to the Vinča culture, which was involved in the genesis of many cultures and cultural groups of the Carpathian-Balkan-Danube region. Precucuteni – Trypillia A culture had intensive contacts with many cultures to the west and south, as is fully reflected in local cultural traditions.

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The 'disappearance' of Trypillia culture

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ABSTRACT – *The Trypillia-Cucuteni cultural complex over a period of almost 2000 years was an outstanding phenomenon east of the Carpathians, but it fell into decay. The Late period of Trypillia culture dates back to 3200–2700 BC and is represented by a few local types or so-called 'post-Trypillia cultures', all located in regions with different natural conditions and resources, from forest to steppe zones. Local features displayed different trends of change in the economy and material culture and also in social structures. The most conservative were groups with the highest development of social organisation and economy based on a division of labour, with proto-cities, as 'points of rest'. On the borders of Trypillia culture, intercultural relations took on a special significance and led to changes in material culture and economy that materialised as a process of 'disappearence'. It seems that these changes had a common point of departure – changes in the environment since 3200 BC.*

IZVLEČEK – *Kulturni kompleks Trypillia-Cucuteni je predstavljal izjemen fenomen vzhodno od Karpatov v časovnem razponu več kot 2000 let, vendar je razpadel. Pozno obdobje kulture Trypillia datira v čas 3200–2700 pr.n.št. in je predstavljeno v obliki lokalnih tipov t.i. 'kultur po-Trypillia', ki so locirane na področjih z različnimi naravnimi pogoji in viri, od gozda do stepe. Lokalne posebnosti kažejo različne trende sprememb v gospodarstvu in v materialni kulturi, pa tudi v družbenih strukturah. Najbolj konservativne so bile skupine z najviše razvito družbeno organizacijo in gospodarstvom, ki je temeljilo na delitvi dela, s proto-mesti kot 'točkami počitka'. Na mejah kulture Trypillia so medkulturne povezave dobile poseben pomen in so privedle do sprememb v materialni kulturi in gospodarstvu, ki se je materializiral kot proces 'izginotja'. Zdi se, da so imele te spremembe skupno izvorno točko – in sicer spremembe v okolju okoli leta 3200 pr.n.št.*

KEY WORDS – *Trypillia-Cucuteni; intercultural relations; east of the Carpathians*

What came before

Before the beginning of the changes in the second half of 4th millenium BC Trypillia culture consisted of several local types with different structures (Figs. 1 and 2). It was a period in which large settlements flourished. Researchers are now aware of the existence of almost 200 Trypillian settlements with an area of over 10ha, and with the help of a magnetic survey and aerial photographs, the development of almost forty of them have been ascertained (*Videiko 2007.251–276*). They are known not only in the interfluve of the Southern Bug and the Dnieper, but also between the Bug and the Dnister; even in Moldova a few dozen such settlements were even found in Moldova (Fig. 4). As a special phenomenon, large settlements existed from the second half of the 5th millennium until the first half of the 3rd millennium BC, *i.e.* for more than one and a half thousand years. Thus we are dealing not with some accidental episode, but a phenomenon in the history of this part of Europe, which deserves thorough research.

The largest of them is situated between the villages of Talyanky and Lehedzine; its area is almost 400ha. A magnetic survey showed the housing development on the basis of the same plan and more than two thousand dwellings. Excavations also confirmed the simultaneous existence of the settlement, which was about 3.5km across and was settled at one time

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(*Krutz 2008. 42–49*). Another large settlement existed *c.* 4000–3900 BC near the village of Nebelivka on a square of up to 300ha (*Chapman* et al. *2010*).



Fig. 1. Trypillia and Cucuteni cultures before 'disappearing'. ❍ ***large sites (proto-cities).***

Strictly speaking, according to the example of these mega-sites – proto-cities – we can observe the initial stages of the process of urbanisation with all its contradictions, and positive and negative consequences. Solving the economic and social problems which they faced, Trypillian society created quite a complex hierarchical organisation, now designated as chiefdom. This very sophisticated organisation made it possible to solve problems in one way or another – from the distribution of land between separate families and clans, to assuring the protection of tribal territories and trade at a great distance.

The division of labour led to the flourishing of handicrafts, which is especially noticeable in pottery. The realistic 'portrait' statuettes give rise to reflections on the development of art. A ramified and large-scale system of exchange of raw materials and of metal and flint products was created (the annual requirement of one super-settlement for flint inserts for sickles constituted a few tons, and deliveries came from the Volhynia region, hundreds of kilometres away).

A huge settlement with a few thousand residents could muster a few hundred or even a thousand warriors for its defence. Such a powerful (for that time, and well-armed – including 'the most advanced' copper weapons) military contingent was quite sufficient to discourage neighbours who did not have such a 'mobilised resource' from raising territorial and property claims. On the other hand, the concentration of the population in proto-cities led to the appearance of previously unknown (or almost unknown) problems with ecology, exhaustion of natural resources, deterioration in the quality of life. In principle, by their example we can observe practically the first display of the permanent ecological crisis caused by humans.

Sooner or later, all civilisations are relegated to oblivion and become part of history forever. It happens in different ways, but usually this process in ancient times is described as an invasion of cruel barbarians whose hordes burn and reduce to dust and ashes flourishing oases and towns. It is understood that there are such views concerning the epoch when the civilisation of 'Old Europe' disappeared. Bellicose nomads from the Pontic steppes have been identified as the aggressors by some scientists. However, these terrors, as it turned out, have almost nothing to do with what really happened. Thanks to research conducted by representatives of different sciences – from paleo-geographers to archaeologists – an overall picture of events on the continent more than forty-five centuries ago is now available.

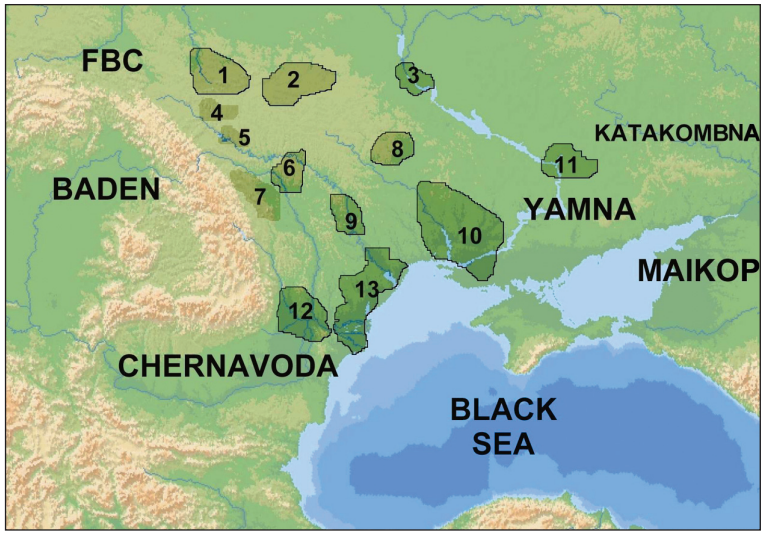


Fig. 2. Trypillia in the process of 'disappearing'. Local groups and 'post-Trypillia' cultures. 1 Khoriv and Lozy. 2 Troyaniv and Gorodsk. 3 Sofiivka. 4 Kasperivtsi. 5 Zhvanets. 6 Gordineshti. 7 Erbiceni. 8 Kosenivka. 9 Vykhvatincy. 10 Serezliivska. 11 Zhyvotylivska. 12 Foltesti. 13 Usatove.

Three modes of development

If one looks closer at the diversity of variants of the Trypillian culture after 3400–3200 BC, one can see that different groups of the population overcame a crisis in a different way (Figs. 2 and 3). So, we can speak of a few 'anti-crisis programmes' implemented in ancient times by the Trypillians, who were striving desperately to survive. Not all these programmes appear to have been 100% successful (a success rate one cannot expect even now), but perhaps thanks to them, the Trypillian world survived for another 500–600 years.

In the interfluves of the Southern Bug and Dnieper, proto-cities existed for another half millennium or perhaps even more – the latest of them is dated to about 2750 BC: Olkhovets, an area of almost 180ha (Fig. 6). Other large settlements with painted pottery existed at Kosenivka (near 120ha), Apolyanka (90–100ha), Sharyn (30ha), and other places. All of them parts of the local Kosenivka group, which appeared at the end of the Trypillia CI stage *c.* 3500–3200 BC and existed during stage CII. In the area between the Dnister and the Carpathians communities survived which continued the previous way of life. Their security was based on small fortified settlements located in out-of-the-way places.

Perhaps complexity and the power of the social organisation worked here; reserves of food created by powerful chiefs for 'the black day' appear to have been very useful; they allowed people not only to survive, but also to resist the raids of their hungry neighbours. Groups of warriors (well-fed and organised and also numerous) managed to defend the harvest in the fields. In any case, the residents of the proto-cities in the Cherkassy region continued to make painted pottery and perform a rite of abandoning settlements, which was accompanied with an immense sacrificial fire until the end of their existence.

Near the borders of this group there were other groups which used some Trypillia culture pottery and also made figurines. They are known from the graves under burial mounds, and were divided into a few local groups: Serezliivka, Zhyvotylivska (Fig. 2). They occupied the river valleys of Southern Bur and Dnipro in the Steppe zone (*Dergachov 2004. 109–111*).

Nomads appeared in the Steppe zone in those hard times, not without the help of the Trypillians. In the Usatove culture which was spread in the steppes mainly between the Dnister and the Danube their presence is rather noticeable. A considerable quanti-

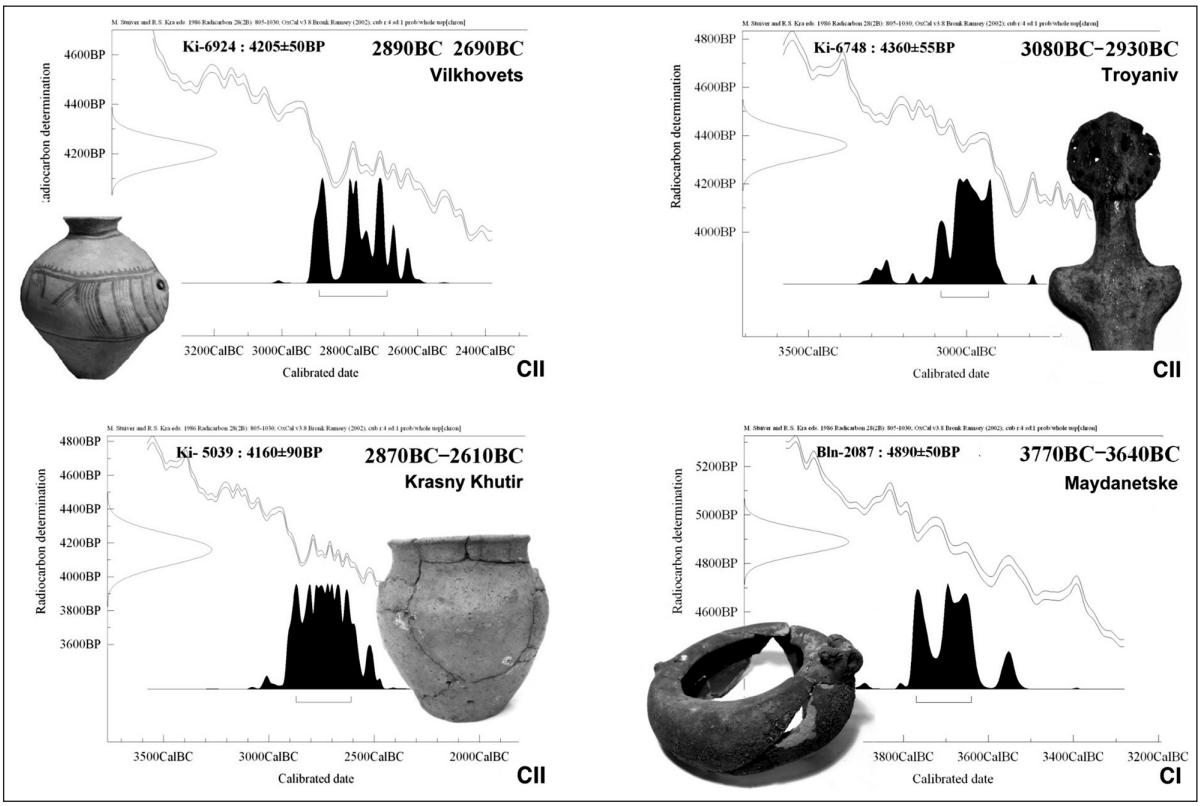


Fig. 3. Chronology of Trypillia culture – stages CI and CII.

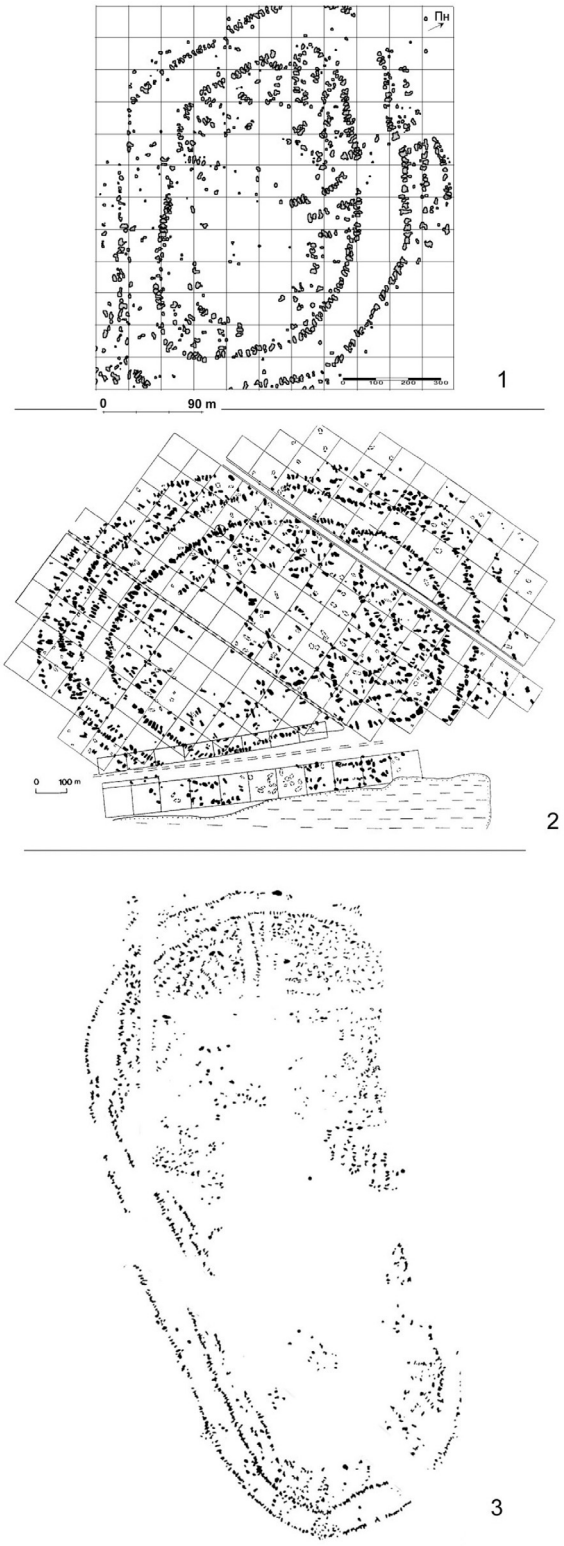


Fig. 4. Large Trypillia culture settlements. 1 Glybochok (BII, near 132ha). 2 Maydanetske (CI, near 200ha). 3 Talianky (CI, near 400ha). 1–3 after V. Dudkin.

ty of painted pottery has been found here; statuettes of rather peculiar appearance were used in rites (Fig. 8). Another important component of the Usatove community (judging by the same pottery) was the population of the Cernavodă culture, which had come from the West, from the Danube; probably descendants of a tribe ruled by the chief buried with a horse-head sceptre in the Suvorove burial mound took part in the process of carrying out the steppe 'anti-crisis programme' (and creating a new culture).

The important thing is that the bearers of the Usatove culture were probably the first to create and use nomadic cattle-breeding as a special type of economic management in the steppes. Their burial mounds – with characteristic burial sites – are scattered along watersheds of Dnister valley, from maritime estuaries to Tiraspol, indicating the routes of ancient nomads (Fig. 2). Only a few settlements are known, all of them are situated near estuaries, in the South. Bearers of the Usatove culture probably spent winter here, closer to the warm sea. This system of economic management continued here until the 18th century.

It has also been established that residents of Usatove settlements continued to grow cereals: einkorn, hull-less barley, oats, peas, bitter vetch (for forage), and millet, a traditional plant of nomads (*Patokova, Petrenko, Burdo and Polishchuk 1989.118–122*). The latter prevails to a great extent among impressions on pottery and on anthropomorphic statuettes. However, grain cultivation could not have been the main element in Usatove economic management, because the plots suitable for sowing were confined to a floodplain and a few in number.

Numerous bones of domestic animals found in these settlements during excavations and studied by paleozoologists became one of the reasons favour supporting conclusions regarding bearers of the nomadic Usatove culture. It has been established that the main 'breadwinner' of Usatove culture must have been herds. Their composition was as follows: sheep comprised almost 70%, cattle and horses comprised the same amount (13–17%) (*Patokova, Petrenko, Burdo and Polishchuk 1989.120, mavl. 4; Videiko, Burdo 2004.89–91*). Both in terms of quality and quantity, this range of domestic animals was ideally adjusted to farming on the steppe. In winter, when pastures are covered with snow, the first horses were sent there. Tall animals walked trampling snow and pastured, 'trimmed' the tops of plant stems. They were followed by cows which 'removed' the next layer of forage and also trampled snow. Sheep were the last to be sent to pasture, eating the remaining grass revealed from the snow cover by the bigger animals (*Masanov 2000.116–130*).

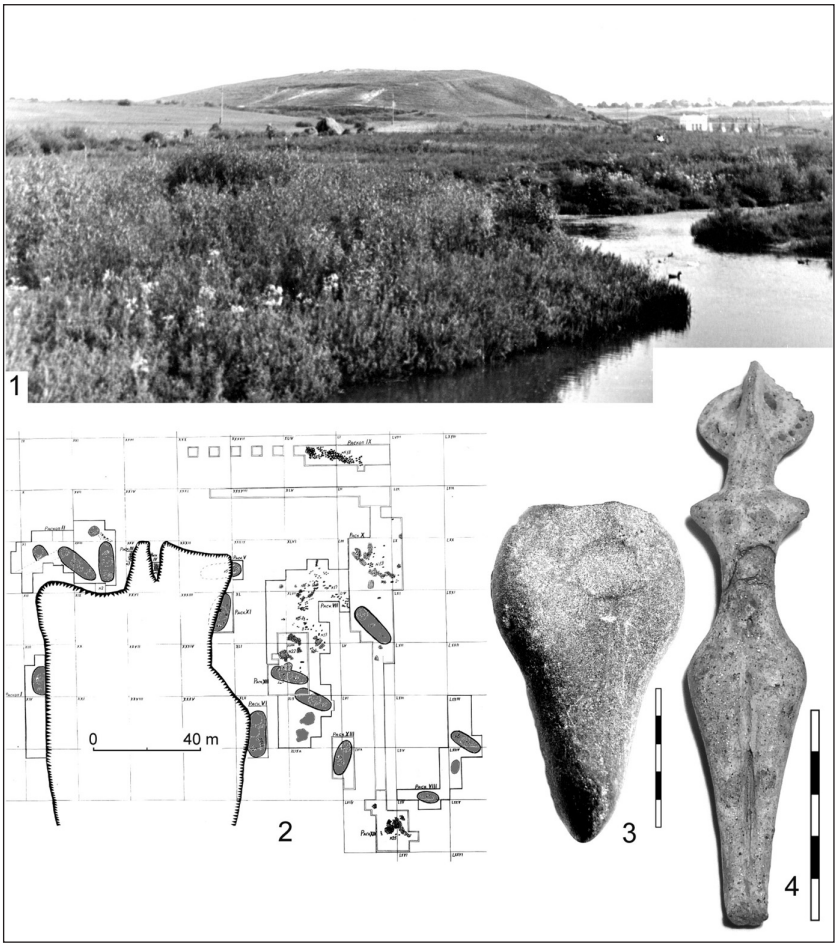


Fig. 5. Troyaniv, Late Trypillia, stage CII. 1 view at place of location. 2 plan of explored part of the settlement (1–2 after M. Shmaglij). 3 hammer-axe, stone. 4 clay figurine.

This feeding regime (bio-technology, as it were) on the snow-covered winter steppe was effective for many millennia. In Kazakhstan in the 19th and the beginning of the 20th century, ethnographers found a correlation between the number of animals per herd similar to the Usatove numbers. There is one caveat: even according to the most perfect model of such economic management, the steppes could feed nomads much less than grain growers. Grain growing in the steppe was impossible at that time for ecological (and technological) reasons. First, it was cold and dry; second, it was impossible to plough virgin land without iron tools (it would happen only a few thousand years later).

Moreover, they had to compete for possession of these pastures, just as they had for possession of fields. This is why it is not difficult to distinguish the graves of military leaders among Usatove burial places; they are distinguished by their monumentality and the presence of bronze weapons. And among 'ordinary' bearers of the Usatove culture, there are quite a lot of military burials with traces of injuries received while protecting a herd (*Videiko 2001.52–54*).

A third way was taken by the Trypillians who went north, closer to the forests, where a lack of grain could be compensated for by hunting and fishing, gathering edible plants and mushrooms. This is how Trypillians appeared in the Volhynia and Zhytomyr regions at the beginning of the 3rd millennium BC – the Troyaniv, Gorodsk, Lozy, and Sofiyivka local groups (*Dergachov 2004.109–110*).

Judging by the appearance of pottery and weapons, these tribal groups already included not only Trypillians, but also some other, new western neighbours (*Videiko 2000. 32–55*). For the new community, painted pottery was almost as exotic as for the bearers of the Usatove culture in the South. At most, the surfaces of vessels were covered with red paint. However, during excavations, fragments of simple, roughly made pots predominated (Fig. 5).

Thus these descendants of Trypillians knew how to grow grain and breed cattle, but virtually none of them established permanent settlements (which now comprised two to three dozen buildings) with large ground dwellings any longer. They also seem to have completely forgotten the rite of burning settlements. At the same time, they chose places for settlements which were as high as possible, on capes and hills, with slopes as steep as possible. They chose narrow capes; if necessary, it could easily be blocked by a ditch or a rampart. This population continued to use deposits of Volhynia flint and even used it to make great plates toothed sickles (*Budziszewski 1995.148–189*). However, arrows heads definitely predominate among the flint finds.

In the area of Kyiv, a few necropolises with cremations of the late Trypillian culture have been found

(Fig. 7). They were dubbed 'cemeteries of the Sofiyivka type' after the name of the first find near the village of Sofiyivka (*Videiko 1995.15–134*). All in all, five are now known; however, there could be (and were) many more. Excavations have shown quite a number of warriors were buried there; including those who died in a battle (burnt arrows have been found among the ashes). A large (a few hundred specimens) collection of arrows was collected by Fr. Yanovskyi near the village of Vyshenky some time ago. We can even try to reconstruct a few sets of weapons of horse archers, which were obviously made by the different fighters for themselves. And again, there are many burnt points of arrows heads in the collection. This very fact allows us to assume the presence of a large burial ground of the Sofiyivka type in the area of the village.

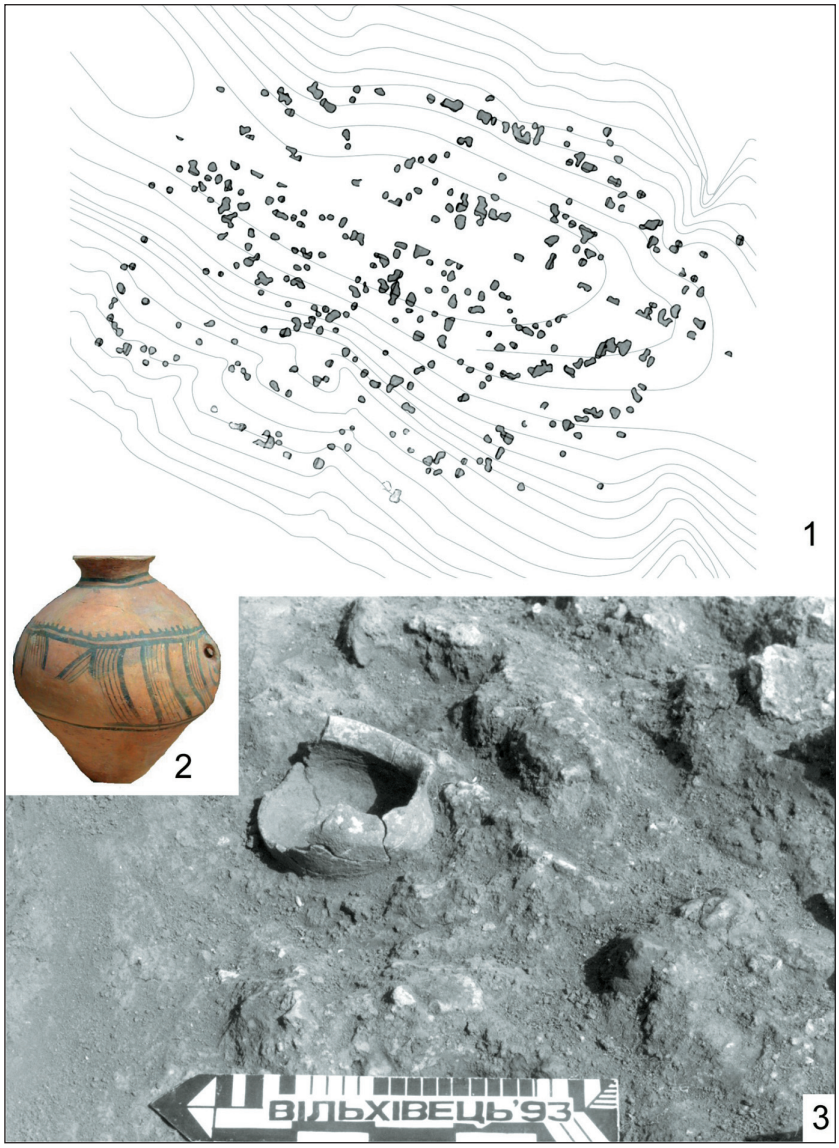


Fig. 6. Vilkhovets, Late Trypillia, stage CII. 1 plan (after V. Dudkin). 2 painted vessel. 3 remains of burnt house with pottery inside.

Judging by these flint points, the same Trypillians might also have been of the warriors were killed in battle. In addition, quite an impressive collection of flint combat axes-hammers has been found at burial sites. Some have prototypes among the weapons of their neighbours in Central Europe, or were even made of raw materials which had been brought from beyond the Carpathians (*Petrougne 1995.190–199*). Such axes-hammers are also among the weapons of some of the last southern and eastern Dnieper Trypillians. On the butt of some axes there are splits due to blows, while some axes are broken. Thus these axes appear to have been used in battles more than once (*Klochko 2001.50–67*).

The armoury also included carved copper daggers. One was placed on the funeral pyre of the deceased together with a grindstone. An analysis of metal products from the Sofiyivka burial ground has shown that, just as before, deposits of copper explored more than a millennium ago within the limits of Volhynia and Dnistro region had been used. We can only guess why the last 'Trypillian wars' on the bank of the Dnieper were waged almost forty-seven centuries ago.

The visible and invisible changes

Everything is simple at first sight: if painted vessels, statuettes, wattle, and daub dwellings disappeared, it seems that the people who created them, *i.e.* Trypillians, must also have disappeared. However, in discussing the disappearance of the culture, the decay and twilight of this civilization, we must understand that its bearers did not disappear from this earth.

Thus, really beautiful and refined Trypillian painted pottery disappeared forever. But perhaps the society

could no longer afford such luxury, or continue to feed craftsmen who made beautiful pots. Because when you are hungry, you become indifferent to jugs and ornaments on bowls. Moreover, it is not very difficult for anyone to a make a pot for preparing food if needs be; it can then be used to make a meal of cereals without employing a potter. In the same way, not only beautiful vessels, but many other things which seemed unnecessary disappeared.

And what of statuettes? Why make them, spend time on them, when for some reason the old gods had stopped defending the people who performed rites in their honour. And it was no longer necessary to give away expensive instruments, food and sacrifice buildings – as this rite had proved to be quite ineffective, too. New gods and new rites in honour of them, new sacrifices were necessary. And the time free from performing rites that were once so vital could be used more effectively for foraging, building fortifications, training in archery, or improving weapons.

It is also worth noting that, according to archeologists’s calculations, at the late stage of Trypillia the number of people in the tribes of this community reached 120 000. However, what catastrophe befell this civilization is explained by the comparison of this figure with the index of the number of the population for the previous period: more than 400 000 (*Krutz 1993.33*). We can see that the number of Trypillians suffered a three- to fourfold decline. Moreover, even in the period of the decay, the population of bearers of different variants of this culture evidently exceeded all the other local populations of the land combined.

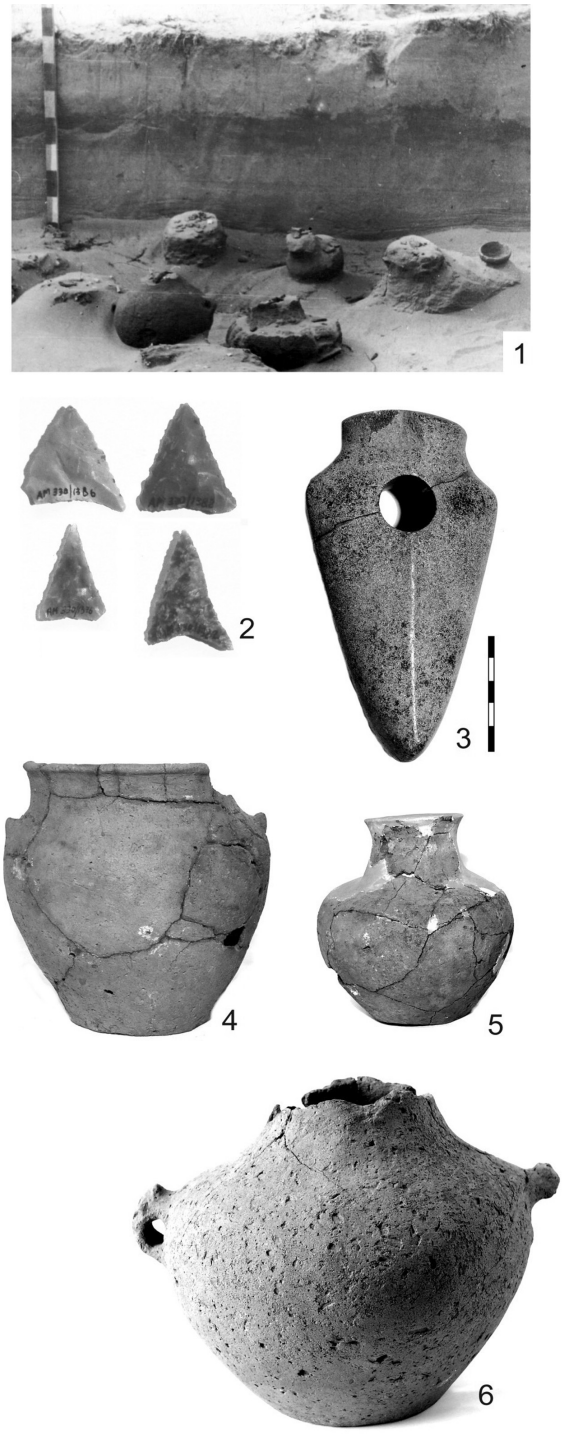


Fig. 7. Sofiivka-type cemeteries, Late Trypillia, stage CII. 1 burials at Chernin cemetery (after V. Kanivets). Sofivka cemetery: 2 arrowheads, 3 hammer-axe, 4–6 pottery.

Conclusions

Judging by the findings of the excavations of ancient settlements of the middle to the second half of the 3rd millennium BC, practically the same thing happened as at the very beginning of Trypillian history there: scarce representatives of tribes and clans who had been very powerful formed new communities which are represented by the archaeological cultures of the Early Bronze Age. It may be said with confidence that in the ensuing millennia in this area, such breakdowns, reformations of clannish and intertribal coalitions occurred more than once. Their traces can be found in the new archaeological cultures.

We may conclude that:

- The process of the ‘disappearance’ of Trypillia culture continued approx. 500 years after 3200 BC.
- It led to the creation of several cultural complexes in the Trypillia-Cucuteni region and on its borders.
- Populations survived in various natural conditions and created different few modes of adaptation.
- Old traditions for a long time survived in groups which had a strong social organization and developed crafts.

- Border groups were in contact with and influenced the closest cultural groups/cultures which led to the rapid disappearance of Trypillian features.
- They used only a few elements of the 'old culture' (painted pottery, figurines), mainly imported from surviving Trypillian enclaves.
- Trypillian heritage was also used by different groups outside the area of the Trypillia-Cucuteni complex.

In the Early Bronze Age, the Usatove culture mentioned above, the cultural groups along the banks of the Dnieper, in the Azov Sea region, in the east of Ukraine are among them. And almost everywhere, if not the material traces of the Trypillian world in the form of painted vessels brought from some last islands of this civilization, then at least the imitation of its achievements can be found – a rough likeness of painted pottery. These have even been finds at burial sites under mounds of statuettes made by local sorcerers who performed rites which were probably somewhat similar to the Trypillian ones.

A great deal of information from different fields of knowledge and skills was preserved by the heirs, but even more information was lost. And information about the creators of the ancient civilization was later completely erased from the memory of generations who returned to their distant heirs long millennia later.

At the times of 'Trypillia culture disappearance' various social structures coexisted: from complex chiefdoms and simple chiefdoms to separate tribes. This situation contradicts the picture of a common evolution displayed for Southern-Central Europe by Gronenborn (*Gronenborn 2009.101–102, Figs. 3–4*).

Did the Trypillian proto-cities have any hope of surviving and their chiefs climbing to the summit of power like the rulers of Crete, and to continue dominating the Pontus steppes as the legendary Minos ruled in the Mediterranean? Probably, yes, they did; however, this chance was missed, and all further attempts were directed not to achieving elusive power, but solely to survival.

For millennia, these lands appeared to be far from the frontiers of the civilized communities of the Old World. Also, it took entire millennia to approach the level attained in the distant 5th millennium BC.

At the same time the Trypillian experiment clearly showed that this area, which is now called Ukraine,

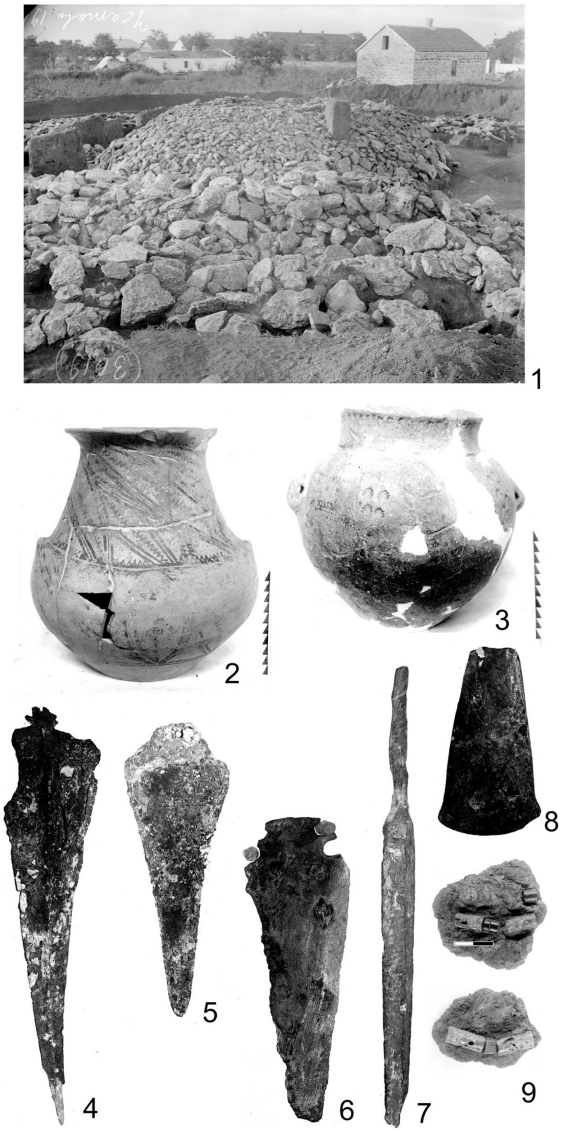


Fig. 8. Usatovo culture (type), Late Trypillia, stage CII. 1 burial mounds at Usatove with stone constructions. 2 painted vessel. 3 pot with stamp decoration. 4–9 copper objects (after O. Lagodovska, report on excavations at the Usatovo cemetery).

can provide its residents with practically unlimited possibilities. It is a paradise for grain growers and cattle-breeders; there are plenty of mineral resources here. Here, with enough knowledge, skills and most importantly, will and desire, a flourishing civilization can be built which will arouse the surprise and envy of neighbours near and far. However, the sweet fruit of civilization may be in the same way lost by the heirs of its creators if they cannot face the challenges of history and nature, not once and not twice. What was created in these lands by the heirs of the Trypillians and their neighbours in the Bronze Age is one more clear proof that history has plenty of opportunities and factors which can determine its further development.

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The petroglyphs of Dowzdaghi, Northwestern Iran

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ABSTRACT – *This paper deals with recording and interpreting a complex of petroglyphs at Dowzdaghi in the northern part of Iranian Azerbaijan in Northwestern Iran. The assemblage can be divided into four sub-assemblages; the designs and images depicted on the surfaces of isolated boulders usually constitute a panel and sometimes individual motifs and inscriptions. The investigations have revealed more than 400 carved and scratched drawings on rock boulders on Mt. Dowzdaghi. The main themes include anthropomorphic figures, animals (ibex, with long elaborated curved horn, deer, dog, horse, bull, ram, fox, snake, alligator, and hedgehog), hunting scenes, Arabic and Persian inscriptions, and symbolic designs.*

IZVLEČEK – *V članku se ukvarjamo z dokumentiranjem in interpretiranjem kompleksa petroglifov na lokaciji Dowydaghi v severnem delu iranskega Azerbajdžana v severozahodnem Iranu. Skupek lahko razdelimo v štiri podskupine; vzorci in podobe, ki so upodobljeni na površini posameznih skal, običajno predstavljajo plošče, včasih pa posamezne motive in napise. Pri preiskavah smo ugotovili več kot 400 izrezljanih in izpraskanih risb na kamnitih skalah na gori Dowzdaghi. Glavne teme upodobitev so antropomorfne figure, živali (kozorog z dolgim, dobro izdelanim ukrivljenim rogom, jelen, pes, konj, bik, oven, lisica, kača, aligator in jež), lovski prizori, arabski in perzijski napisi ter simbolične upodobitve.*

KEY WORDS – *Mt. Dowzdaghi; Azerbaijan; Iran; rock carving*

Introduction

Rock art involves marking the land by people who do more than wander around a politically neutral, open landscape (*David, Lourandos 1998*). Carved rock art has been found in at least three quarters of the rocky regions of the world. They can be found in a variety of places, such as on the walls of caves, rock shelters, or on block stones at open-air sites, but it often appears in similar contexts (*Bradly* et al. *1994*). Traditionally, those images which are depicted in association and constitute a group are called 'panels', and individual markings and images labeled as motifs. Because this rock art is no longer a part of living culture, we have no first-hand information about either the tools or the methods employed to produce these rock engravings; as it is possible, however, to cut identical markings by striking the rock surface with a sharp-edged hard stone, it appears likely that those who made ancient rock markings used similar tools. In archaeological terminology, 'rock art' is used to refer to any man-made markings on natural stone. In the general, rock art falls into two major categories, petroglyphs and pictographs. In Iran, petroglyphs are more widespread than pictographs, which are preserved chiefly in dry regions, inside caves, and under overhanging cliffs. Several assemblages of these petroglyphs from all over Iran have recently been published in a special volume of the journal Bastanpazhuhi (*2007*) which is dedicated to rock art studies in Iran (*Vahdati 2010. 10*). The history of rock art studies in Iran dates back thirty-seven years, to when some pictograms were re-discovered by Izadpanah at the Dushe and Mir Mallas rock shelters in the Kuh Dasht region (western Iran) (*Izadpanah 1969*). In spring 2011, the ar-

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chaeologists studying the Zarkhane site (a prehistoric site near to rock carvings), before starting excavations, made a random survey of the region that led to the discovery of this complex. The discovery of the Doozdaghi rock carvings in the Qaredagh Mountains formed part of a campaign spanning the last decade to identify the distribution patterns of rock art in the region and show the great potential of northwestern Iran for further research (*Rafifar 2002; 2004; 2007; Horshid 2004*). In terms of the number of carved surfaces, Dowzdaghi is one of the largest petroglyphic complexes in the northwest of the Iranian plateau.

Site location

The complex of Dowzdaghi (Mountain of Pigs) is located 120km east of Ahar in Eastern Azerbaijan province, in the vicinity of the village of Dashbolagh garros, which can be considered the nearest residential center to the Dowzdaghi rock art (Fig. 1). The complex of rock carvings, known locally as 'Yazli Dareh' is located N 38° 39' 59", E 47° 27' 25" and 1400m amsl., around Mt. Dowzdaghi in the Qaredagh range. The assemblage of Dowzdaghi rock carvings is a huge and precious volume of rock art in this region; it is a scatter of blocks of stone of various sizes, including various dimensions from 2x3cm to 60x70cm. This complex is dispersed over an area over 2km long and 2km wide, and can be divided into four sub-assemblages, designated with the numbers 1 to 4. All four assemblages are situated around Mt. Dowzdaghi (Fig. 2).

Petroglyphs of Dowzdaghi

The complex contains over four hundred carvings, which can be divided into five groups: the groups include anthropomorphic figures, animals, hunting scenes, Arabic and Persian inscriptions, and symbolic designs (Figs. 3–7).

Anthropomorphic figures: the first group comprises a few human images. The main feature of this group is the conventional gesture in such drawings of humans raising one of their hands.

Animals: the second group of petroglyphs in our study includes many carvings of animals, the great majority of which can be identified as ibex. The ibex are depicted with long elaborately curved horns, longer than we would expect to encounter in a closed environment. Among the animal imagery, apart from ibex, animals such as deer and ram predominate. The other animals are horses, bulls, dogs, Bactrian camels, foxes, snakes, alligators, and in one case, a hedgehog swallowing a snake. It is noticeable, although horses occur, that they are shown without riders or other human figures. Animals are often accompanied by abstract designs and invariably drawn in profile; in some cases they seem to be in motion.

Hunting scenes: these drawings are widely distributed and can be recognised in many rock art sites throughout the Iranian Plateau. Hunting scenes usually feature mounted hunters; in this complex, the scenes depict hunting on foot and with hounds in several cases. In some panels, the hunters are carrying weapons resembling bows.

Arabic and Persian inscriptions: there are some Arabic and Persian inscriptions in this complex, whose dating must not be prior to the Late Islamic era.

Symbolic designs: some conventional drawings can be seen that certainly and meaningfully symbolise something. Some of these drawings are in the form of crosses. These symbolic designs have been employed to complete the concepts of different scenes and to convey the ideas more precisely (*Rafifar 2007*).

Chronology

Chronologically, the lack of absolute dating techniques for such finds meant that we had to rely on the main criteria of relative dating, including an iconographic study of the images and the degree of repatination of the carved surfaces. The patination and varnish on only some panels of the petroglyphs in this complex indicate that the Dowzdaghi rock art was carved at different times, and that a uniform dating for all panels is obviously not possible. The existence of different styles in rock carvings underlines a complex process of execution during different phases. However, the lack of stratigraphic relations between the drawings does not allow us to describe their chronology. The complex was in use for a long period, possibly from prehistoric times to the Late Islamic era. The existence of an Iron Age site at Zarkhane near to the rock carvings shows the presence of a human population in this region at least from the Iron Age.

Discussion and conclusion

If our observations were confined to isolated panels of carved rock, there would be no reason to regard them as particularly significant, but the same pat-

terns are repeated around the entire Mountain, so what seemed to be an isolated pattern may be regarded as a more coherent system. However, there is a strong probability that all the drawings in this complex are conventional. It has not been the purpose of this paper to offer a detailed discussion of the ideology that may lie behind the Dowzdaghi carvings. Our objective has been far simpler: we have attempted to introduce this complex to indicate the great potential of this area of Iran for further research on rock art. More interpretations must await further work in the field. In conclusion, it should be mentioned that since the Dowzdghali carvings were created in the open-air, a large number of petroglyphs have been destroyed by the effects of the sun, wind, atmospheric precipitation, seismic activity, and cycles of hot and cold weather, so that many images are badly worn and some unrecognisable.

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Fig. 1. Map showing location of the site in NW Iran.



Fig. 2. Southern view of the site showing distribution of Dowzdaghi petroglyphs.

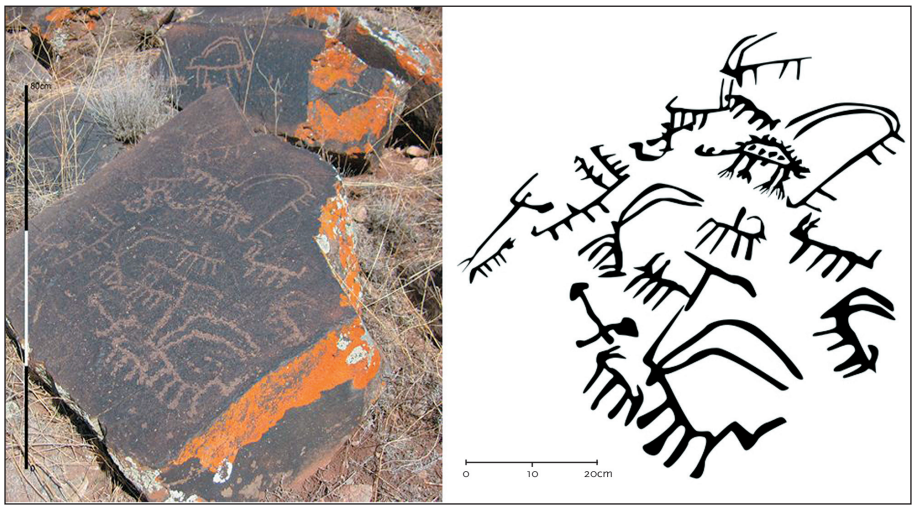


Fig. 3. View of the main group of petroglyphs at Dowzdaghi.



Fig. 4. A human carrying a bow, with a hedgehog swallowing a snake.



Fig. 5. Long curved horn ibex; the degree of patination is significant on this motif.



Fig. 6. Huge block of stone with symbolic design.

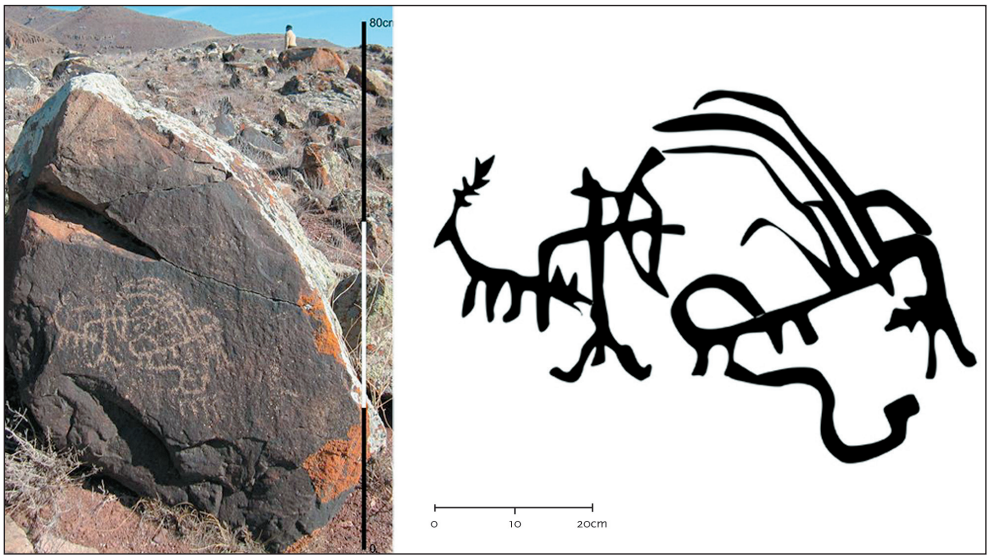


Fig. 7. Small panel with hunting scene.

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