UNIVERZA V LJUBLJANI FILOZOFSKA FAKULTETA

ODDELEK ZA ARHEOLOGIJO

# Documenta Praehistorica

# XXV

Poročilo o raziskovanju paleolitika, neolitika
in eneolitika v Sloveniji XXV

NEOLITSKE ŠTUDIJE/NEOLITHIC STUDIES

*Uredil/Edited by*
*Mihael Budja*

UDK 05:903(4+5)"631/636" 061.3:903(4+5)"631/636"(082)
ISBN 86-7207-060-7 ISSN 1318-6708



LJUBLJANA 1998

DOCUMENTA PRAEHISTORICA XXV (POROČILO O RAZISKOVANJU PALEOLITIKA, NEOLITIKA IN ENEOLITIKA V SLOVENIJI XXV)

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Published by/Založila
FILOZOFSKA FAKULTETA
ODDELEK ZA ARHEOLOGIJO

Technical editor and DTP
Tehnično urejanje in DTP
CAMBIO d.o.o., LJUBLJANA

Printed by/Tisk
Tiskarna NOVO MESTO

Number printed/Naklada
700 izvodov

Natisnjeno s podporo Ministrstva za znanost in tehnologijo ter Ministrstva za kulturo Republike Slovenije.

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Na podlagi mnenja Ministrstva za kulturo z dne 22. 12. 1998 številka 415-104/98 sodi XXV. zvezek revije *Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji* med proizvode iz 13. točke tarifne številke 3. Tarife davka od prometa proizvodov in storitev, po kateri se plačuje davek od prometa proizvodov po stopnji 5%.

# VSEBINA – CONTENTS

# Uvodnik Introduction

Ob izidu petindvajsetega zvezka naše revije, ki je hkrati tudi peti zbornik *Neolitskih študij*, predstavljenih na petem *Neolitskem seminarju* v Ljubljani, je prijetno razmišljati o vseh prejšnjih. Lahko je spregovoriti o razvoju revije, težje ga je ocenjevati, še posebno od blizu. Kljub temu sodimo, da so bili pri razvoju revije ključni trije mejniki. Prvega, ki presega vse ostale, je z ustanovitvijo revije zagotovo postavil profesor Josip Korošec. Drugega povezujemo s sistemom stabilnega finaciranja. Tega je vzpostavila profesorica Tatjana Bregant, ki je urednikovanje nadaljevala po Koroščevi smrti. Zadnjega predstavlja koncept, s katerim smo revijo povezali z *Neolitskimi seminarji* in ji določili program, v katerem se predstavljajo in soočajo raziskovalni pristopi ter relevantne in aktualne pojasnitve, ki nastajajo na univerzah in raziskovalnih inštitutih po svetu.

Revija je prvič izšla leta 1964. Izdala jo je Univerza v Ljubljani, založila pa Univerzitetna založba. Njen prvi urednik je bil profesor Josip Korošec. Revija je nastala zatem, ko je profesor Korošec v neprijaznih okoliščinah najprej zapustil Sekcijo, danes jo poznamo kot Inštitut za arheologijo in nato še uredništvo *Arheološkega vestnika*, četudi je oba na koncu štiridesetih in v začetku petdesetih let formalno in vsebinsko oblikoval prav on (*Pleterski A. Inštitut za arheologijo polstoletnik. Ljubljana 1997:24-34, 48-49*). Izid nove revije je bil povezan s predstavitvijo rezultatov prvega petletnega raziskovalnega programa Oddelka za arheologijo na Filozofski fakulteti v Ljubljani. Program je bil usmerjen v raziskovanje neolitskih in eneolitskih najdišč na Ljubljanskem barju, zato ni naključje, da je revija nosila ime *Poročilo o raziskovanju neolita in eneolita*. Tretjemu zvezku je nova urednica, profesorica Tatjana Bregant dodala še podnaslov *Kultura Ljubljanskega barja*. Revijo od takrat dalje izdaja Oddelek za arheologijo. S širitvijo raziskav in novimi izkopavanji so se pojavile vsebine, ki so narekovale "obravnavo celotne kulturne dediščine predkovinskega obdobja", zato je uredništvo četrtemu zvezku ponovno spremenilo podnaslov, petemu pa tudi naslov. Revija je tako postala *Poročilo o raziskovanju paleolita, neolita in eneolita v Sloveniji* (1976), s podnaslovom *Predkovinske kulture Slovenije*.

Poleg razprav o paleolitskih, neolitskih in eneolitskih kulturah so bile v reviji objavljene številne študije paleookolja in predstavljene analize paleolitskih in neolitskih gospodarstev. Pri tem velja posebej poudariti, da so bila *Poročila* na področju nekdanje Jugoslavije edina arheološka revija, ki je sistematično objavljala podatke o paleookolju in predstavljala $^{14}$C datacijske nize.

V zadnjih letih je revija prestopila slovenski nacionalni okvir. Ocenili smo namreč, da je v arheologiji mezolitika in neolitika nujno vzpostaviti uravnotežen program izme-

On the publication of the twenty-fifth volume of our journal, which is at the same time also the fifth *Neolithic Studies* anthology, comprising papers presented at the fifth *Neolithic Seminar* in Ljubljana, it is pleasant to contemplate earlier volumes. It is easy to talk about the development of the journal, but much harder to evaluate it very closely. Nevertheless, we believe that three turning points were of key importance. The first and most important was that Professor Josip Korošec established the journal. The second is linked to a system of stable financing established by Professor Tatjana Bregant, who became the editor of the journal after Professor Korošec died. The last is embodied in the concept which linked the journal with *Neolithic seminars* and determined the Journal's programme and content, in which different research approaches as well as relevant and topical explanations from various universities and research institutes around the world are included.

The first issue was published in 1964 by the University of Ljubljana, under the editorship of Professor Josip Korošec, after he resigned as head of the Section, now known as the Institute of Archaeology, and also as the editor of *Arheološki vestnik* in unpleasant circumstances (*Pleterski A. Fiftieth Anniversary of the Institute of Archaeology. Ljubljana 1997:24-34, 48-49*). The new journal was connected with the presentation of the results of the first five-year research programme of the Department of Archaeology on the Ljubljana Marshes, and it is no coincidence that the journal was named *A Report on the Research of the Neolithic and Eneolithic*. A new editor of the journal, Professor Tatjana Bregant, added to the third volume the subtitle *Culture of the Ljubljana Marshes*. The new researches appeared, which demanded "the treating of the entire cultural heritage of Stone and Copper Age". This is why the editorial board again changed the subtitle of the fourth and fifth volumes. Thus the journal first became *A Report on Research into the Palaeolithic, Neolithic and Eneolithic in Slovenia* (1976), with the subtitle *Stone and Copper Age Cultures in Slovenia*. Parallel to discussions on Palaeolithic, Neolithic and Eneolithic cultures, a number of studies on palaeoenvironment and palaeoeconomy were published. What needs to be emphasised here is that the Reports was the only archaeological journal, which systematically published data on the palaeoenvironment and presented $^{14}$C data series.

In the last few years both the form and content of the journal has expanded beyond the Slovene national framework. We felt that studies on the archaeology of the Mesolithic and the Neolithic needed to develop a more balanced exchange of research data concerning the transition to farming in Eurasia. In the last five years the Department of Archaeology at the University of Ljubljana has organised

njave podatkov, povezanih s procesi prehoda na kmetovanje v Evraziji. Na Oddelku za arheologijo Filozofske fakultete v Ljubljani smo zato v zadnjih petih letih pripravili na to temo pet mednarodnih *Neolitskih seminarjev*. Vse razprave smo v obliki zbornikov *Neolitskih študij* izdali v okviru revije v slovenskem in angleškem jeziku. Petega zaradi omejenih finančnih sredstev tiskamo le v angleškem. In ne nazadnje, slovenskemu naslovu revije smo pritaknili še *Documenta Praehistorica*.

Na vsebinskem področju sicer še ohranjamo stik s kulturnimi, periodnimi in tipološkimi paradigmami, vendar je težišče že na strani konceptov in modelov, ki jih poznamo kot "meja kmetovanja", "demska difuzija", "val napredovanja", "proces neolitizacije", "model dosegljivosti", "sekundarni centri neolitizacije", "dvojni model neolitizacije", "pionirska morska kolonizacija Evrope" itd. Opozorili smo na tafonomske filtre, ki delujejo pri odkrivanju in interpretiranju mezolitsko-neolitskih palimpsestov. Poleg analiz prehoda na kmetovanje v Evraziji in z njim povezanim spreminjanjem logistik in poselitvenih vzorcev ter oceni njegovega vpliva na okolje, je bila posebna pozornost namenjena analizam razvoja in uporabe kamnitih orodij in lončarskih tehnik.

V *XXV. zvezku – 5. Zborniku neolitskih študij*, objavljamo kitajske poglede na proces neolitizacije na eni ter analizo socialno-ekonomske strukturiranosti predneolitskih in zgodnjeneolitskih skupnosti na Bližnjem Vzhodu na drugi strani. Ocenjujemo fenomen kompleksnega simbolizma v Çatalhöyüku ter predstavljamo kontinuiteto staroselskega, mezolitskega, simbolizma v Karpatski kotlini. Predstavljamo genezo "obpontske kulturne zone", kulturno in kronološko strukturiranosti traškega neolitika ter tipološko identiteto severnega obrobja kulture Starčevo v Transdanubiji. Sledimo kontemplativnemu pristopu k analizi mezolitsko-neolitskega prehoda v srednji Evropi. Poseben poudarek namenjamo analizam genetskih razmerij med kultiviranimi živi, rastočimi zunaj naravnih habitatov in njihovimi divjimi predniki, ki so temeljnega pomena pri pojasnjevanju procesa njihovega kultiviranja. To velja tudi za analize stabilnega ogljika ($^{13}C$) in dušika ($^{15}N$), ohranjenega v kostnem kolagenu, ki služijo ocenam spreminjanja prehrambenih vzorcev, povezanih s prehodom na kmetovanje na atlantski obali severozahodne Evrope.

five international *Neolithic Seminars*. All the papers presented were published as part of the journal in the form of five *Neolithic Studies* anthologies. They were published in both Slovene and English. Now, due to limited financial means, they can only be published in English. The latest novelty is the name, since we have added *Documenta Praehistorica* to the Slovene title of the journal.

As far as content is concerned, we have maintained the link with cultural, periodic and typological paradigms, although the focus has been shifted to concepts and models such as "agricultural frontier", "demic diffusion", the "wave of advance" model, the "process of Neolithisation", "the availability" model, "secondary centres of Neolithisation", "double model of Neolithisation", "maritime pioneer colonisation of Europe" etc. The taphonomic filters, which operate in a studies of Mesolithic-Neolithic palimpsests, were also discussed. Besides the analyses of the transition to farming in Eurasia and changes in logistics and settlement patterns, as well as the earliest discernible environmental impact arising from the transition to agriculture, special attention was paid to the use wear traces on stone tools and Neolithic pottery techniques.

In *volume XXV – the 5th Neolithic Studies* anthology, we publish Chinese views on Neolithisation on the one hand, and an analysis of the social and economic structure of the Pre-Neolithic and Early Neolithic communities in the Near East on the other. The phenomenon of complex symbolism in Çatalhöyük is evaluated and the continuity of Mesolithic symbolism in the Carpathian Basin is presented. The genesis of the "Circumpontic cultural zone", cultural and chronological structure of the Neolithic in Thrace and the typological identity of northern rim of the Starčevo culture in Transdanubia were presented. We also follow a contemplative approach to the analysis of the Mesolithic-Neolithic transition in Central Europe. Special attention was paid to analyses of genetic relationships between cultivated types occurring outside their natural habitat and their wild relatives, which clarifies important aspects of plant domestication. The same holds for the analysis of stable carbon ($^{13}C$) and nitrogen ($^{15}N$), preserved in bone collagen, which served to the estimates of changes in nutritional patterns linked with the transition to farming at the Atlantic coast in north-western Europe.

Ljubljana, december 1998

Mihael Budja

UDK 903(510)"632"
Documenta Praehistorica XXV (Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji XXV)

# New observations on Paleolithic in China reflected by three sites

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ABSTRACT – *This paper provides some new research results by three representatives Paleolithic sites in the North, South and Southwest China, which are very potential in answering some important questions relevant to the human culture in East Asia. New theories of human evolution are expected to be reconsidered here.*

POVZETEK – *V članku objavljamo rezultate novih raziskav treh reprezentativnih paleolitskih najdišč iz severne, južne in jugozahodne Kitajske. Z njihovo pomočjo bomo verjetno lahko odgovorili na nekatera pomembna vprašanja o kulturnem razvoju človeka v vzhodni Aziji. Predvidevamo tudi, da bodo sprožila razmislek o novih teorijah evolucije človeka.*

## 1.INTRODUCTION

In finding clues of human dispersal on this globe, China occupies a good geographic position and provides excellent archaeological evidence recently discovered to make questions clearer. They might lead to another myth of human cultural evolution. After the first recorded Palaeolithic tools were discovered in 1920, in loess deposits in Qingyang County, Gansu Province, in north-western China, Palaeolithic archaeology in China developed well in the 1920s', thanks to some western archaeologists. The most significant discovery was 'Peking Man' (*Homo erectus pekinensis*) (*Jia & Huang 1990*), which established China's important status in human evolution. After the foundation of the new China in 1949, more and more cultural remains and human fossils that involve each of the main stages of hominid evolution have been uncovered in the vast territory of the country, not only in the north and west, but also in the north-east, south and south-west, even including many parts of the Qinghai-Tibetan plateau. The last two decades have been a new, significant period, in which new discoveries and research work have advanced dramatically. The three sites introduced here are representative and outstanding in their archaeological contents (Fig. 1). They would play great roles in providing some new explanations of their own developmental stages and shaking our minds very much. Some relevant discussions will be displayed in the following introductions to each site. The other reason that I chose these three sites for presentation here is that they are actually synonymous with of close concerning work that I have been doing since 1991.

## 2. TOPOGRAPHY AND QUATERNARY SEDIMENTS OF CHINA

The topography of China is divided into three steps, from west to east, according to the characteristics of their different elevations. The Qinghai-Tibetan Plateau is the first step, with an average elevation of 4000–4500 m above sea level. The second step is eastward to the chain of the Daxinganling Hills, Taihangshan Mountains, Wushan Mountains and Xuefengshan Mountains, with an average elevation of 1000–2000 m. It contains some plateaux (such as the Inner Mongolia Plateau, the Loess Plateau) and basins. The third step is the most easterly, with an average elevation below 500 m, and this lowest step contains the main eastern plains of the country. This higher western and lower eastern topographic

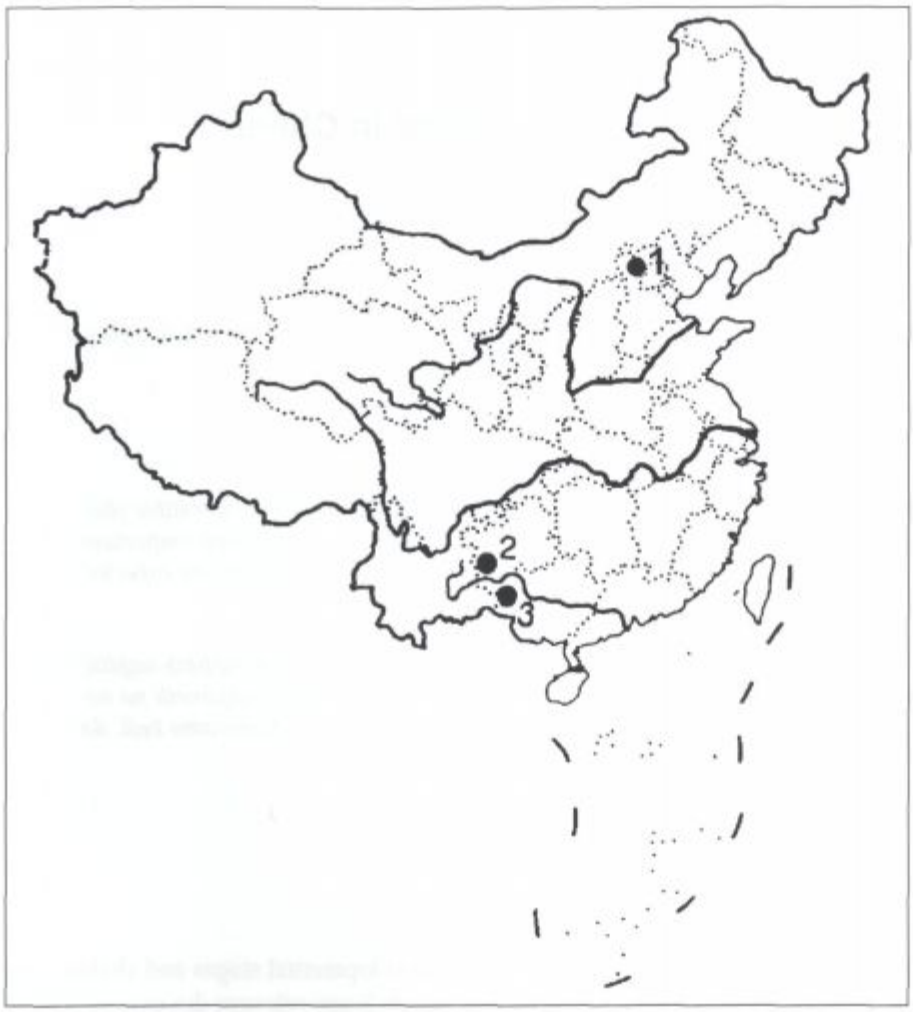



*Fig. 1. Location of three sites mentioned in the text. 1. Nihewan Basin 2. Panxian Dadong 3. Bose Basin.*

structure makes the two great rivers, the Yellow River, and the Yangtze, flow downwards from west to east.

The Qinling Range of eastern China (ca. 34°N latitute) is a physiographic boundary between north and south China and Quaternary deposits differ in these two regions. In the north, the principal sediments are composed of well-developed, fluvio-lacustrine basin formations and widely distributed thick loess deposits. The latter is deposited 300 m at its thickest. It refers complete geological records since ca. 2.5 Ma, and is one of the three environmental measurements of the global chronology sequences beyond deep sea and ice core records. Chronologically, loess deposits is defined three formations of Wucheng, Lishi and Malan loess deposits corresponding to the Lower, Middle and Upper Pleistocene respectively. Each of these is characterised by a definite fauna group. In the south, there are earlier Pleistocene fluvial and fluvio-lacustrine formations, cave deposits and widely distributed lateritic sediments.

## 3. THREE RECENT REPRESENTATIVE SITES

### 3.1. The early Palaeolithic sites of Nihewan Basin in North China

#### History and Geological Background

The Nihewan Basin is 150 km north of Beijing, in the Sanggan River valley of Northern Shanxi province and Northwest Hebei Province. It occupies 9000 km$^2$ and is 800 m above sea level. The basin deposit is more than 1000 m thick, and consists of fluvial-lacustrine sediments overlapped by sequences of clay, sandy clay, fine-sand, sand and gravel in varying thickness and appearance, such as grey, yellow-green, yellow-brown, reddish brown, etc. In the eastern end of the basin, Pleistocene outcrops of 100 m have been exposed by fluvial erosion. It was famous for its Plio-Pleistocene mammalian fossils and geological deposits in the 1920s and 1930s (*Barbour 1924; 1925; Barbour et al. 1926; Teilhard de Chardin & Piveteau 1930*) and was further regarded as the standard Lower Pleistocene fossil sequence

in North China. Its Palaeolithic archaeological evidence was defined after new China, even though the discovery of a faceted stone by Licent and Teilhard de Chardin was recognised as human modification by Abbe Breuil, but was dismissed as a natural specimen (*Movius 1948*). In the past three decades, the area containing a large number of archaeological sites spanning the Lower through Middle to Upper Pleistocene and Holocene in the Nihewan Basin, especially some older early Palaeolithic sites (1Ma–2Ma) (*You et al. 1978; Tang et al. 1995*) has become recognised as one of the key regions for understanding early hominid evolution in Asia. Research shows that the Pleistocene Nihewan Basin experienced an evolution of "lake formed-lake recede-gorges and valleys cut through-erosion, fluvial, aeolian sedimentation" and its geological development is strikingly similar to the famous Olduvai Gorge of Tanzania (*Wei 1997*) (Fig. 2). Evidence that is more recent is gradually strengthening the realisation that the Nihewan Basin could be the "Olduvai Gorge" of China or East Asia. Among those early Palaeolithic sites in the basin, Donggutuo is the most attractive.

Donggutuo site was found in 1981 (*Wei 1985*) in the Nihewan Formation which was attributed to the Lower Pleistocene within the Nihewan Beds. It is one of the most extensively excavated and prolific sites yet studied in the Nihewan Formation. The site lies about 120 m above the Sanggan River, and more than 45 m below the surface of a platform that was intermittently capped by the Malan loess overlying the Nihewan Beds in the region. Five trenches were worked as a trial excavation in the year. T1 is the largest of them, and follow-up excavations continued there in 1991, 1992 and 1997. A total of more than 10 000 stone artefacts have been recovered, as well as large numbers of mammalian bone fragments and teeth (*Jia & Wei 1987; Wei 1985; 1988*). The 1991 and 1992 excavations were part of a joint Sino-American project and were concentrated on T1 (Pl. 1). The cultural sequence of the site was divided into five layers, A to E, according to the different geological characteristics of the deposits in situ. Palaeomagnetic analysis has shown a long sequence of reversed and normal strata. A normal strata above the site has been linked to the Jaramillo Subchron, which would fit the Donggutuo site into the Matuyama Chron, just prior to the Jaramillo ca. 1 Ma (*Cheng et al. 1978; Li & Wang 1982*). This polarity results and time was corroborated by American scientists in 1990 (*Schick et al. 1991*) and fitted well with the stratigraphic interpretation of previous research (*Yuan 1995*). So, the Donggutuo site is indicated at an age of approximately 1 Ma.

## Industry

The stone assemblage of the Donggutuo[1] site appears obvious small-tool character that belongs to one of

***Pl. 1. Dongguo site in the 1992 excavation.***

1 The excavations at Donggutuo site in 1991 and 1992 were financed by the Luce Foundation and carried out in collaboration with Prof. J. D. Clark of the University of California at Berkeley, and Profs. N. Toth and K. D. Schick of Indiana University by IVPP. The 1997 excavation was supported by Chinese Academy of Sciences SEPP.

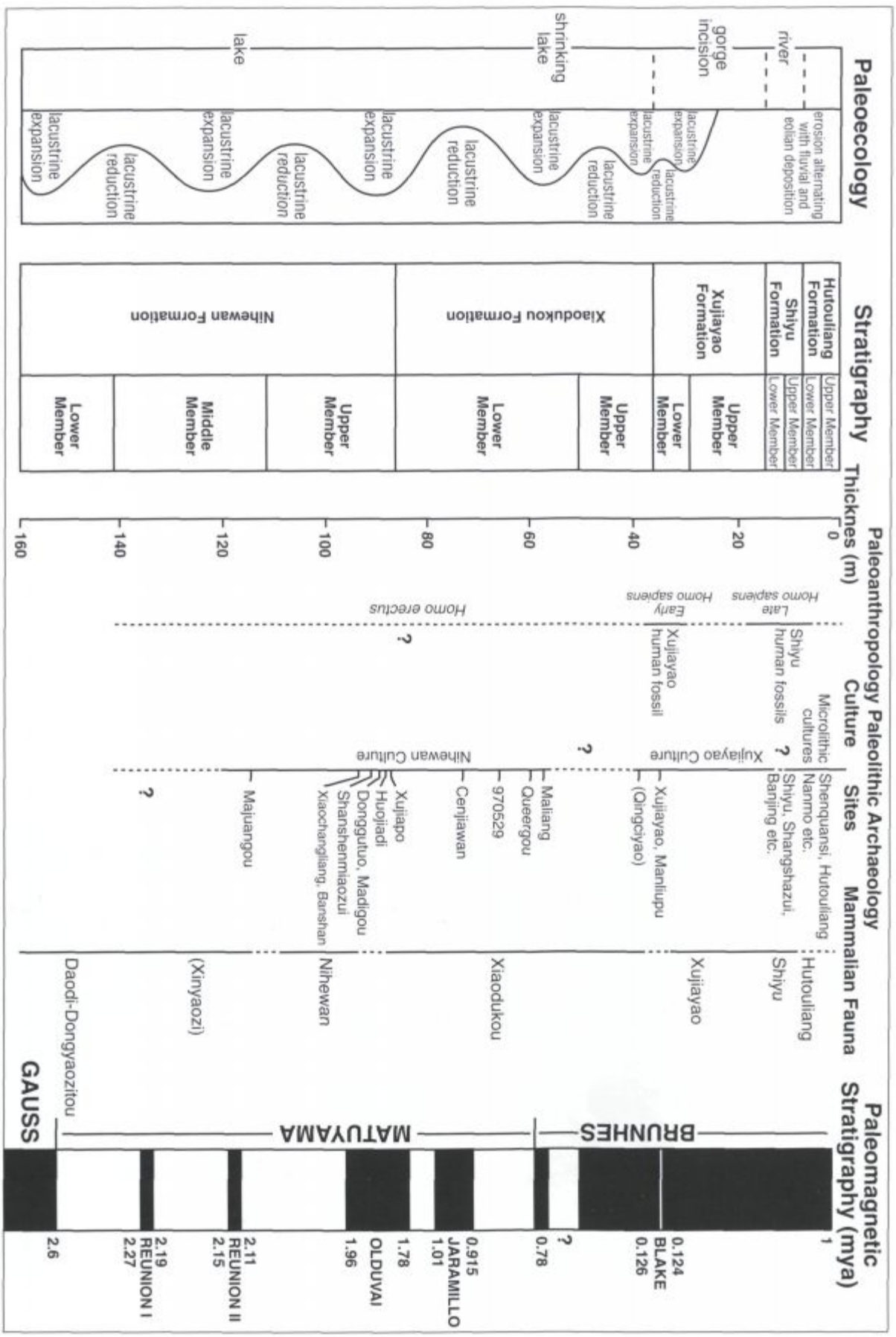



*Fig. 2. The framwork of archaeological geology of the Nihewan Basin (Wei 1997).*

the two development lines of stone industry in North China. Here it is characterised by rather small flakes and flake tools, marginal scars has often happened on flakes. The cores flaking were thought simple and casual (*Schick & Toth et al. 1991*), and the modification does not seem very standardised. Denticulates are a kind of characterised tool typology here. Scrapers are not in good formation. There are also some end-scrapers. Points (Fig. 3) and burins are quite well developed, some are trimmed carefully and look very nice. They both are the dominant typology of the site. Some new materials from the 1997 excavation show again of most impression mentioned above. However, new phenomenon may convert our constructed concepts. For example, together with casually flaked cores there are several prepared cores named as "Donggutuo-shaped cores" (Fig. 4) that were identified for the first time (*Hou et al., in press*). They all have a very similar shape, having a rough line of wedge-like cores of the Upper Palaeolithic period, although they do not have the same regular shape as the latter ones. These cores have clear, prepared platforms for further flaking by shifting to another angle to work. They sometimes have two pointed ridges on the lateral and the bottom. Donggutuo man shows their definite idea for shaping such kind of shaped cores: they wanted to produce flakes by more regular and effective methods and they were trying to achieve this aim. Evidence of such shaped cores including crested flake has been recently observed from stone assemblage of 1981 excavation. Moreover, these discovered cores can be recognised in the different position of "chaîne opératoir" and vary in their materials and sizes. This new evidence of shaped cores can break through conventional views on Dongguttuo materials that there are "extremely" casual cores (*Schick & Toth et al. 1991; Schick & Toth 1993*). Careful research into these special cores may provide clues to the origin of the microlithic and its developments in the basin. North China is regarded as an original site of microlithic culture in North Eastern Asia and North America. Nevertheless, such earlier clue is first to be known in this area. A brief reported paper on new materials from the 1997 excavation of Donggutuo will be published soon by the present author (*Hou et al. in press*).

Stone artefacts are very well preserved. Raw material for making stone artefacts at the Donggutuo site are supposed to come from local outcrops of bedrock stratigraphically below the sediments, and some-

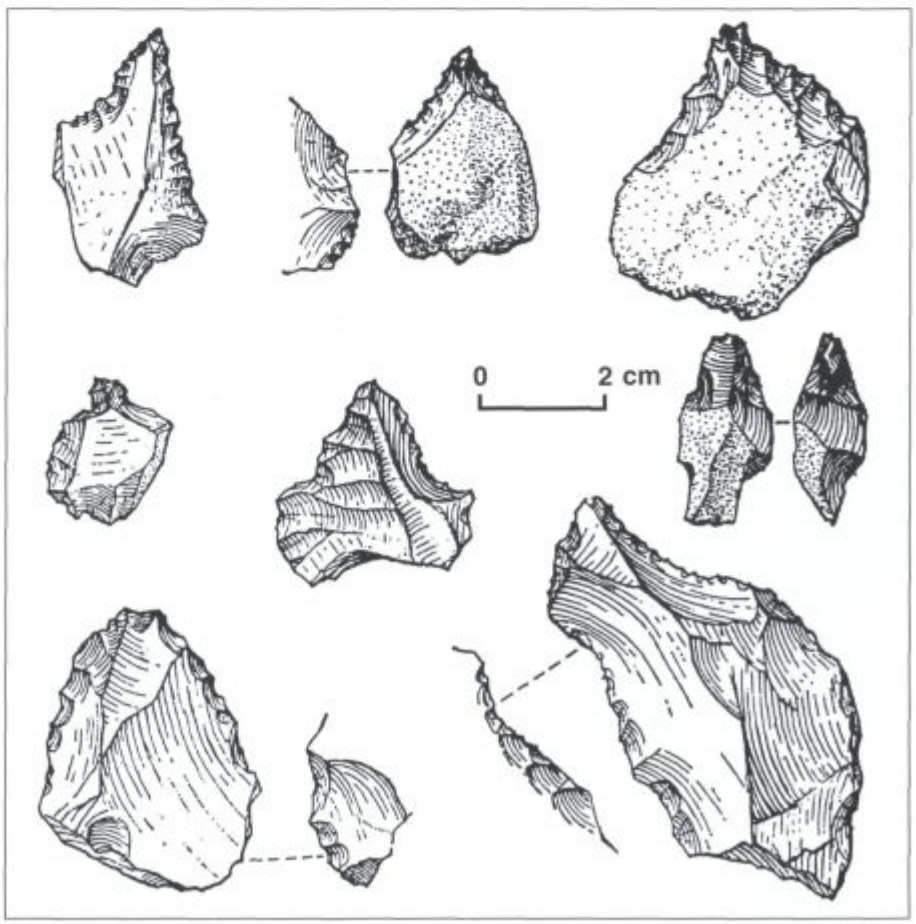



***Fig. 3. Some points of Donggutuo site from 1981 excavation (Wei 1985).***

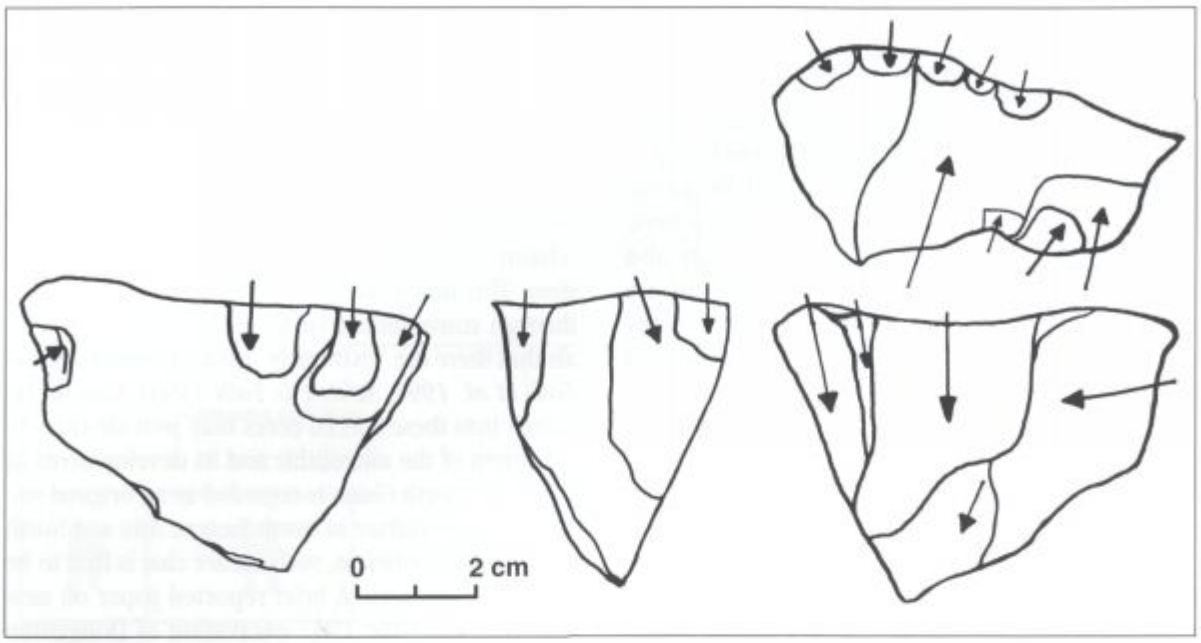



*Fig. 4. Diagram of "Donggutuo-shaped core" (No. 97 DGT 576) from 1997 excavation of Donggutuo.*

times at elevations above the archaeological horizons. They are mostly fine-grained siliceous materials, fine-grained quartzite and a few volcanic rocks, limestone or some other materials. Some fine-grained, raw materials are apt to microscopic observation for use wear polishes. Except for the coarsest chert, there are rare crystals and opals for making tools. Most of the fossil bones excavated from the site are highly fragmented and only a few are identifiable as shaft fragments, ribs, cranial fragments or vertebrae, teeth and so on. Bone materials are in various conditions to identify as much weathering, disintegration, evident cracking, trampling damage or excellent preservation. A small proportion of bones showed probable evidence of carnivore modification, gnaw marks, punctures. Cut marks and teeth marks are few and in very small proportion. The reason for this requires further research.

### 3.2. The Bose Basin sites in South China

#### Stratigraphy and Chronology

Bose Basin[2] is one of the Cenozioc basins in Southeast Asia; it slopes from the Yunan-Guizhou plateau in the Northwest and faces the Indo-Chinese peninsula in the south. It covers an area of roughly 800 square kilometres, and lies at an elevation of 80–100 m above sea level. Beneath the basal part of the basin lie 3000 m of Tertiary lacustrine deposits capped by lateritized fans which consist of about 15 to 20 m of basal gravel overlain by about 10 to 15 m of mottled brick-red clays and sandy clays (Pl. 2). The Youjiang River, which is a tributary of the Pearl River system, flows through the whole basin from Yunnan and joins the Zuojiang River to the Youjiang River. Influenced by a humid, subtropical, monsoon climate, the basin has long, hot summers, and obviously differs in the dry and wet seasons. There are some lower hills of Triassic sandstone in the southwest, and Paleozoic limestone karst landscapes and valleys in the south-east. It was filled in a Tertiary lacustrine sandstone, sandy-siltstone, and siltstone 3000 m thick yielding coal and oil. Through long erosion it received a laterite group consisting of thick gravel in the lower, and fine grainy sand, sandy clay, and clay in the upper until the Quaternary. Since about the later Middle Pleistocene this deposit has been eroded by the Youjiang River and shaped the highest lateritized terrace, which is widely distributed in the margin or in the centre of the basin. Meanwhile, the Youjiang River has constantly created its own, younger terraces at two or three levels. The four excavations since 1988 have shown that the Bose Palaeolithic is from the upper part of the lateritized terrace.

The laterite is a kind of red clay appearing reticular and mottled character, which is present in the south of East Asia (south to the Yangtze) and some valleys

2 Recent geological work in the Bose Basin was supported by Chinese Academy of Sciences SEPP and Smithsonian Institution, co-organised by Dr. Richard Potts, and is part of a collaborative project between two institutions.

of Southeast Asia. It is the most significant sedimentary process in the Late Cenozoic of South China. This Cenozoic deposit was formed some nuclear by a long period strong chemical weathered and accumulating oxides inside by decomposing clay minerals and de-silicifying procedure. Geologists called it vividly "vermiculate laterite" or "reticular mottled red clay". It was yet hard to give a definite age for this deposit because of the absence of its fauna evidence. These formations are the most strongly leached of the red beds and clays in the south (Pl. 3). This characteristic condition is therefore a sure criterion for distinguishing the Bose sediments from many younger formations. By observation on lithology, palaeoecology and geohydrography it was ever compared with the Nihewan Beds in North China (*Teilhard de Chardin et al. 1935*), i.e. earlier than Zhoukoudian. However, the absence of fossil evidence from this kind of highly acidic sediment makes any kind of bio-stratigraphic correlation very difficult. The chronometric dating of this area has therefore been very controversial. In recent decades, paleomagnetic and isotopic dates show that their judgement was basically right (*Huang 1991*). A primary result by fission track method on tektite from the Bose Palaeolithic layer puts the age at 0.73 Ma BP (*Guo et al. 1996; 1997*). Some other methods are continuing to do.

## Cultural Remains

The Palaeolithic tools of the Bose Basin were first discovered in 1973 (*Li and You 1975*). Localities yielding 600 pieces of collected stone artefacts increased to numbers of hundreds by constant work done by IVPP and Guangxi region museums. But only few of them were from definite deposits, all others were collected from the surface, and it is difficult to determine their strata and time. Original reports classified them, as Upper Palaeolithic because of their geomorphic characteristics and because of no associated ground stone artefacts, pottery. Some other researchers later accepted this view.

Since in the spring of 1986 Huang Weiwen has taken charge of a long-term investigation in the Bose Basin, the primary aim of which is to look for the strata and chronology of those collected stone artefacts. They had ever induced that artefacts were probably from a terrace, which is equal to a period of Peking Man's period - Middle Pleistocene (*Huang et al. 1988*). In the last season of 1988 a definite strata of yielding stone artefacts was found from excavation. This new discovery corrected some old opinions and put "Bose artefacts" back to "at least the early time of Peking Man's period; moreover, it could be earlier than later". In other words, it could be in the early Middle Pleistocene or late Lower Pleistocene. The same evidence was proved again in the excavation of 1989 (*Huang et al. 1990*). In the excavations at two localities conducted by the author in the spring of 1993, from the same strata of involving stone artefacts we found tektites that we had noticed before in the surface. The tektite is good material for isotope dating. So, we used it for determining the date of the site after establishing which stra-

***Pl. 2. View of laterite section at Gaolingpo site of Bose Basin.***

ta the artefacts are from. In the 1995 spring field season a lot of work on geology and the environment including palaeomagnetism, collecting deposit samples for pollen or chemical analysis, plotting profiles and statistics on pebbles was done and a better basis constructed for the next stage of systematic, multidisciplinary work (*Hou and Huang 1998a; Hou in press*).

## Stone Industry

The lithic raw materials consist of quartzite, quartz, sandstone, conglomerate and siliceous rocks. The tools are made mainly on cobbles, with some made on heavy flakes. Most exceed 10 cm in length. Picks, choppers, handaxes, heavy scrapers, and hammer stones are all major categories, with picks being the most common. More than 100 handaxes have been found that being the largest number from any single Palaeolithic site in China. The edges of most tools are constituted by deeply depressed scars appearing zigzag and kept thicker dimension, which shows hard hammer stone was perhaps the most popular technique used. However, fewer specimens with shallow scars, relative thinned shape can make us easily think that if they had materials that are more appropriate and improved technique could have been adapted to make tools that are more elegant.

The Bose industry is a kind of "pebble tool industry". It seems that the phenomenon of melting primitive and progressive characters can not be explained as mingled products of different periods. For new discoveries so far from the basin, constantly strengthen the judgement that there was only one cultural period here. Bose stone artefacts consist of picks, choppers, and handaxes, besides fewer, indeterminate cleavers. Picks are in the larger scale and respectively not more than 10% in either handaxes or choppers. Whether in picks or choppers, unifacial pieces account for the overwhelming majority of the assemblage compared to bifacial made tools. The handaxe is not the popular type, but occupies a better position in absolute numbers. Moreover, some of them have possible western Acheulean affinities (*Huang & Hou 1997a*) (Pl. 4a-b).

## Conclusion

In China's domestic Palaeolithic industries the most similar to the Bose industry is the pebble tool industry discovered in the last two decades in the middle-lower Yangtze River district, including Hunan, Hubei, Jianxi, Anhui provinces and southern Shaanxi province. They are of similar materials, made with similar flaking techniques and are of similar assemblage compositions, with picks in the majority. The

***Pl. 3. Laterite deposit and excavated area at Gaolingpo site in Bose Basin.***


***Pl. 4a–b. Both sides of handaxe excavated in Bose Basin (photographed by Huang Weiwen).***

single difference is that spheroid, which is not found in Bose is a higher portion typology and cleaver is obvious in these areas. There are more choppers, but a lower proportion of handaxes than in Bose.

It is interesting that the laterite beds and similar kinds of stone industry are widely distributed in the valleys of many main rivers in Southeast and South Asia. Comparisons can be made between the Yangtze River and Pearl River in South China, the Chao Phraya River in Northern Thailand, and the upper Irrawaddy in Burma. Among them, the Anyathian culture of Burma (*Movius 1943*) appeared some particular character in technique and typology that is closely to its raw material (the fossilised wood) and should not emphasise its speciality too much. The primitive heavy-duty tool industry in this large area mentioned above is not much different in technique and typology from the "pebble tool industry" in East Africa in substance (*Huang 1993*). It could be thought of as archaeological evidence that the spread and migration of *Homo erectus* to the Old World happened in the later Lower Pleistocene and the beginning of the Middle Pleistocene.

### 3.3. The Panxian Dadong cave site in southwest China

#### Geographic Situation, History and Chronology

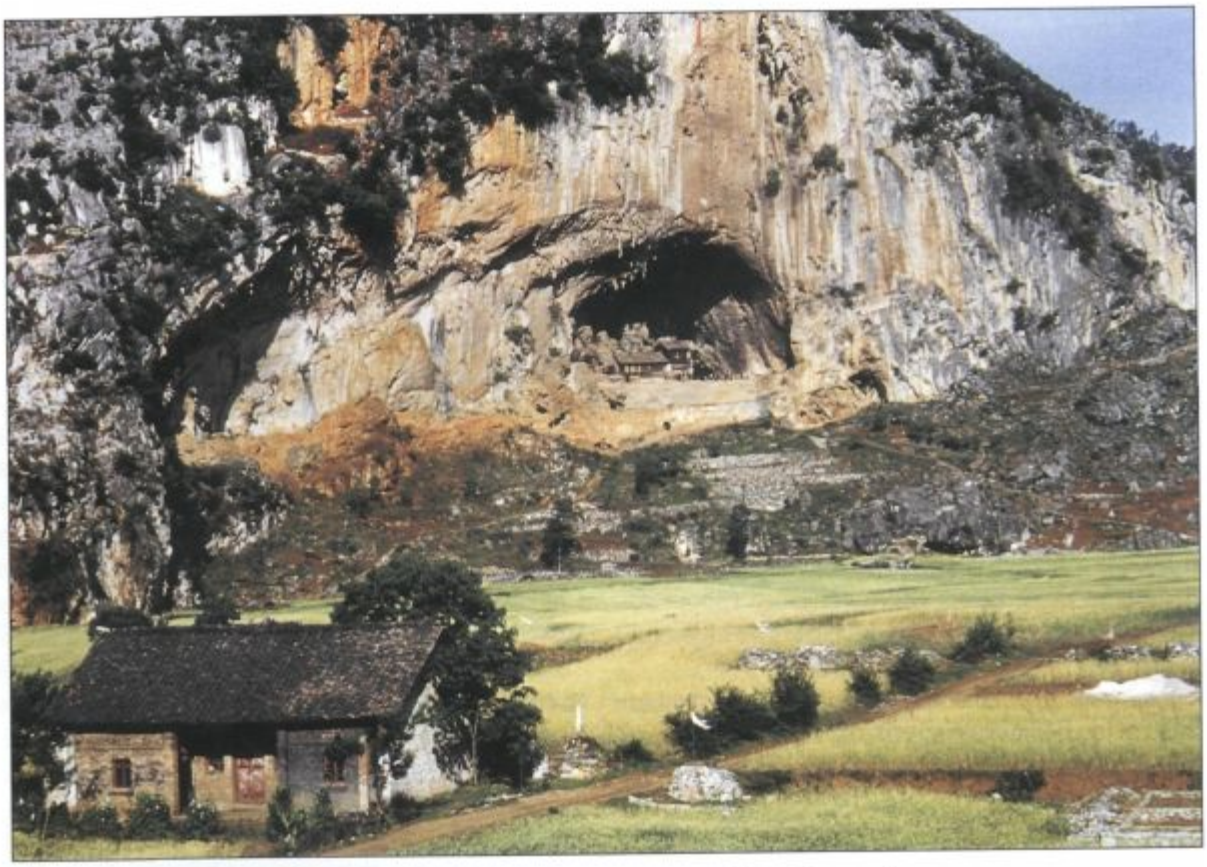
Panxian Dadong[3] is located in the western part of the Guizhou Plateau, which is part of the prevailing karst topography of the south-western region of East Asia. The cave was first brought to the attention of geologists and paleontologists in the 1970s because of its mammalian fossils from deposits. Dadong's potential as a Palaeolithic site was established in 1990. Thus far, excavations have been organised in 1992, 1993 (*Si et al. 1993; Huang et al. 1995*), 1996 and 1998.

Dadong is the middle-level cave in a series of three interconnecting caverns stacked within a 230-m-high hill. The hill itself is situated in a small valley whose floor is at an elevation of 1,630 m above sea level. The cave entrance is 55 m wide and 50 m high, faces east, and lies at an elevation of 31.4 m above the valley floor (Pl. 5). Dadong is really a massive cavern, as its Chinese name implies. The main hall measures 220 m from its back wall to the opening, and covers an area of roughly 9000 m$^2$.

Inside the cave (Pl. 6), there are two large stalagmites and one immense stalacto-stalagmite with a diameter of approximately 200 m. Samples taken from the stalacto-stalagmite for radiometric dating (uranium-series) provide a minimum age of 300 000 BP for this portion of the cultural sequence, and the latest deposit sequence in the cave extends to the Holocene period (*Shen et al. 1997*). In 1998, ESR dating was adopted here to establish a precise chronology of the Dadong stratigraphy, which is a top priority for the project, as this will facilitate the interpretation of the site within the broader context of East Asian prehistoric cave sites. Numbers of samples are being analysed by Dr. W. Jack Rink at the Geology Department of McMaster University in Canada.

The sediments inside the cave consist of brownish-yellow clays, sandy travertines, breccias, and a large limestone block dislodged from the cave roof. The presence of well-bedded, sandy travertines that de-

3 Panxian Dadong project has been supported by both Wenner-Gren Foundation for Anthropological Research and China National Relics Bureau.



*Pl. 5. Outside view of entrance of Panxian Dadong cave site (Hou, in press).*

*Pl. 6. Inside view of Panxian Dadong cave site (Hou, in press).*

velop during moist, mild climatic regimes suggests a sequence of environmental changes during the occupation and formation of the site. While the full depth of the deposits within the central portions of the cave has yet to be determined, the thickness of sediments near the cave entrance is estimated to be 19.5 m. The section of the deeper excavation in 1998 shows a clear event of cave breakdown in Guizhou Plateau that could be closely correlated to the uplift of Qinghai-Tibetan Plateau in the middle Late Pleistocene (*Huang 1998*).

**Archaeological Evidence**

There is plentiful evidence of the use of fire (charcoal, burnt bone, and ash) and four fragmentary hominid teeth. The fauna recovered from Dadong is representative of the Pleistocene *Ailuropoda-Stegodon* fauna suite of south-eastern Asia. The condition of these materials provides evidence for both hominid and carnivore activities in Dadong. There is also evidence of carnivore gnawing on some of the specimens. Most of the individual *Elephas sp.* teeth in the assemblage are from immature individuals, while the *Rhinoceros sinensis* teeth are from old individuals. The hypothesis that the taphonomic distinctions between these two large mammal species indicates a hunting strategy for the Dadong inhabitants will be tested, as larger samples become available.

Two human teeth (one upper right incisor and one lower left canine) were discovered from the excavation in 1992 and 1993, appearing to have the morphological features of *Homo erectus*. But the main characteristics of the two teeth are closer to those of early *Homo sapiens* (*Liu et al. 1997*). Another two hominid teeth were found from archaeological layers in the spring of 1998.

In four field seasons, almost 3000 stone artefacts were collected from Dadong The raw materials are chert and basalt from local hillside out-crops and ancient river gravels, and blocks of limestone from inside the cave The tool assemblage includes side scrapers, end scrapers, notches, borers, denticulate tools, choppers, hammer stones, anvils, a few burins, and a small handaxe, including a few possible bone scrapers from the latest excavations. A number of small, exhausted chert cores show secondary use as scrapers. The borers and notches vary greatly in size. The technology is primarily hard-hammer direct percussion. A noteworthy feature of the assemblage is the prepared core technique, which is discernible on several specimens This is the most extensive reported evidence for the prepared core technique in the Palaeolithic of southern China. Some flakes and cores remind us of the Levallois technique (Fig. 5, 6) (*Huang & Hou 1997b*) The large number of limestone artefacts, which are big cores and flakes, were unexpectedly uncovered from lower archaeological sediments.

Several excavations confirm the rich potential of the Dadong site for Palaeolithic achaeologica1 investigation. The abundance of artefacts, fauna remains bearing evidence of hominid manipulation, charcoal, burnt bone, and ash found in situ attest to an extensive record of hominid habitation at Dadong. The concurrence of these elements in the Dadong deposits will enable us to investigate a broad array of hypotheses concerning site formation, resource exploitation, and behavioural complexity. In addition, the large dimensions of the cave permit horizontal excavation strategies for studying within site spatial patterns.

The prepared core technique of high proportion in the Dadong stone assemblage is an important feature of lithic technology for regional comparative studies within China (*Olsen and Miller-Antonio 1992*). While not well documented in Asia, when the prepared core technique has been described in China it has generally been from sites in North China. The Dadong assemblage therefore represents a rich resource for understanding variability in the operational sequence of the Chinese Palaeolithic. Dadong will also provide an interesting contrast for contemporaneous localities such as Zhoukoudian and Bose, a series of open-air sites in neighbouring Guangxi Province.

## 4. DISCUSSION

I would like to point out some common significance in the presented three sites. Each of them was new discovered in the last ten to three decades and occupies an important part of China in different geographical and morphological environments. They are all connected with longer and complete sediments in each district.

Each stone industry has some interesting characteristics that embody the direction of its cultural development and retain some traces of former practices. They have good condition to connect the past and future in their own side or wider parts. Their cultu-

res might have been influenced by some other, more or less distant cultures, but we do not have enough evidence to rule out the possibility of local origin. They all own the large special and temporal margin to play important role in understanding neighbouring cultures. The driving forces stimulating these cultures are the backgrounds of palaeo-ecological elements in the Quaternary period in each region.

The Donggutuo site is only one of the excellent Early Palaeolithic sites in the Nihewan Basin: there are some other comparable sites to consider along the same geological sequence. Researching these early Palaeolithic cultures and their paleo-ecological backgrounds must be helpful in touching the pulse of the early people who lived in the basin for such a long period. Although having "Donggutuo-shaped cores", the general appearance of the industry is still in primitive stage. But they are not the lowest. The similarity between Donggutuo stone artefacts and that early culture in East Africa will reveal some reason that we are trying to know. The problems hide many important function of the nature happened in the far past time. And questions are still going on. Tool technology at the site is quite advanced and difficult to classify as a primary product of early people. Jia Lanpo says that these technologies must have had a period of development before these known dates. In accordance with this view, he supposes that there exist much earlier hominid traces than 1 Ma in China. Regarding human origins, he supports the possibility of 4 Ma as the earliest beginnings for hominids.

The Bose site is the key to understanding contemporaneous cultures in south-eastern Asia, perhaps even South Asia in some degree. The "Movius line" has played a "great" role to know the East and West divided by so called extremely different culture area. The Bose industry is a lesson to those who still keep "mode I" and "mode II" in mind. We have to change our mind in time according to discovered facts and reconsider some old problems. The Bose stone artefacts indicate that *Homo erectus* in Bose knew much better technology than mode I (*Gibbons 1998*). We may redefine a new standard for them, but we have known it is not model I 's voice again for this large area of Asia. Tool-making traditions are not as simple as we once thought.

Panxian Dadong is located in a critical plateau, potentially the site of the origin of humans. Close to it, there is the locality of *Homo erectus Yumouensis*, whose age is 1.7 Ma. Not only is this region the area in which the most prolific hominoid fossils were found, but also these fossils are at the closest position (ca. 5 Ma) to either pre-human or true human compared to those found in East Africa (13 Ma) or in Europe (10 Ma). The plentiful hominoid fossils found in Zhupeng-Xiaohedi of the Yuanmou Basin include one skull, seventeen maxillae, mandibles, and thousands of teeth. There are opposing opinions on the determination of "who they are" and "how old they are". Some accept them as human, others interpreting them as "ape", and these materials lay in the key period for the exploration of human origins (*Hou & Huang 1998*). In any case, Panxian Dadong is at a later place in the line. But it could help us to find a clue to the mystery in advance. Not to mention the south-western part of China is weak on nice discovery of Palaeolithic cul-

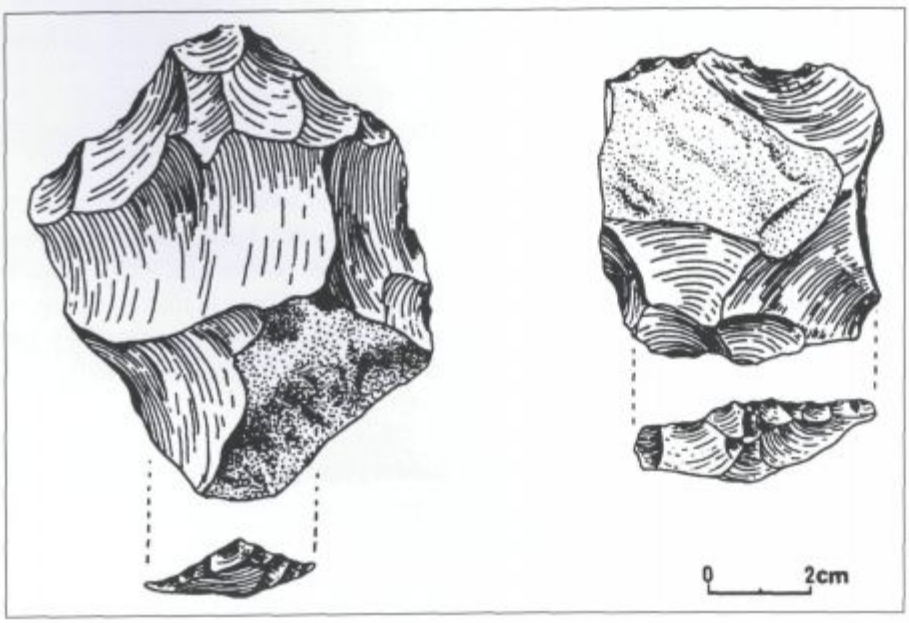



***Fig. 5. Flakes with Levallois character from Panxian Dadong (Huang & Hou 1997).***

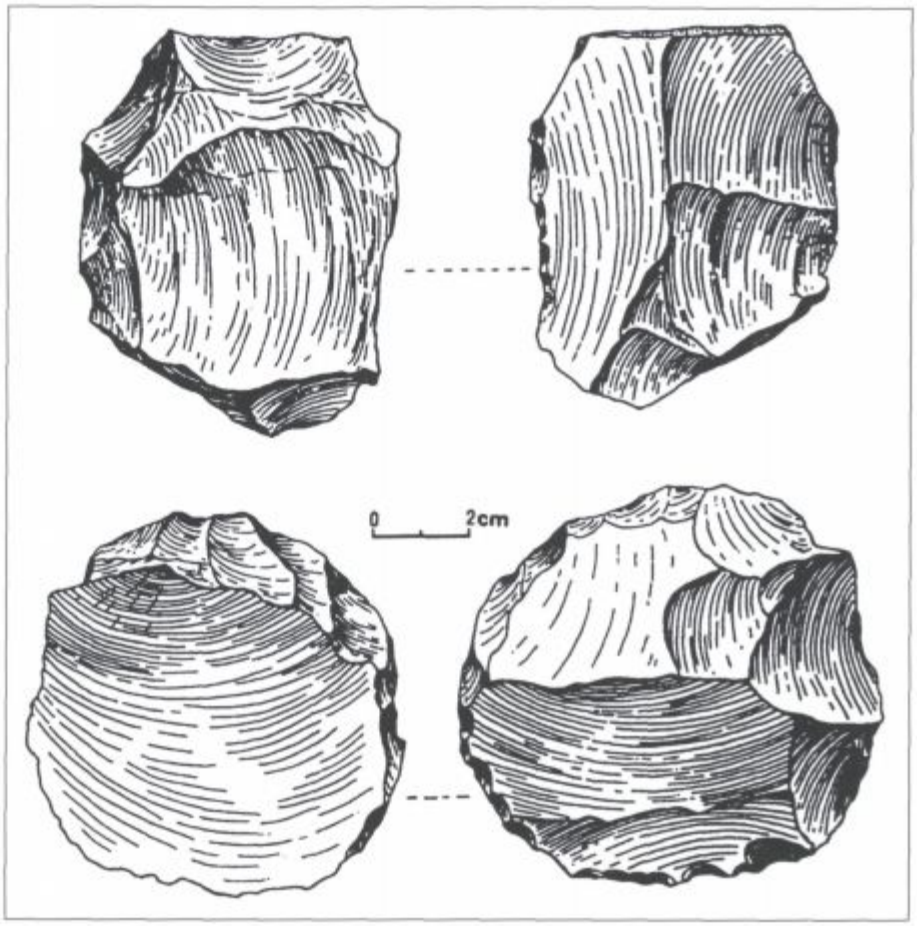



*Fig. 6. Cores with Levallois character from Paxian Dadong (Huang & Hou 1997).*

ture from complete deposit. Dadong has perfect conditions for developing and becoming a standard section in the region. Levallois is another interesting problem in this area. In North China, there is more evidence to consider this sensitive problem. But in the south, from a Palaeolithic site, it is the first to appear some probable clues. We hope that there will be more convincing evidence in future excavations.

**ACKNOWLEDGEMENTS**

I was so glad to meet Prof. Mihael Budja and Prof. Iztok Saksida in the summer of 1997 in the Nihewan Basin, which resulted in Chinese archaeologists coming to Slovenia for the first time to participate in this very interesting and successful Seminar organised by the Archaeology Department of Ljubljana University. I appreciate all the help provided by the department and the enthusiasm of the Slovenian people. I thank Prof. M. Budja and his students for how they took care of us. I hope that the Archaeology Department can become an important point for connecting the Western and Eastern worlds of archaeology. My thanks go to Prof. Saksida, who initiated the first Slovenian visit our excavation sites in China. I was very sorry to hear about his accident. We shall always remember his contribution to this precious beginning between our two countries and put forward our mutual enterprise well in the future.

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UDK 903(510)"633/6343"
Documenta Praehistorica XXV (Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji XXV)

# Searching for the Early Neolithic in China

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ABSTRACT - *The purpose of this paper is to present and interpret the archaeological data on the earliest ceramic assemblages in China that may not be otherwise available to archaeologists working outside China. I will focus on nine sites, which I believe correspond to the earliest Neolithic cultures with archaic pottery in China.*

POVZETEK - *Namen članka je predstaviti in interpretirati arheološke podatke o najstarejših keramičnih najdbah na Kitajskem, ki morda niso dostopne arheologom izven Kitajske. Osredotočili se bomo na devet najdišč, ki po našem mnenju odgovarjajo najstarejšim neolitskim kulturam.*

## INTRODUCTION

Pottery making is considered one of the most important inventions in human history. In China, pottery is thought either to signify the appearance of the Neolithic period or to represent one of the fundamental features of the period (*Yu 1987; An 1997*). Therefore, exploring the origins of pottery is a key to understanding Early Neolithic cultures.

In northern China, the lack of Early Neolithic remains was mentioned by Swedish geologist J. G. Andersson as early as the 1920s, when he excavated the first Neolithic culture, the Yangshao culture, in the Yellow River valley (*Andersson 1925*). In the 1930s, a famous Chinese archaeologist, Xu Bingchang, thought he had found the Early Neolithic culture in Shaanxi province when his team excavated the Doujitai site in the middle Yellow River valley. But this discovery attracted no attention because of the Japanese invasion. Archaeological discoveries made in later years showed that his findings at the Doujitai site were the remains of the Longshan culture, a late Neolithic culture even later than the Yangshao culture (*Chen Xingcan 1997a.304-305*).

Some remains dated to the pre-Yangshao period were first discovered in Shaanxi province in the late 1950s.The Early Neolithic culture was then confirmed after the excavations of the Peiligang culture in Henan, the Cishan culture in Hebei and Laoguantai or Dadiwan I culture in Shaanxi and eastern Gansu provinces in the late 1970s (*Yan 1979; An 1979; Chen Xingcan 1997b*). But, these cultures, dated to about 7000-8000 BP, show the existence of an well-organised sedentary life, millet cultivation, and an advanced ceramic industry. They are too late to be considered Early Neolithic cultures, due to their maturity in agriculture and pottery-making technology and the time gap between the end of the Pleistocene (c. 12 000 BP in Northern China) and these Neolithic cultures. Therefore, those cultures are reconsidered as either the early period of the middle Neolithic or the late period of the Early Neolithic, and only cultures before this period can be identified as from the true Early Neolithic. A stone tool manufacturing site at Emaokou in Shanxi province and the tomb of "Donghulin Man" were discovered in the 1960s and were thought to be Early Neolithic remains.

Finally, the excavation at the Nanzhuangtou site, in Hebei province (*Baoding diqu wenguansuo 1992*) attracted the attention of archaeologists in the late 1980s, because this site yielded the earliest pottery and stone mortars and pestles, dated to about 10 000 BP.

The Yangzi River valley witnessed the finding of an Early Neolithic culture when an excavation was con-

ducted in the early 1960s at the Xianrendong site in Jiangxi province. But contradictory radiocarbon dates led to questions on the reliability of the data (*An 1989*). The Hemudu culture, excavated in 1973 in the lower Yangzi River valley dated to 7000 BP, promoted a revolution in the understanding of the prehistory of this region, which was previously thought to be very backward and uncivilised until the introduction of a more advanced culture from the Yellow River valley in dynastic times.

After a number of Neolithic cultures dated between 7000 to 8000 BP were discovered in the lower and middle Yangzi River valley, the problem of the Early Neolithic has been raised again (*He 1996; Chen Xingcan 1997b*). In 1977, two pottery sherds, associated with fossils of *Crocuta ultima Matsumoto* (an animal which existed in the late Pleistocene, but became extinct in the Holocene), were found at the Henxiandong cave site in Lishui county, Jingsu province. These pottery sherds, therefore, were considered as among the earliest Neolithic ceramic remains in China (*Li Yanxian et al. 1980*). The 1990s has brought a series of excavations related to Early Neolithic culture in the middle Yangzi River valley, and the material remains found at Xianrendong, Diaotonghua in Jiangxi province and Yuchanyan in Hunan province have revived discussions on Early Neolithic cultures (*Yuan 1996; Liu 1996*).

A number of sites containing archaic ceramics were discovered as early as the 1950's, and more sites continue to be discovered today in the Lingnan region, an area south of the Yangzi River valley (*Jiao 1990; Zhao 1997*). By the beginning of the 1990s, about 120 early Holocene sites had been discovered in this region (*Jiao 1992*), although the date and nature of many of these sites are still controversial (*An 1989; Fu 1998*). In recent years, the Institute of Archaeology at the Chinese Academy of Social Sciences, and local archaeologists from the Zhuang Automomous Region in Guangxi, have jointly excavated two shell-mound sites at Dingshishan and Baozitou, both near Nanning city, the capital of Guangxi. The excavations have yielded many new clues for the study of Early Neolithic culture in this region and in South China (*Fu et al. 1998*).

As early as in 1947, the material deposits found at Zalainuoer in Inner Mongolia, led Professor Pei Wenzhong to believe that these were remains of the Mesolithic era (*Pei 1947*). At the beginning of the 1970s, coarse ceramics associated with microlith cores, and the bones of humans and *Mommuthus primigenius Blumenbac* were found in the bottom of layer 4 at this site. This material was considered to be from one of the earliest Neolithic cultures in north-east China and North East Asia (*Shi 1978*). Since there is a large number of Neolithic sites dated between 7000 and 8000 BP, I believe that there may have been a long developmental process in Early Neolithic prior to this period in north-east China.

## NORTHERN CHINA

### Nanzhuangtou (Fig. 1a–b; 2a–b)

This site, about 10 km to the east of the Taihang Mountain and 21.4 m above sea level, is located on the western margin of the Huabei Plain. It consists of several stratigraphical components (*Baoding diqu wenguansuo et al. 1992; Li Jun 1998*). The lowest occupation has seven radiocarbon dates in a range between 9700 and 10 510 BP. This component contains stone artefacts including mortars, pestles, and a hammer, but without microliths or small chipped stone tools, which often occur at late Palaeolithic

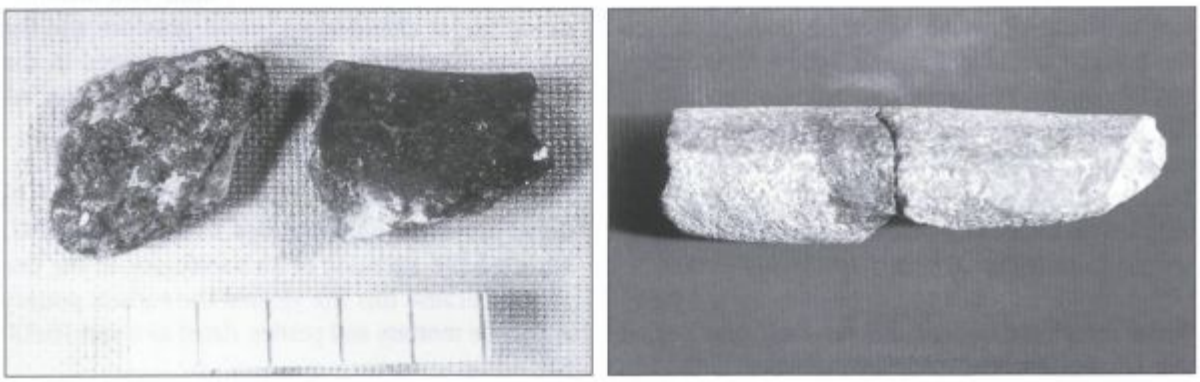

***Fig. 1a–b. Left: Potsherds from the Nanzhangtou site (From the 1980's excavation at Nanzhuangtou site, Northern China. The ceramic is brittle and coarse, and represents the beginning of pottery-making in North China.) (After Baodingdiqu Wenguanhui etc. 1992.). Right: Stone pestle from the Nanzhuangtou site.***

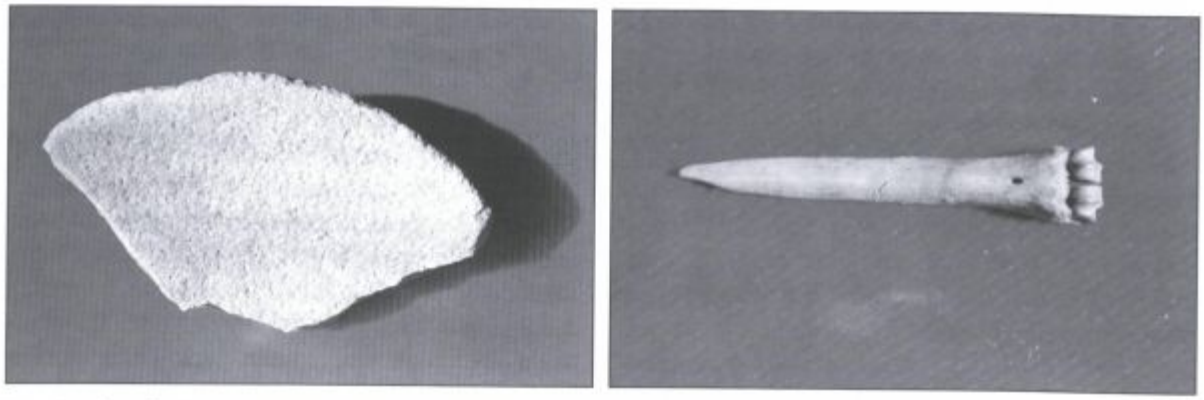

***Fig. 2a–b. Left: Stone mortar from the Nanzhuangtou site. (No traces of farming exist, but the appearance of both pestle and mortar may indicate that food collecting is extremely important and initial agriculture is just under way.) (After Baodingdiqu Wenguanhui etc. 1992.) Right: Bone awl from the Nanzhuangtou site. (From the 1980's excavation. Bone and antler implements are very important in the Nanzhuangtou culture; this is further demonstrated by the 1990's excavation.) (After Baodingdiqu Wenguanhui etc. 1992.)***

and Early Neolithic sites in both southern and northern China. Bone and antler tools, such as awls and arrowheads, were found. In addition, pottery sherds were discovered in the lowest level of deposits. An examination of the pottery by the excavators and myself suggests that the pottery-making technology was rather primitive.

The ceramic paste is coarse, tempered with quartz, biotite, sand, and shell. The texture is brittle and loose. The thickness is uneven, about 0.8–1.0 cm. The surface decoration is predominantly cord-marked, but also includes appliqué bands and picks, prick designs, and perforations. The pottery types are simple, flat-bottomed jars, usually with smudge traces on the outer surface. The manufacturing techniques are still unknown because of the small size of the sherds. Excavators (*Jin et al. 1992*) have identified no evidence for the slab-method. However, some kind of moulding or a paddle-and-anvil technique may have been used. No re-firing test has been carried out to determine the firing temperature. However, the presence of carbonised plant fibres on the inner surface, a greyish-brown colour of the past, and the impure surface, suggest a very low firing temperature.

## YANGZI RIVER REGION

### Shenxiandong

The cave site is located on the north-western slope of the Huifengshan hill and at an elevation of more than 80 m above sea level. The cave deposits can be divided into upper and lower components separated by a 10 cm limestone board. The cultural remains and animal fossils were found in the upper component. Two pottery sherds and the bones of *Crocuta ultima Matsumoto* and *Meles leucurus Hodgson* were found at the second level of this component (*Lishui Shenxinadong Team 1980; Li Yanxian et al. 1980*). The radiocarbon date of the layer points to 11 200 years ago and the appearance of *Crocuta ultima Matsumoto* of the late Pleistocene support the date, although more dating work is needed.

The two potsherds are very small, the largest being only 2.7 cm long, 1.8 cm wide, and 0.5 cm thick, so manufacturing techniques cannot yet be determined. The outer surface of the sherds is brown, while the inner surface is orange. The thickness is uneven, and some micro air holes can be seen in both the inner and outer surfaces. The ceramic paste is tempered with fine sand and plant fibre, which was carbonised. However, since only a small portion of the site was excavated, and no cultural material other than potsherds was found, the authenticity of this site and the potsherds has been challenged by some archaeologists (*An 1989; Deng 1986; Zuochuan 1984*).

### Xianrendong (Fig. 3, 4) and Diaotonghuan

The Xianrendong site is located on the slope of a small hill in the north-east of Jiangxi province. With a river and flat land in front of the cave, the habitat is suitable for human habitation. Four excavations have been carried out since 1962, and the latest ones, in 1993 and 1995, conducted by a Sino-American team has yielded exciting results that have yet to be published (*Jiangxisheng wenguanhui 1963; Jiangxisheng bowuguan 1976; Liu 1996*).

The reporters of the first excavation realised that the site consisted of two cultural-chronological com-

ponents. The lower occupation was the Early Neolithic, and the upper one was the late Eneolithic. The researchers on the second excavation of 1964, however, believed that the both occupations belonged to the Early Neolithic. Although archaeologists had different opinions on the chronology of the deposits, they all agreed that the two occupations had chipped and polished stone tools and potsherds. The only difference is that the lower one had less polished stone tools with less variation in ceramics, while polished stone tools and various ceramics dominated the upper one. The last two excavations revealed four horizons; the third and fourth were thought to be the lower occupation, and the second was the upper occupation. The cultural remains of the two occupations are different because the lower one has only chipped stone tools, whereas the upper one has not only chipped and polished stone tools, but also potsherds. The lower occupation is considered to be of late Palaeolithic culture, while the upper is Early Neolithic. Since a report on the latest excavations has not yet been published, it is impossible to compare deposits yielded from different excavations. However, it seems that the upper occupation of the last two excavations can be further divided into different periods, which correlate to the lower occupations of the first two excavations. The radiocarbon dates of the upper occupation of 1993 and 1995 excavations are from 9000 to 14 000 BP, and thus have been regarded as the earliest Neolithic remains in China.

Diaotonghuan rock shelter site is about 800 m away from the Xianrendong site. It consists of the same cultural-chronological components as those of the Xianrendong site. It is thus considered the campsite of the residents living in Xianrendong.

The lower occupation of the 1960s excavations shares many characteristics with the upper occupation of the 1990s excavations. For example, polished stone tools appeared, and a large number of bone and shell tools were found. The pottery paste is primarily coarse, tempered with sand (mainly quartz), as large as 1.0 cm long and 0.5 cm wide. The walls of the sherds are uneven and thick. The texture is brittle and loose. The pottery shapes are simple, mainly round-bottomed jars, based on the reconstruction of large pieces of potsherd. It is difficult to distinguish body parts from rims. The colour is heterogeneous reddish and brown, resulting from inadequate control of the firing temperature. The pottery surface is unslipped and rough. In some cases, both the inner and outer surfaces are decorated with cord marks or basket-like impressions. I have thus hypothesised that some kind of moulding or a paddle-and- anvil technique was employed. A rounded stone, bamboo, basket, gourd, or melon may have been used as a mould, to which pieces of clay were then applied (*Chen Xingcan 1998; Wang 1995*). Some kinds of perforations were applied near rims; a similar feature has been identified in early ceramic assemblages in the Russian Far East and other parts of China (*Zhushchikhovskaya 1997; Chen Xingcan 1998*). I hypothesise that the perforation is evidence of a molding technique rather than a kind of decoration.

Pollen analysis and phytolith studies show that the incipient cultivation of wild rice should have been

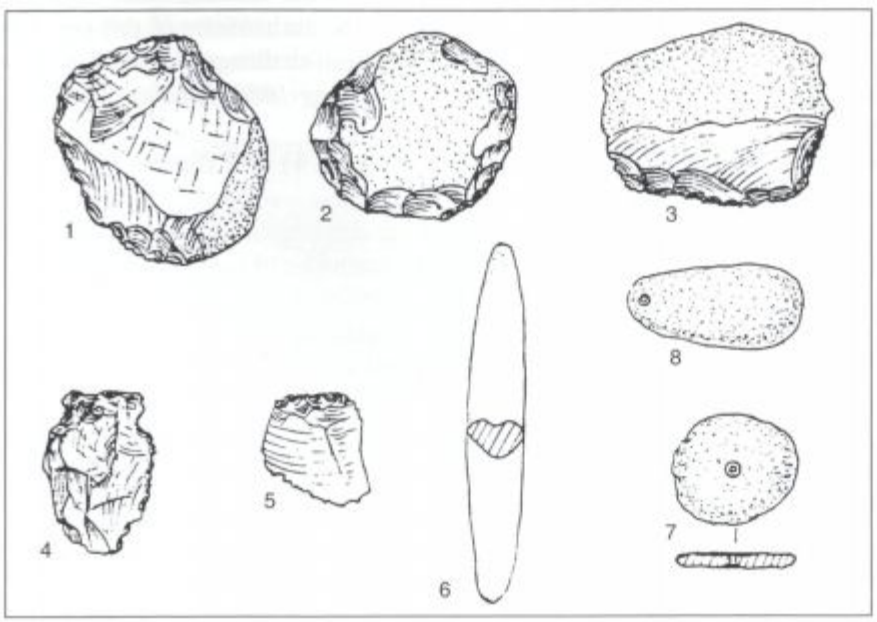


***Fig. 3. Xianrendong. Early Neolithic stone tools and artefacts. (After Jiangxisheng Wenwu Guangli Weiyuanhui 1963; Jiangxisheng Bowuguan 1976.) M 1:2.***

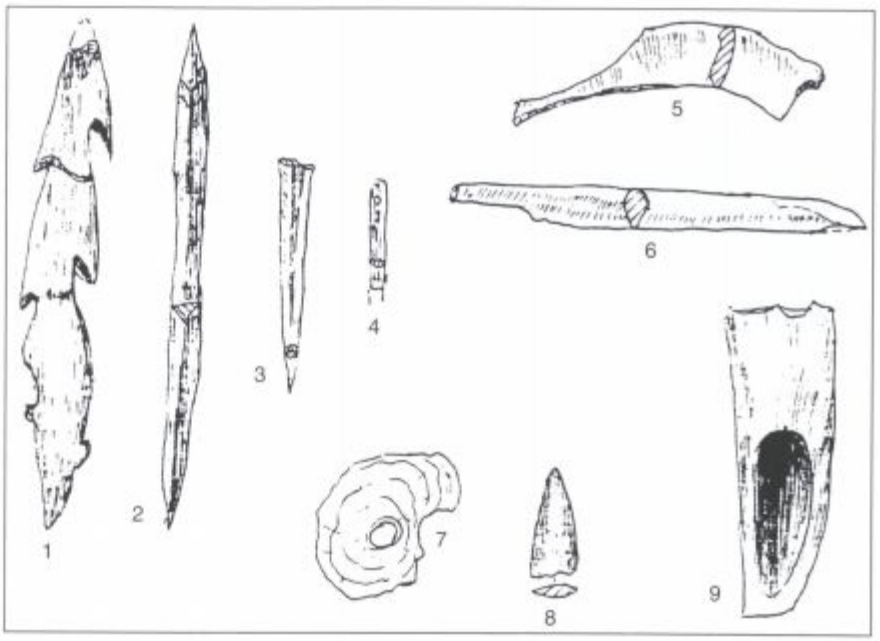


***Fig. 4. Xianrendong. Early Neolithic bone tools. (After Jiangxisheng Wenwu Guangli Weiyuanhui 1963; Jiangxisheng Bowuguan 1976.) M 1:2.***

practised during the upper occupation period. But more work on absolute dating is needed.

### Yuchanyan

This cave site is located at Baishizhai village in Daoxian county, Hunan Province. It consists of cultural deposits of about 120 to 180 cm in depth, with a large number of artefacts such as tools made of stone, bone, antler, and shell. All stone tools are chipped, including cores, flakes, choppers, scrapers, knifes and hoe-like tools. The stone tools are very coarse, and few microliths were found (*Yuan 1996*).

The ceramic assemblages from this component are predominantly small fragments of body sherds. The ceramic paste is coarse, tempered with sand and plant fibre. The colour is brown, indicating that the firing temperature was low. The walls of the ceramics are as thick as 2 cm. However, the texture is very brittle because of the low firing temperature and non-plastic temper. In some potsherds, two or more layers can be observed on the cross section, and basket-like marks can be seen on both the inner and outer surfaces. These may be related to manufacturing techniques such as molding. An experimental study in making ceramic vessels on a hard mold has shown that small pieces or disks of clay can be applied to the mold in order to form a vessel (*Zhushchikhovskaya 1997; Yu 1987*).

No radiocarbon dates of this component have been published, but a similar site nearby has been dated to 12 060 ± 120 BP Thus it is believed that the Yuchanyan component is about 10 000 BP (*Yuan 1996*). One of the most important findings at this site is the discovery of rice husks and rice phytoliths. Studies indicate that rice began to be cultivated there. Therefore, the rice remains discovered at Yuchanyan represent the earliest evidence of rice cultivation in China and in the world. However, more dating work must be done before we make any further inferences.

## LINGNAN REGION

### Dingshishan (Fig. 5a–b)

This site is a shell mound site, located on the first terrace of the Bachijiang river in the east of Nanning city, Zhuang autonomous region, Guangxi province. It consists of several cultural-chronological components (*Fu 1998; Fu et al. 1997*). The lowest occupation is under a layer containing shells and is about 20 to 30 cm thick. This component contains stone artefacts of a small flake tool tradition, which is characterised by micro cores and flakes only about 1–1.5 cm long, directly purchased from silicic volcanic cobbles. Only a few pieces of ceramic vessels were discovered, and there is no distinction between body and rim parts. The shape is simple, with a round bottom. The walls of the pottery are thick and the texture is brittle. The outer surface is decorated with cord marks, and in some cases, the rims were decorated with appliqué bands. The ceramic paste is tempered with sand. The size of the sand is uneven, and the distribution of grains in the paste is irregular.

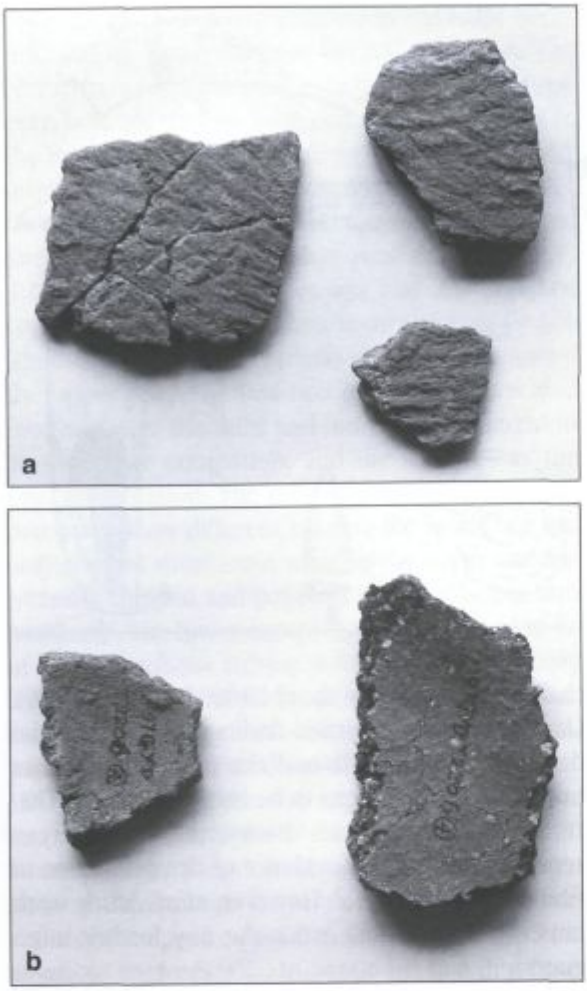

*Fig. 5. a: Potsherds of Dingshishan site (front view). b: Potsherds of Dingshishan site (back view). From the first period of Dingshishan site, south China, about 10 000 BP. Extremely coarse sand can be seen from both exterior and interior faces. (After Fu 1998.)*

This component is considered one of the earliest Neolithic remains in the Lingnan region (*Fu 1998*). No radiocarbon dates for the component are available, but the upper level of occupation is dated to 10 365 ± 113 BP Taking into account the error in radiocarbon dating caused by limestone environment there, it is believed that the upper level of occupation is about 7000–8000 BP. Typological studies of ceramics support this hypothesis. Therefore, the component in concern should be dated about 10 000 BP (*Fu 1998*). However, more work on the dating of the component still needs to be done before we make any further inferences.

## Liyuzhui

The site is located in the southern suburb of Liuzhou city, in the Zhuang autonomous region, Guangxi Province. It consists of two cultural-chronological components (*Liuzhoushi bowuguan et al. 1983*). The lower component consists of shell deposits as thick as 100 to 170 cm, containing both chipped and polished stone tools and ceramic fragments. The chipped stone artefacts are come from two traditions: chopper-chopping tools and small, chert flake tools. Axes and discs with a hole in the centre dominate the polished stone tools. But the chipped stone tools make up the majority of the stone artefacts. Only eight pieces of potsherd have been discovered. Among them, seven are tempered with sand and one is of fine clay. Thickness varies from 0.2 to 0.8 cm. The surface is red or black, decorated with coarse cord marks. The shapes of the vessels, although they cannot yet be reconstructed accurately, are probably as simple as those from the other sites: jars with round bottoms and no clear distinction between the body and rim parts.

Two radiocarbon dates are available for this component: the shell sample is 23 330 ± 250 BP (BK 82091), but the human bone sample at the upper level of the occupation is 11 785 ± 150 BP (PV-0402). These dates contradict two other dates of 12 880 ± 220 BP (BK 82090) and 7860 ± 100 BP (PV-0378) obtained from the upper level of components. In spite of errors in dating, it seems that the upper and lower occupations may have been accumulated over a long period, and the lower one may have contained the Early Neolithic remains. Comparative studies on ceramics and lithics also indicate the existence of the Early Neolithic culture.

## Zhuwuyan

This cave site is located on the eastern slope of a small hill, with a main chamber facing to the east and two side chambers extending to the west and south (*Guangdongsheng Bowuguan 1961*). The investigation and test excavation yielded many materials, such as shells, burnt bones, ash, choppers, and, most important, a piece of potsherd. The potsherd is sandy ware, with coarse cord marks.

Several similar cave sites have also been discovered nearby. Some of them contained ceramic remains, which are usually considered as the same assemblage as the example from the Zhuwuyan site. A re-collecting sample from the Zhuwuyan site has a radiocarbon date of 17 140 ± 260 BP (BK) (*Chen Tiemei 1988*). This date is far from reliable. However, the artefacts support the hypothesis that the component is of Early Neolithic cultural remains.

## NORTH-EASTERN CHINA

### Zhalainuoer

This site is located at an open coalmine near Mangzhouli city, Inner Mongolia. Human and animal bones and cultural remains have been found several times since the 1930s. In 1974, geologists made an observation on a section at the northern part of the minefield, and divided a Quaternary occupation of 12.9 m into six layers. Three human skulls and a number of artefacts were discovered from the fourth layer (*Shi 1978*). The material component contains stone artefacts characterised as from the microlithic tradition, including arrowheads, end scrapers with convex edges, microcores, and microbaldes. In addition, notched bone knives, bone awls and a piece of polished bone scapular blade, fragments of ceramic vessels, including undecorated and cord-marked ones were found in the same context. All pottery sherds are tempered with sand, and unslipped and rough.

There was no carbon 14 dates for the component prior to the 1980s investigation. A date of 11 460 ± 230 BP (PV-15) obtained from the upper part of the fifth layer indicates that the component was about 10 000 BP, which belongs to the early Holocene (*Shi 1978*). But some archaeologists doubt the reliability of the date, since the sample was not from the fourth layer (*An 1983*). In 1980, another investigation was carried out and the results supported the first investigation. That is, the component belongs to the early Holocene (*Li Xingguo et al. 1991*). However, two radiocarbon dates of 11 660 ± 130 BP (PV-171, wood sample) and 7070 ± 200 BP (PV-106, shell sample) from the upper parts of the fifth and the fourth layers make the situation more complicated. Geologists believe that there is a bed between the fifth and sixth layers, which respectively corresponds to the Pleistocene/Holocene transition. So, it is believed that it is proper to date the component to about 10 000 BP, even though the fourth layer was considered as a lacustrine sedimentation rather than a residential area of human occupation (*You 1984*). Since formal reports have not been published yet, any inference is debatable. However, the microlithic tradition may support the above conclusion. Also, the early ceramics assemblage between 8000 and 13 000 BP from the Russian Far East and Japan hint the possible existence of the Early Neolithic culture with incipient pottery making.

I believe that the eight sites discussed above are the earliest Neolithic cultural remains with incipient ceramic assemblages. The Peiligang culture in the middle Yellow River valley, the Houli culture of the lower Yellow River valley and the Pengtoushan culture in the middle Yangzi River valley all revealed ceramic remains dated to as early as 8500 BP (*Henansheng wenwu yanjiusuo 1998; Shandong sheng wenwu kaogu yanjiusuo 1998; He 1996*). If we place all the cultural remains prior to 8000 BP in Early Neolithic culture, these sites should be included in this discussion. But all of them developed advanced sedentary villages and practised agriculture, therefore they are excluded here.

## DISCUSSION

The earliest Neolithic sites in China, six of them are cave or shelter, and three are identified as open-air sites share many common features. For example, they are characterised by the same subsistence strategy of hunting, fishing and gathering, rather than farming, although in some cases incipient rice cultivation may have been employed (Yuchayan). The occurrence of polished stone mortars and pestles (Nanzhuangtou) may indicate the processing of grains, but no cultivated millets or other crops were found in the deposits. These tools, therefore, may have been used to process wild plants rather than domesticated ones. Stone mortars were also discovered at the terminal Palaeolithic site, Xiachuan, which is located not far away from Nanzhuangtou. They are considered as tools for processing wild plants. At a few sites, knives made of shells were used as cutting tools. These shell knives, along with a large quantity of mollusc and fish remains, show that fishing may have played an important role in the daily life of these prehistoric people. Only two kinds of animal found at the Nanzhuangtou site, pig and dog, may have been domesticated but identification is still problematic (*Baoding diqu wenguansuo 1992*).

Various stone tool traditions developed in different regions, but the stone artefacts are characterised by a combination of Palaeolithic and Neolithic technologies. In the cave sites in southern China, chipped tools dominated the lithic assemblages. In some cases, a chopper-chopping tool tradition occurred (Zhuwuyan, Liyuzhui); while in other cases a small flake tradition (Yuchanyan and Xianrendong) dominated the tool kit. In one case at the Dingshishan site, a microlithic-like tradition existed. Fauna analysis shows that there were no extinct species of the Pleistocene in those assemblages, except for the Shenxiandong assemblage with the finding of *Crocuta ultima Matsumoto.*

Early ceramic assemblages from the different regions in China are characterised by certain technological and morphological features. Almost all-ceramic pastes are very coarse, and tempered with non-plastic material (mainly quartz, and in some cases plant fibre). The size and distribution of the sand grains in the paste are irregular; indicating that natural clay may have been used, without artificially processing the temper (*Zhushchiknovskaya 1997*). However, a stack of artificially tempered clay with very coarse quartz grains was discovered at the Baozitou site near Dingshishan, dating to a period later than the lowest occupation of the Dingshishan site (*Fu 1998*). This may suggest that even incipient ceramic pastes were artificially processed rather than directly obtained from natural sources.

All ceramic vessels were hand-made, but not all assemblages provide evidence of manufacturing techniques. In most cases, a molding technique, perhaps in conjunction with the use of a paddle and anvil, may have been employed. This hypothesis is supported by the fact that cord or basket-like marks are found on both inner and outer surfaces, and that two or more layers of clay can be observed on the cross sections of some vessel walls. Small pieces or discs of clay may have been pasted on a stone, basket, or even a guard to form a vessel in the initial manufacture. The coiling method, mainly used in the middle and late Neolithic periods in China, has not been found in these early assemblages. This is different from that of the early assemblages of the Far East region in Russia, where a coiling technique was employed in the early pottery-making period. The use of molds in the manufacturing process was popular in several areas of Eurasia (*Borrinsky 1978*), especially in East Asia (*Zhushchikhovskaya 1997; Wang 1995; Yu 1987; Chen Xingcan 1998*).

Most ceramic vessels are decorated with cord marks; only a few are plain. Appliqué bands and /or perforations are often employed on the rim. These features are similar to those of early ceramics from other regions of eastern Asia and other areas in the world (*Vandiver 1991; Zhushchikhovskaya 1997*). The appearance of perforations may indicate the application of a molding method. The absence of surface treatments, such as rubbing, smoothing, and slipping, is typical of these early assemblages.

The ceramic shapes are simple. In most cases, there is no distinction between body and rim parts. The bases of almost all vessels found in southern China, whenever identifiable, are rounded (Xianrendong, Dingshishan). But, a flat base seems to dominate pottery design in north China (Nanzhuangtou). These features later became distinctive traditions characterising southern and northern Neolithic ceramic assemblages in China. For example, most vessels from the Xinglouwa culture in Inner Mongolia which have been dated to 7000 to 8000 BP are flat-bottomed, while the Pentoushan culture of the middle Yangzi River valley has yielded more round-bottomed vessels. The different traditions may occur as early as the onset of the pottery-making period. The differences may reflect that different molds were used for ceramic production then. The prehistoric people of the South may have used round-bottomed objects such as basket or guard as molds, while people in the North may have used flat-bottomed objects such as wooden containers as molds.

In the Early Neolithic cultures, a reddish-brown or greyish-black coarse ware with sandy or plant fibre temper made up the major portion of pottery assemblages. The walls of the sherds are uneven and thick. The ceramic samples are very brittle and loose. In most cases, the sherds are very small, so it is difficult to study and to reconstruct manufacturing techniques. The firing temperature must have been very low because of the brittle texture and heterogeneous colour. However, re-firing tests have not been carried out in most cases, and no kilns have been found at those early sites. It is reasonable to infer that the incipient pottery may have been burned in open-firing sites rather than in kilns.

These eight sites consist of ceramic assemblages that represent a similar level of pottery manufacture, and are dated to a fairly large temporal interval between 14 000 and 9000 BP. This large interval may be affected by the small number of radiocarbon dates available for these assemblages, and by the lack of more efficient absolute dating methods. However, any progress in Early Neolithic studies should be based on fieldwork rather than on carbon 14 dating itself. The contradictory absolute dates may have been caused by fieldwork rather laboratory errors.

Since the pottery dated to about 10 000 BP was found in the 1950s in the Japanese archipelago, East Asia has been considered as one of the locations to search for the origins of ceramics by a increasing number of archaeologists in the world (*Deng 1985*). As early as 8000 BP, various ceramic traditions had been established in China, indicating that there must have been a long process of development in each of those traditions prior to this period. Archaeological

discoveries support this hypothesis. The new evidence not only places the origins of pottery to a period 1000 years earlier than we thought before, but also changes our understanding of the Early Neolithic cultures.

There are two questions arising from these new data. First, did the invention of ceramics appear with subsistence based on agriculture? It seems that the early pottery vessels were made by people who depended on food foraging rather than on food production. Although rice cultivation may have started in some areas (Diaotonghua and Xianrendong), hunting, fishing, and gathering still dominated the economy. In most areas of Lingnan and north-east China, agriculture did not begin until the late Neolithic or even the Bronze Age. In contrast, the peoples in West Asia and Southeast Europe had lived in sedentary villages and practised agriculture for 1000 years or more before making pottery (*Singh 1974*). The second question is, did China experience Pre-Pottery Neolithic cultures? The concept of a pre-pottery Neolithic that refers to the appearance of agriculture signifies the beginning of the Neolithic Age. But agriculture did not occur in most of the early Holocene sites, regardless of the presence of ceramics. It seems that the idea of a Pre-Pottery Neolithic, which is widely used in the Western literature, may not be apt for Early Neolithic cultures in China.

**ACKNOWLEDGEMENTS**

I would like to thank all of the Chinese colleagues who gave me permission to observe and study Early Neolithic cultural artefacts from archaeological excavations in China. I am grateful to Mr. Fuxianguo, Zhao Yonghong and Ming Wei for processing slides, and to Liu Jianguo for his help in map making. Dr. Li Liu has helped extensively in improving the language and style of this article. I express my gratitude to Dr. Mihael Budja for giving me the opportunity to come to Ljubljana and present this paper at the Fifth Neolithic Seminar on the Neolithization of Europe and Asia: Regional Approaches.

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UDK 903(510)"633/6343"
Documenta Praehistorica XXV (Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji XXV)

# New achievements in the study on the transitional period from the Palaeolithic to the Neolithic in China

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ABSTRACT - *The archaeological data on transitional period from Palaeolithic to Neolithic in South and North and South China are presented. In South China in the transitional period from 21 000 BP to 12 000 BP, the primitive pottery, polished blades, microliths and plant opal phytoliths similar to cultivated rice appeared in the context of chipped pebble flake tools, polished bone and antler tools, and foraging and hunting subsistence economy. In North China the transitional period is embedded in time span from 16 000 BP to 11 000 BP. In stone tool assemblages, the flake tools and microliths prevail. The pottery appeared in the Hutouliang cultural context 10 000 BP. There are the evidences of foraging and hunting subsistence economy only.*

POVZETEK - *V članku predstavljamo arheološke podatke o prehodnem obdobju med paleolitikom in neolitikom v severni in južni Kitajski. V severni Kitajski se v prehodnem obdobju med 21 000 BP in 12 000 BP pojavljajo primitivna keramika, glajene kline, mikroliti in rastlinske mlečnosteklene okamnine, podobne gojenemu rižu, v kontekstu z odbitkovnimi orodji, glajenimi kostmi in orodji iz rogovja ter lovsko-nabiralniškim gospodarstvom. V severni Kitajski prehodno obdobje obsega čas med 16 000 BP in 11 000 BP. Med kamnitimi orodji prevladujejo odbitkovna orodja in mikroliti. Keramika se pojavi 10 000 BP v kulturi Hutouliang. Glede gospodarstva imamo dokaze le za lov in nabiralništvo.*

## INTRODUCTION

The transitional period from Palaeolithic to Neolithic, identified as Mesolithic by some scholars and, because of some important changes in the history of human development still attracts pretty much attention in prehistoric archaeology and quaternary environmental science. Thanks to the continuous progress in natural sciences, technology and in other interdisciplinary studies, Chinese archaeologists provide remarkable research results in recent years. Several research projects and field activities in Wannian, Xianrendong (Jiangxi Province), Qinshui, Xiachuan/Jixian, Shizitan (Shanxi Province), Liuzhou, Bailiandong (Guangxi Province) and Yangchundushizi (Guangdong Province), Diaotonghuan, Daoxian, Yuchanyan (Hunan Province), Yangyuan, Hutouliang (Hebei Province) have been carried out to establish Mesolithic stratigraphic and chronological sequence; to identify palaeoclimatic changes and to provide palaeoenvironmental reconstruction; to analyse process of animal domestication and agriculture origin; to identify the appearance of pottery production and polish stone-tool technology.

### Bailiandong (Fig. 1-3)

Bailiandong is a cave site. The tuff seems to divide the cave accumulation into east and west part. The Museum of Liuzhou and the Natural Museum of Beijing and some other research groups excavated the cave deposit in the period from 1973 to 1993. The assemblages of charcoal, burnt bones, calcium slice, spiral shells, and fossil bones and, pollen samples have been collected in correlation with their stratigraphic positions from different cultural and natural layers (*Yi Guangyuan et al. 1994; "Excavation report..."1987*). The chrono-stratigraphic sequence and the sequence of superimposed layers, artefact and bone assemblages from both parts of cave deposits are presented on Tables 1 and 2.

### Yuchanyan

Yuchanyan is a cave dwelling site located in Daoxian, Hunan Province. The entrance into the cave looks like a 12-15 meters wide, 6-8 meters long, and approximately 5 meters high hall. The catchment area is flat and reach with fresh water sources.

The Institute of Cultural Relics and Archaeology of Hunan Province excavated this site in 1993 and 1995. Artefact assemblage mainly consists of chipped stone tools, bone, antler and, shell tools and a large amount of animal bones was deposited in 1.2–1.8 meters thick deposit. There were also a few pot-sherds with pointed and round bottoms found. The pottery is thick, heavy, and mingled with coarse sands and organic material (Fig.4). Coiling was used as manufacturing technique, namely coils of clay

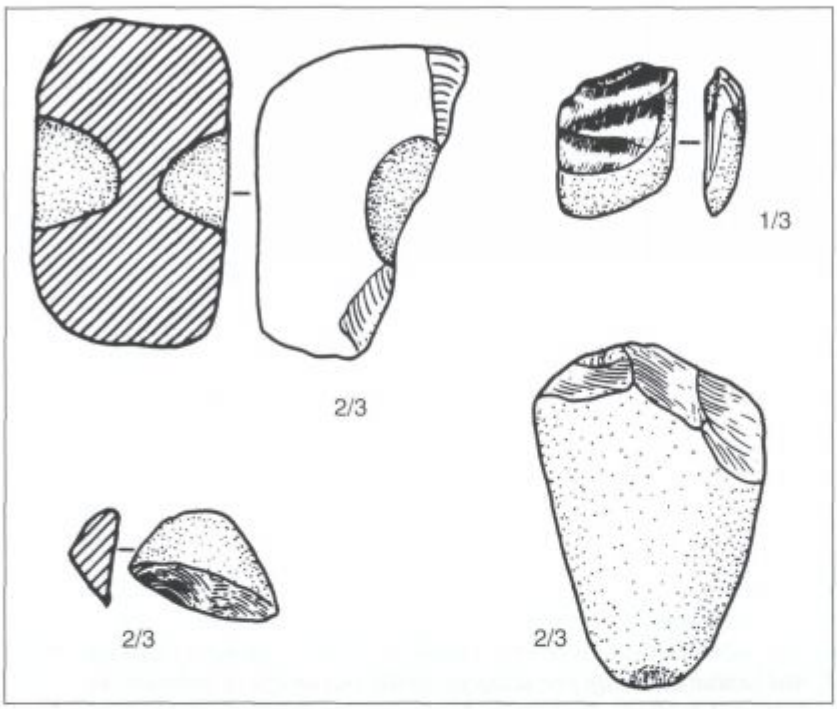


*Fig. 1. Bailiandong. Layer 2, western part. Stone tools. M 1:3 – 2:3.*

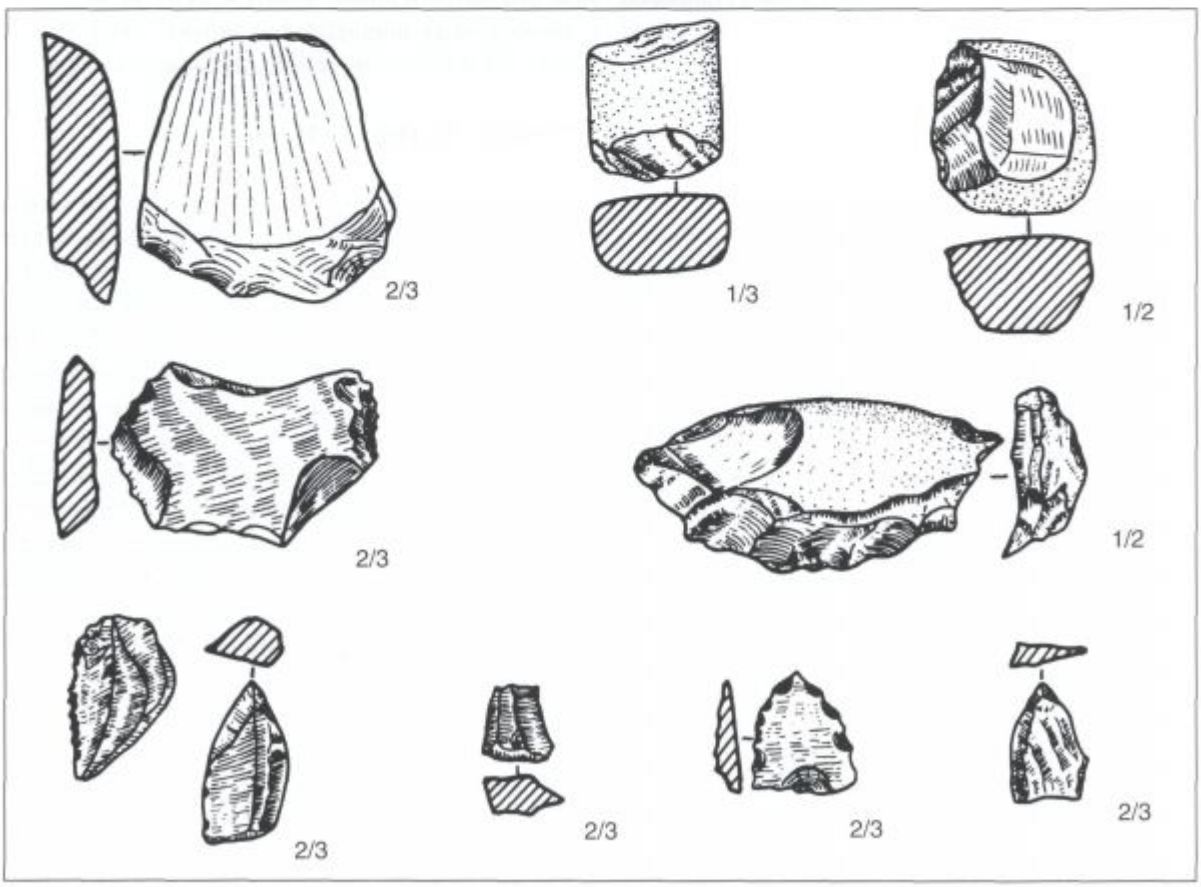


*Fig. 2. Bailiandong, layer 3, western part. Stone tools. M 1:3 – 2:3; 1:2.*

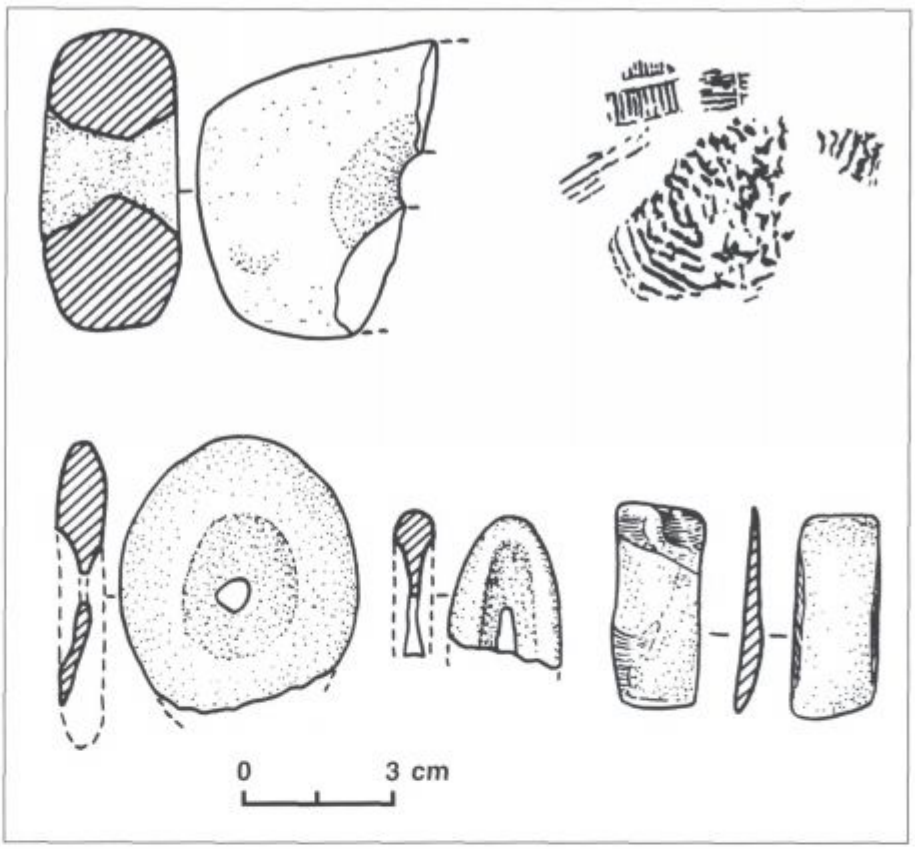


*Fig. 3. Bailiandong. Layer 3, eastern part. Stone tools and implements.*

were built up to establish the vessel. There are traces of prints on the pottery identified. Some bone tools are polished, and shell tools are perforated. Bone assemblage consists of remains of deer's, birds, mammals, fish, tortoises, and molluscs such as snails and shells. Deer's and birds bones prevail. Flotation and dry sieving produced dozens of seeds and kernels. We can conclude that the subsistence strategies were based on hunting and gathering. But, the analyses of rice species confirmed that some groups are wild and the other cultivated showing all characteristics of a wild *indica* and *japonica* species. It is believed that the later group belongs to an ancient type of rice, which has been cultivated approximately 10 000 BC, just before splitting in two species (*Yuan Jiarong 1996; Yan Wenming 1997*).

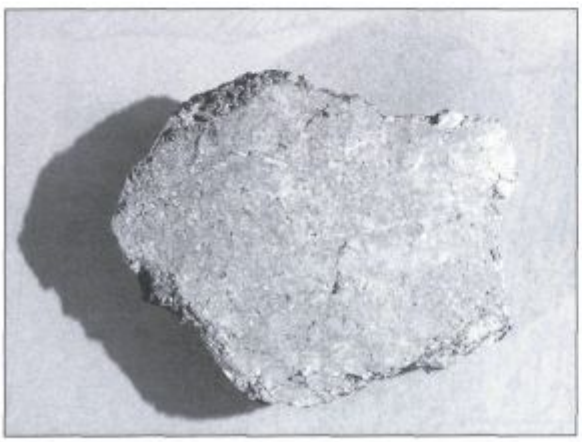

*Fig. 4. Yuchanyan. Pottery fragment.*

## Xianrendong and Diaotonghuan (Fig. 5)

The Xianrendong site and the Diaotonghuan site are two cave dwelling sites at a distance of 800 meters in Wannian, Jiangxi Province. A Sino-American archaeological team excavated there in two seasons – 1993 and 1995. In second season they found 625 pieces of stone tools, 318 pieces of bone tools, 26 pieces of perforated shell tools, 516 pieces of potsherds, dozens of fragments of human bones and ten of thousands fragments of animal bones. The artefact assemblages, documented in cultural layers provide important sources for the study of cultural chronology, the settlement pattern changeability, the emergence of pottery production and rice cultivation in the transitional period from the Late Paleolithic to the Early Neolithic in southern China. Small flake tools of flint and quartz, such as scrapers, side-scrapers, gravers, end-scrapers, points, and a few pebble-choppers represent the Late Paleolithic stone tool assemblage. The number of small stone tools significantly decreased in the beginning of Early Neolithic. In the stratum that has been correlated to the transition from the Paleolithic to the Neolithic,

perforated shell tools, bone, and antler shovels, polished stone tools and primitive potsherds were found. The date of the earliest potsherds from the Xianrendong site is earlier than 14 000 BP. The pots with round bottoms are mingled with quartz sands, and most of them were made by means of attaching clay-piece sticks, while some others were made by accumulating layers of clay strips. The main decoration is an impressed pattern. A large number of plant opal phytoliths of wild rice were unearthed in strata from F to H in the Diaotonghuan site, while some plant opal phytoliths of semi-cultivated rice were found in strata from E to C. The excavators consider that the strata from F to P belong to the Late Paleolithic, while the strata from E to C belong to the Early Neolithic. Animal bones comprised several species, including deer, pigs, tortoises, birds and so on, among which deer are the major type, accounting for about 80%, and pigs and birds are the second. The Diaotonghuan site was recognised as a temporary camp and slaughterhouse for the inhabitants living in Xianrendong at the time (*Zhang Chi, Liu Shizhong 1996*).

**Miaoyan**

The an Miaoyan site is a cave site in Guilin, Guangxi Province. Trial excavation yielded a cultural sequence stretching from the Late Palaeolithic to the Neolithic. Cultural deposits are divided into six strata: the earliest potsherds were found in the middle of the fifth stratum. They are coarse and tempered with sand, surface colour varies in tones of brownish-grey to reddish-brown. Pots were probably fired at a low temperature. Potsherds are dated to 14 000 cal BP, which is one of the earliest dated pottery assemblage found in China so far (*Yuan Sixun 1997*).

| Stratum & Sample* (Lab No.) | | $^{14}$C age (yr Bp) |
|---|---|---|
| 2 | BA92030-1 | 12730 ± 370 |
| 3M | BA92033-1 | 12630 ± 450 |
| 4M | BA92034-1 | 13710 ± 270 |
| 5L | BA92036-1 | 18140 ± 320 |
| 6L | BA92037-1 | 20920 ± 430 |

***$^{14}$C Ages of the Miaoyan Site.***

As it was mentioned above, the study of archaeological cave deposits dated to the period from 21 000 to 12 000 BP provides some insights into the processes of transition from Palaeolithic to Neolithic in South China. Transition period is marked by the appearance of pottery, polished blades, perforated heavy stone tools, microliths, and arrowheads. The pots are coarse and simple shaped with round or pointed round bases. Fabric was tempered with sand

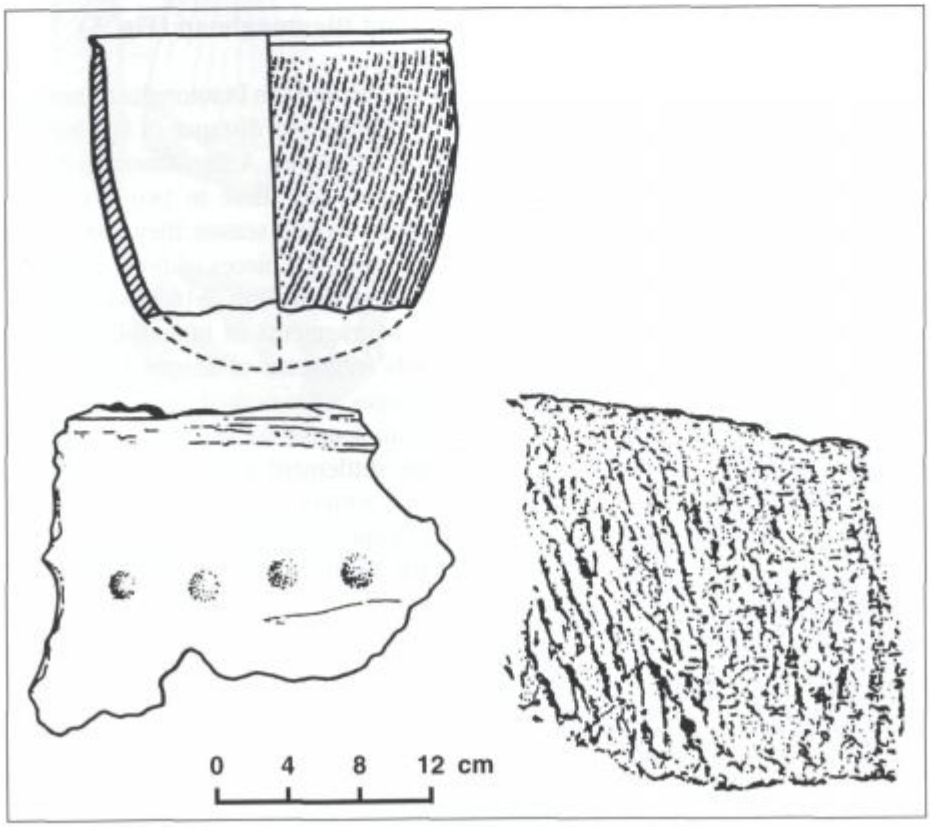


***Fig. 5. Xianrendong. Neolithic pottery.***

and fired at low temperatures. Although economy was based on hunting and gathering, presence of plant opal phytoliths similar to those of cultivated rice indicates the initiate stage of agriculture.

### Shizitan (Fig. 6)

The study of transition from Palaeolithic to Neolithic in northern China is still at the beginning. The research projects are currently running on Shizitan site in Jixian, Shanxi Province and on Hutouliang site in Yangyuan, Hebei Province.

The Shizitan site is situated near the Qingshui River, a tributary of the Yellow River. The size of the area excavated in 1980 campaign was more than 100 m$^2$ and yielded 10 m thick stratigraphical sequence stretching from the Late Palaeolithic to the Early Neolithic. Many important cultural remains and some animal bones were unearthed during this excavation. In 1994, the Department of Archaeology at Peking University and other institutes re-examined the original stratigraphic section and collected carbon and soil samples from each stratum. Samples are still being processed.

About one half of all stone tools from the cultural strata dated to 16 000–11 000 BP are flaked stone tools (including scrapers, points, arrowheads, etc.), made of flint and quartz, the other half are typical

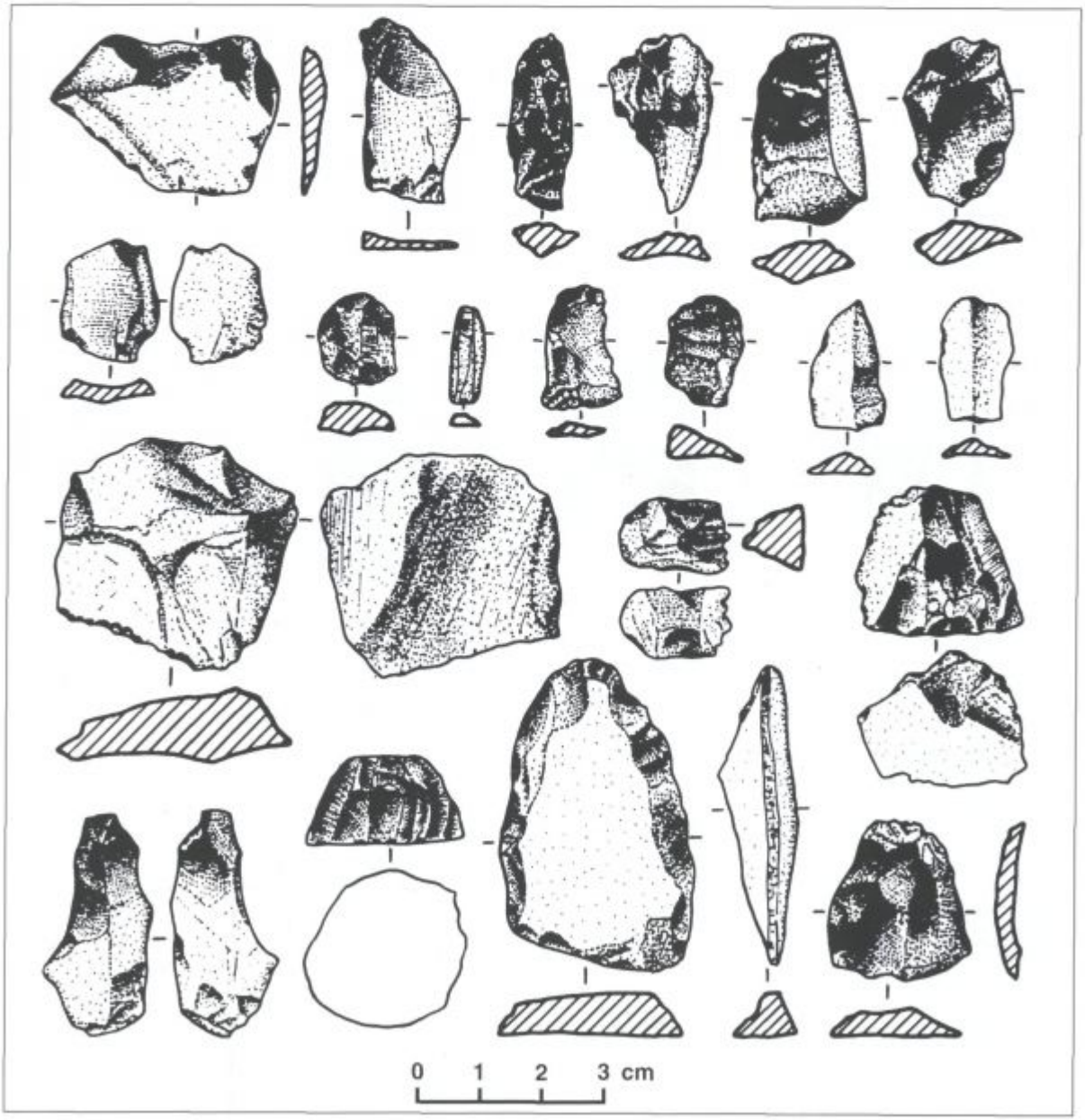


*Fig. 6. Shizitan, central part. Microlithic stone tools.*

microlithic tools, represented by a large number of micro-blades and variety of micro-cores (funnel-shaped cores, boat boff-shaped cores, wedge-shaped cores, etc.). Among microlithic tools micro-blades predominate by 70%. Generally, pressure flaking produces them.

Some features were also excavated, including irregularly shaped pits, filled with ashes and burned animal bones. Identified species include antelopes, pigs, oxen, mice, and so on. Antelope bones predominate and a large part of them had been burned. According to the data, economy was based mainly on gathering and hunting (*"Cultural Bureau..." 1998; Yuan Si-xun, Zhao Chaohong 1998*).

**Yujiagou**

From 1995 to 1997, the archaeological team of the Hebei Provincial Institute of Cultural Relics and the Department of Archaeology at Peking University excavated the Yujiagou site and some other locations of the Hutouliang group, in Yangyuan, Hebei. Cultural deposits from the Late Palaeolithic to the Early and Middle Neolithic were found, yielding a large number of stone artefacts, animal bones and primitive potsherds. Stone artefacts include micro-cores where wedge-shaped cores predominate, and a certain amount of composite tools such as arrowheads, spearheads and wedge-shaped tools (Fig. 7). Composite tools hold an important position in the Jiqitan and Hutouliang culture (*Liu Lihong 1998*); wedge-shaped tools were found in the Xiachuan site at Qinshui, Shanxi province (*"Ji Qi Tan microlithic..." 1993*), while in the Hutouliang group there were even more numerous. Some of them had been polished at the ventral side and use-wear polish is visible. Wedge-shaped tools from Hutouliang sites are dated earlier than their counterparts of the Xiachuan culture. From the upper stratum of the Xiachuan site come six dates, stretching from 23 900 ± 1000 BP (zk-417) to 16 400 ± 900 BP (zk-385). Latest phase of the Hutouliang group microlithic culture may be dated to about 10 000 BP according to the earliest

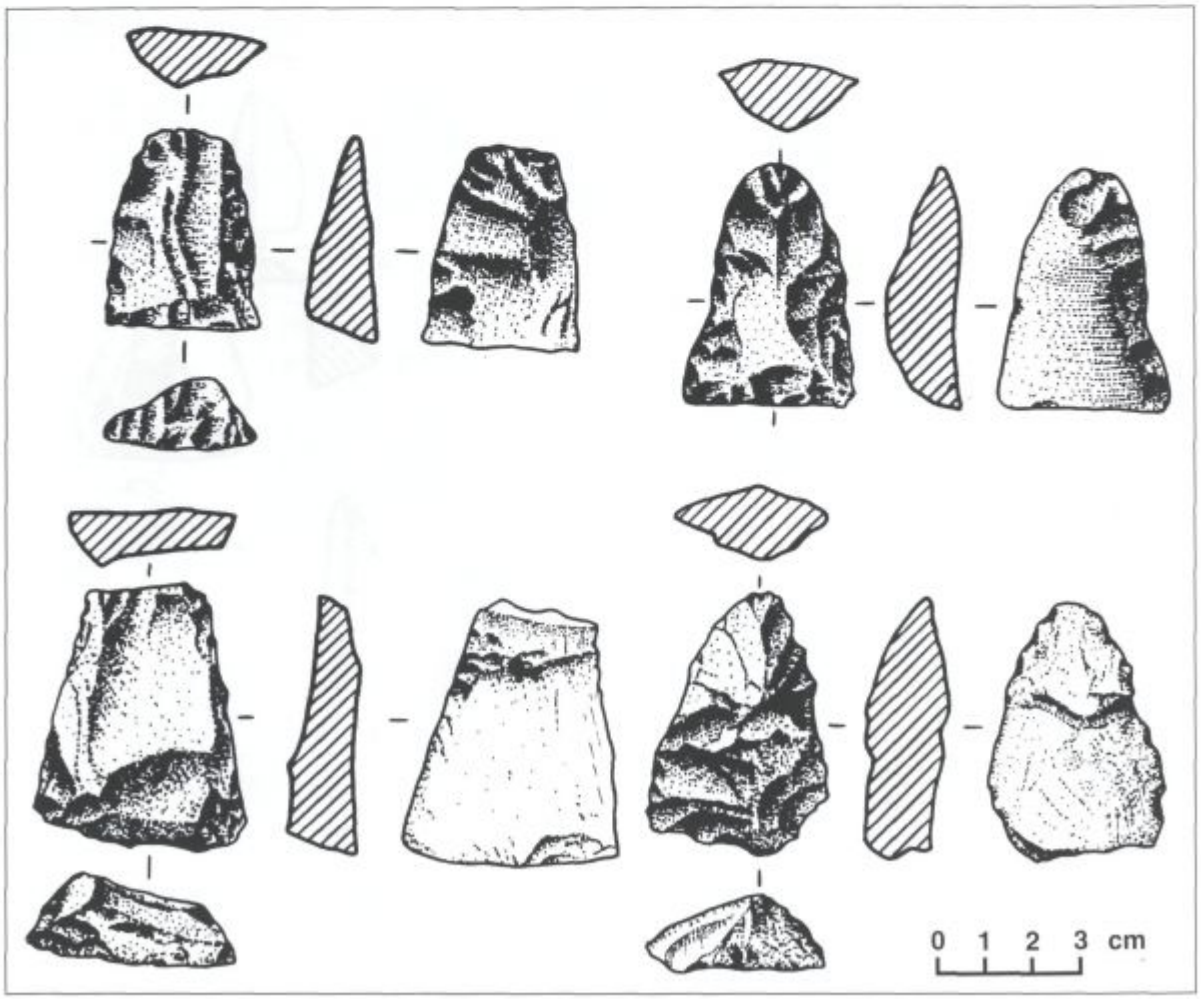


*Fig. 7. Jiqitan. Wedge-shaped stone tools.*

potsherds from Location 65039 (Yujiagou) of the Hutouliang group. Potsherds were found at the bottom of sandy loess and the upper part of the lower strata of fine soils, geologically dated to about 10 000 BP (*Wang Jian et al. 1978*).

The excavation and multi-disciplinary research are still in progress at present. Important factors to be considered are the climatic changes that took place during the last glacial stage of the Pleistocene. In this period, the ancient cultures of China had obviously different cultural characteristics due to the environmental differences and different cultural traditions. According to the available data, China can be divided into two areas: South and North, each with its own characteristics. On the whole, South China artefacts and remains are mainly found in caves and rock-shelters, with some locations on river terraces. Single-side retouched stone tools, some tools made of quartzes and flints, and perforated heavy stone tools are characteristic of that area. Mesolithic people also developed relatively advanced bone and horn polishing techniques and shell-drilling techniques. A few partly- polished stone tools and coarse sand-mixed pottery were also found in South China. On the other hand, North China sites from this period were mainly found along alluvial plains and some of them in caves. Microliths and composite tools are characteristic of the region, some partly-polished stone tools and sand-tempered pottery were also found.

Despite these differences, there are some synchronous developments in the economy and technology of both regions.

1. A few partly-polished stone tools were found in both areas. The blade-polished tools in South China are dated almost as early as 20 000 BP while in North China are younger, dated to 10 000 BP.

2. Primitive pottery appears. In South China, it probably appeared around 12 000 to 15 000 BP, while in North China it is dated to 10 000 BP. Pottery of both regions is similar, both being coarse, with about 1 cm thick walls, sand-tempered and fired at low temperatures. Shapes are simple with few varieties.

3. The subsistence was based on gathering, hunting and fishing. In some regions with favourable climate, natural resources and social conditions early agriculture and process of domestication might have begun.

4. There are open-air and cave sites. Features of the open air-sites include hearths, pits (natural recesses were often used), stone tool workshops, charcoal grains and animal bones, but so far no circular ditches or walls have been discovered.

At present, some achievements have been made in the multi-disciplinary research on the transitional period from the Palaeolithic to the Neolithic in China, but these studies are still elementary. In terms of research into the transition period, methods, means and theories need to be improved and strengthened. For example, the application of phytolith analysis method, pollen analysis and other dating methods need to be supplemented and perfected, and accuracy needs to be improved. Some new scientific methods need to be developed. In academic circles, the understanding of the interaction between humans and their surroundings in different natural environments needs to be deepened, in order that people can get closer to the objective reality of the social development of human societies.

| Layer | Cultural relics | Ages | | | |
|---|---|---|---|---|---|
| | | Lab number | sample material | $^{14}C$ age | uranium-series age |
| the first layer calcium board | Ostracons with thick cord mark, fragmentary spiral shells | BK82092 | calcium board | 7080 ± 125 connected by tree-ring dating method bc5952-5630 | |
| the second layer calcium board the total thickness of these two layers is about 5-25cm | spiral shells, animal bones | BK94044 | calcium board, (upper) calcium board, (lower) | 7140 ± 60<br>9520 ± 90 | |
| the third layer Isabel clayey soil, cinereous (grayish white) and tawny (yellow-brown) in part the average thickness: 38cm | 1 polished stoneware, 1 ground perforated gravel, 2 perforated stone ornaments, chipped stone stools, a few flint flakes; animal fossil, burnt bones carbon granules, lots of spiral shells | KBY82239<br><br>BA93016 | osteolith (fossil bones)<br><br>carbon slack | <br><br>11 160 ± 580 (AMS-$^{14}C$) | 8000 ± 800 |
| the forth layer tawny clayey soil, thickness: about 36cm | 1 stone adze with polished blade (its lower part was ground into circular blade), chipped stone stools, a few flint flakes, ground bone artefacts and horn artefacts, animal fossils, a few spiral shells, carbon granules, | BA93017 | carbon Slack | 13 550 ± 590 (AMS-$^{14}C$) | |
| the fifth layer calcium board thickness: 1-4cm | spiral shells seen occasionally | PV-445 | calcium board | 13 905 ± 250 (AMS-$^{14}C$) | |
| the sixth layer and rock brown clayey soil, containing sand, thickness: 43cm | incompletely perforated gravel, chipped stone stools, plenty of spiral shells at the top of the accumulation, carbon granules, | BA92003 | spiral shell | 14 650 ± 230 (AMS-$^{14}C$) | |
| the seventh layer calcium board thickness: 44cm | | BK94041 | calcium board | 19 465 ± 200 | |
| the eighth layer ferruginous clayey soil, containing lots of breccia, exposed thickness: 1m, bottom unseen | black flint flakes, animal fossils | BA92013 | burnt bones (AMS-$^{14}C$) | 20 240 ± 660 | |

***Table 1. Dating results of the layer's accumulation, and cultural relics (eastern part).***

| Layer | | Cultural relics | Ages | | | |
|---|---|---|---|---|---|---|
| original layer | New layer | | Lab number | sample material | $^{14}C$ age (BP) | uranium-series age (BP) |
| accumulation of spiral shells above the main accumulation | 1 | gravel tools and flint fragments, spiral shells and primitive perforated gravels | BA94027 | carbon slack (top) | 10 310 ± 290 (AMS-$^{14}C$) | |
| calcium board | 2 | | BK93033 | calcium board (top) | 12 780 ± 180 | |
| the first layer Isabel clayey soil, thickness: 20–34 cm | 3 | animal fossils, burnt bones, spiral shells | BA92017 | spiral Shell | 18 450 ± 410 (AMS-$^{14}C$) | |
| the second layer calcium board thickness: 5–30 cm | | ground gravel cutting-tool fossil bones, a few spiral shells | BK82097 | calcium board | 19 910 ± 180 | |
| the third layer tawny clayey soil, thickness:: 18–36 cm | 4 | Chipped stone stools, among which black flints increase in amount and a considerable part bears the feature of microlith; metal arrowhead, animal bones, more spiral shells, carbon granules. | BK92039 | tufa | 21 575 ± 150 | |
| the forth layer thickness: 4cm | | carbon slacks | BK82098 | | 26 680 ± 625 | |
| the fifth layer tawny clayey soil, brown in part thickness: 30–34 cm | 5 | chipped stone stools, among which flinted stoneware covered a considerable part, gravel tools and some stone artefacts bearing the feature of the Palaeolithic period, animal fossils, very few spiral shells, fire piles, carbon slacks. | | | | |
| the sixth layer stalactite thickness: 10 cm | | fossil bones | BKY82141 | fossil bones | | 28 000 ± 2000 |
| the seventh layer black tawny clayey soil, containing breccia, thickness: 18 cm, | | chipped stone stools, 2 fossils of human teeth, animal bones including rhinoceros, stegodons and giant pandas, no spiral shells | | | | |
| the eight layer calcium board thickness: 10 cm | | | | | | |
| the ninth layer tawny clayey soil, thickness:: 12 cm | | | | | | |
| the tenth layer containing clay at the top of the calcium, unseen bottom | | animal fossil fragments occasionally seen | BK82101 | | 37 000 ± 2000 | |

***Table 2. Dating results of the layer's accumulation, and cultural relics (western part).***

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UDK 903(510:3–11)"6343"
Documenta Praehistorica XXV (Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji XXV)

# A comparative outline of the Early Neolithic cultures in China and in the Near East

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ABSTRACT – *The transition between a hunting-gathering and food-producing economy occurred at both ends of the Asia continent at roughly the same time. A survey of the archaeological evidence published on this cultural period in these regions produces some very interesting results. It clearly shows that, if the basic principles for sedentism and the domestication of local plants and animals were similar in the Near East and in China, the respective adaptive strategies chosen by the local populations to solve technological and metaphysical problems which must have been similar, were completely different. It must then be accepted that the cultural changes that happened at the beginning of the Neolithic period were not the result of direct contacts or exchanges of influences between the Near East and China, and that the transition occurred independently in these regions.*

POVZETEK – *Do prehoda iz lovsko-nabiralnega v pridelovalno gospodarstvo je v vzhodni in zahodni Aziji prišlo skoraj sočasno. Pregled objavljenih arheoloških podatkov o tej kulturni fazi ponuja v omenjenih regijah nekaj zanimivih rezultatov. Ti jasno kažejo, da so bile adaptivne strategije, ki so jih uporabljale lokane skupnosti pri reševanju tehnoloških in metafizičnih problemov, kljub podobnim osnovnim načelom sedentizma in domestikacije lokalnih rastlin in živali na Bližnjem vzhodu in na Kitajskem, različne. Velja ocena, da se je prehod na kmetovanje na teh področjih odvijal neodvisno in da kulturne spremembe, ki so se dogodile na začetku neolitika, niso bile posledica neposrednih kontaktov, izmenjav in vplivov med Bližnjim vzhodom in Kitajsko.*

## I. INTRODUCTION

At a certain point in their development, people decided to stop wandering around and to settle down instead. The real reasons for this have yet to be established with certainty, beyond probable climatic, ecological or demographic problems. It is even possible that Jacques Cauvin's suggestion that the decision was primarily a step towards human sociological and intellectual maturity (*une mutation mentale*) is indeed correct (*Cauvin 1994.97*). We do not know, but what is certain is that similar events occurred in both Eastern and Western Asia at roughly the same time.

Based on archaeological reports, this study is a synoptic outline of what is presently known about the events resulting from the switch from the hunting-gathering way of life to sedentism and a systematic food-producing economy i.e., the Early Neolithic cultural period. Generalization means oversimplification, which may be dangerous, but it is necessary if one wishes to draw conclusions about general trends. Consequently, in order to have an overall view of how each region solved problems which must have been similar, I decided to deal with the Chinese archaeological evidence in the same way Western researchers usually treat the Near Eastern material. China will therefore be considered as a single cultural block, and will not be divided into the four traditional geo-cultural zones of the North, the North-East, the Central Plain and the South, as is the case elsewhere in more detailed investigations of some Early Chinese Neolithic cultures (*Zhao Chaohong and Chen Xingcan, this volume*).

What, then, really happened during the earliest Neolithic period in China and in the Near East? In both regions, the cultural period appears to be the result of indigenous developments of the local, Palaeoli-

thic foundation. How, then, did both groups solve problems which must have been similar?

## Method

The methodology is straightforward. After a brief summary of the Early Neolithic in the Near East, the equivalent period in China is rapidly surveyed. Then a series of specific features is surveyed and the East Asian evidence is compared with analogous data from Western Asia.

## Definitions

To begin with, we must be aware that the definition used for the cultural period is slightly different at each end of Asia.

In the Near East, the Neolithic is essentially characterised by sedentism and an economy based on agriculture and animal husbandry. Pottery is not involved during the two earlier phases, which are known as Pre-Pottery Neolitihic A (PPNA), starting around 9000 BC, and the later, Pre-Pottery Neolithic B (PPNB). There was even a Pre-Pottery Neolithic C (PPNC) which appeared on a limited basis in the Syrian Desert and in the Southern Levant (*Cauvin 1994.20-21; Avner et al. 1994; Yakar, this volume*).

In China, any settlement dated to the early Holocene with pottery and some form of sedentism is attributed to the Neolithic period, even if agriculture and/or animal husbandry was not yet fully developed.

## Radiocarbon Dates

In this study, all the radiocarbon dates were calibrated according to the latest publications (*Kuijt & Bar-Yosef 1994; Zhongguo Kaoguxue Zhongtau Shisi Niandai Shujinji 1991*).

| BC | BP | Central Anatolia | Coastal Phoenicia Cyprus | S. Levant Negev Sinaï | Jordan Damascene | Middle Euphrates | Eastern Taurus | Syrian Desert | Eastern Djezireh (Sinjar) | Zagros |
|---|---|---|---|---|---|---|---|---|---|---|
| 6000- | 7200 | | | YARMUKIAN | | | | El Kowm 2 PNA PPNC | Hassuna | PN |
| 6500 | 7600- | Hacilar | Amuq A-B | Ain Ghazal | | | | | | |
| | | | Ras Shamra V Byblos Neo. | PPNC Ain Ghazal F-PPNB | Ramad III | Abu Hureyra 2C | XXXXXXXXXX | F-PPNB El Kowm 2 | Umm Dabaghyah | Jarmo |
| | | ↑ | XXXXXXXXXX | | XXXXXXXXXXX | | Gritille | | XXXXXXXX | XXXXXXX |
| 6900 | 8000- | Çatal Hüyük | Khirokitia L-PPNB | L-PPNB XXXXXXXXXX | | | | L-PPNB XXXXXXXXX | L-PPNB (Sinjar) | Aceramic Jarmo Ali Kosh Ganj Dareh |
| 7000- | 8100 | XXXXXXXXX | | | L-PPNB Abu Kosh | L-PPNB Abu Hureyra 2B | | Bouqras | | |
| | | | Ras Shamra V | Ain Ghazal | Ramad I-II Beisamoun | Tell Assouad XXXXXXXXXXX | Cafer Hüyük | | Magzalia | |
| 7600 | 8600- | Asikli | | | M-PPNB | M-PPNB Mureybit IVB | PPNB | | | |
| 8000- | | | | | Jericho PPNB Munhata | Abu Hureyra 2A Halula | Cafer Hüyük Çayönü | | NEMRIKIAN Nemrik | |
| | | | | | SULTANIAN | E-PPNB Mureybit IVA | | | | |
| 8800 | 9600- | | | | Jericho PPNA | | Çayönü | | | |
| 9000- | | ? | | | Netiv Hagdud | Mureybit IIIB | | | | ? |
| | | | KHIAMIAN (Lebanon) | KHIAMIAN Abu Madi I | Jericho Protoneo. | (xx) Mureybit IIIA | | | | |

***Tab. 1. The Beginning of Agriculture in Western Asia: a chronology. Simplified after Jacques Cauvin, Naissance des divinités. Naissance de l'agriculture, (Empreintes), Paris 1994.20–21. Calibrated according to Kuijt & Bar-Yosef 1994.227–245 and Evin 1995.15. (E – Early; M – Middle; L – Late; F – Final; Neo – Neolithic; Up. – Upper; ═ – Beginning of Agriculture; xxx – Beginning of Pottery).***

## II. THE EMERGENCE OF THE NEOLITHIC IN THE NEAR EAST

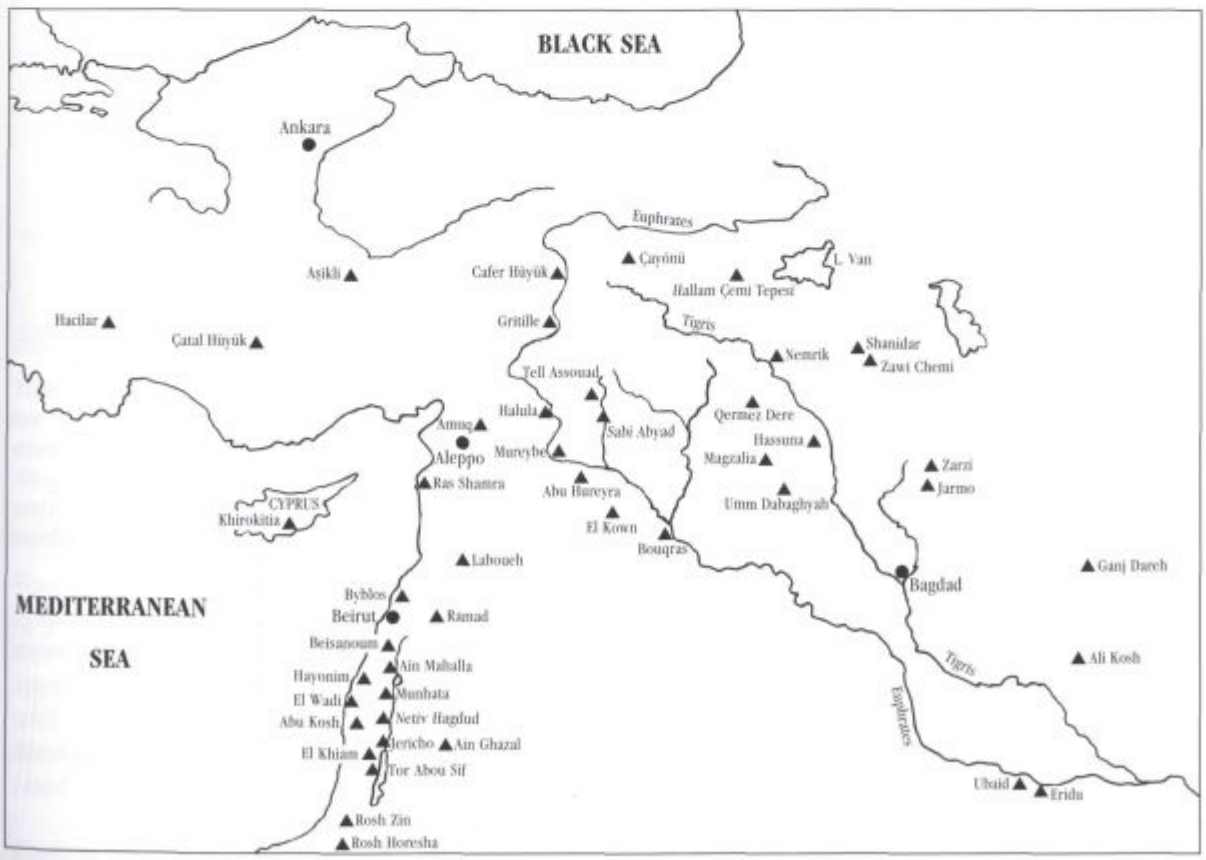
In the Near East, the Neolithic evolved directly from the preceding Epipaleolithic (*Yakar, this volume*), which began about 14 000 years ago. The beginning of the agricultural economy was not synchronic in all the different regions of this part of Western Asia (Tab. 1).

Apparently, it began in the Middle Euphrates region (Mureybit) and the Jordan/Damascene area (Jericho, Netiv Hagdud). It then radiated southwards, to the Negev/Sinai (Ain Ghazal), eastwards to the Djezireh (Mazalia), to the Zagros (Jarmo), and to the Syrian Desert (Bouqras), and northwards, to Phoenicia (Ras Shamra) and the island of Cyprus (Khirokitia). Domestication occurred in the eastern Taurus area (Çayönü) shortly after the two earliest core areas already mentioned, and seems then to have expanded mostly towards Central Anatolia (Çatal Hüyük).

In the Near East, the duration of the Neolithic is divided into three periods: the Early Neolithic (EN), the Middle Neolithic (MN), and the Late Neolithic (LN). This general classification is made for definite cultures, independently of modern political divisions (Map 1).

## III. THE EARLY NEOLITHIC PERIOD IN CHINA: THE BACKGROUND

Until the beginning of the 1920's, there was no archaeological evidence of any Neolithic cultures in China, and this part of prehistory was presumed not to have occurred. Settlements and artifacts, attributed to the Neolithic period, and at the time dated to c. 2500 BC, were, however, excavated in 1921 in the village of Yangshao, in Shaanxi province, by Johan Gunnar Andersson, a Swedish geologist and archaeologist employed by the Chinese government to survey the mineral resources of the country. They were soon followed by investigations in the provinces of Gansu and Henan, which revealed more Neolithic material (*Chen 1997, and this volume*). This was the real beginning of prehistoric archaeology in the country. Classified at first as belonging to the EN period, the Yangshao culture is now recognised as pertaining to the MN, although, because of the high quality of the pottery, some Chinese scholars would attribute it to the early LN.




***Map 1. Early Neolithic settlements in the Near East.***

The terminology (EN, MN, LN) is also used in China. Regarding the exact geographical identification of these widespread cultures, the problem is the same for Chinese archaeology as it is for its Near Eastern counterpart. Since archaeological cultural sectors are often located in more than one Chinese province, the name of an eponymous site is used to characterise a culture, even if the latter is then found far from the first excavated settlement (Map 2). However, some confusion may occur if two or perhaps three different sites with the same culture have been unearthed in different provinces, as in the the cases of the Dadiwan (Gansu), Laoguantai and Baijia (both in Shaanxi) cultures, which are now recognised as being similar. Any of these three names can be then found in the relevant literature, but the problem will eventually be solved.

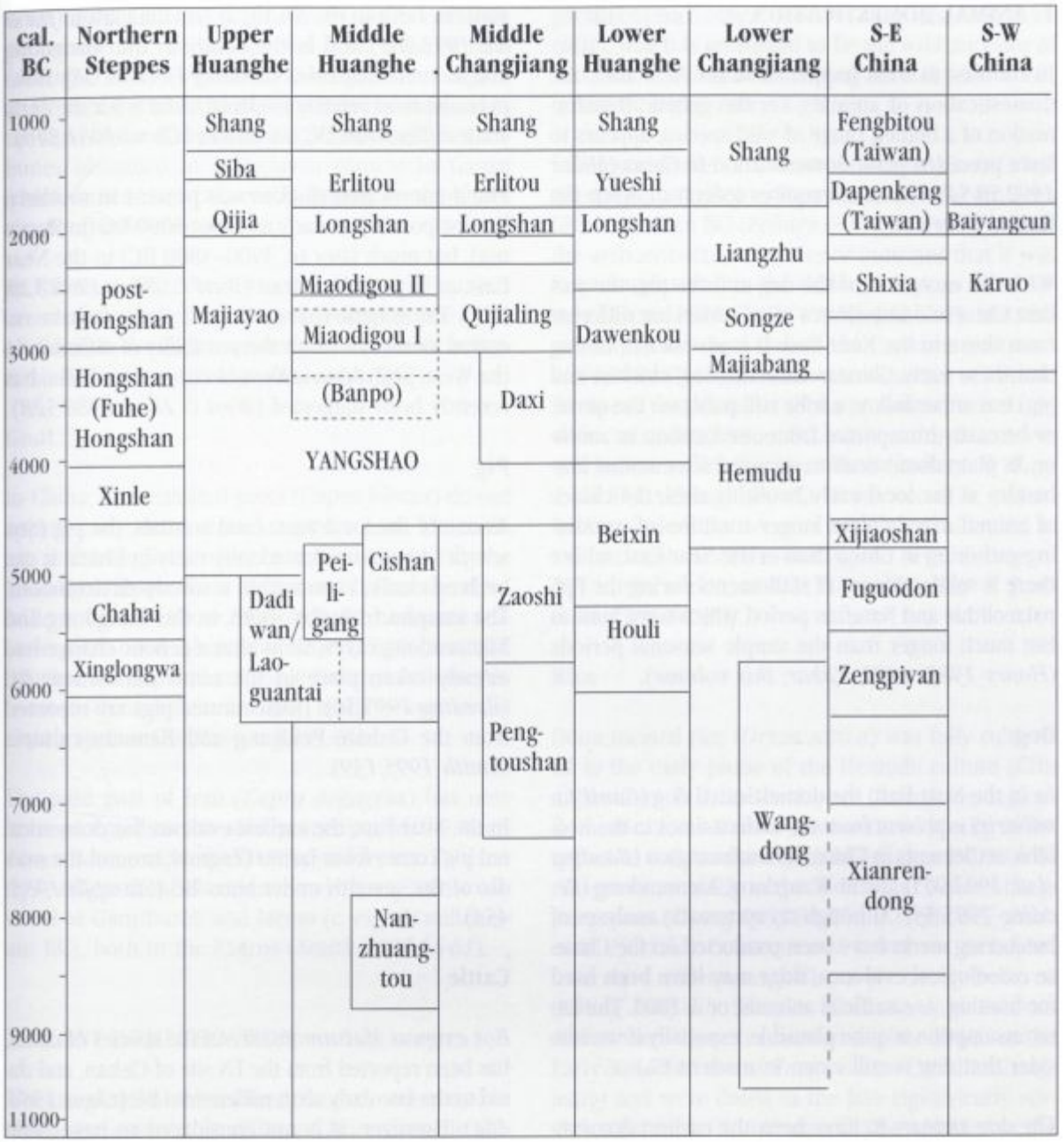
## IV. THE EARLY NEOLITHIC PERIOD IN CHINA: THE ARCHAEOLOGICAL EVIDENCE

It is still unclear when the Neolithic period proper, as we know it in the Near East, began in China. A large number of Early Neolithic cultures, all with pottery, have recently been discovered in various parts of the country, and many were even excavated and the findings published in many of the local archaeological journals. Few of these cultures displayed strong specific regional characteristics. However the majority showed enough relationships with the cultures of neighbouring regions to suggest inter-site contacts on a limited local basis (Tab. 2).

To date, the earliest Neolithic cultures in China with early $^{14}C$ dates have been recovered at Peiligang in Henan (c. 6500–5000 BC), Cishan in southern Hebei (c. 6500–5000 BC), Dadiwan (c. 6000–5000 BC) in Gansu, Laoguantai (or Baijia) in Shaanxi (c. 6000–5000 BC), Houli in Shandong, Pengtoushan (c. 7000–5500 BC) and Zaoshi in Hunan (c. 5500–5000 BC). The cultures of Xinglongwa and Chahai (c. 6200–4500 BC) were unearthed in Liaoning. In the South-Eastern part of the lower Changjiang, Early Neolithic cultures were discovered at Zengpiyan in Guilin (c. 6600–5400 BC) and Fuguodun in Fujian (c. 5600–4700 BC).

In the South, a Sino-American team recently excavated two caves at Wangdong (c. 9000–6000 BC) and Xianrendong (c. 8500–7000 BC) in the Dayuan Basin,


***Map 2. Early Neolithic sites in China.***




***Tab. 2. The most important Chinese cultures from the Neolithic to the beginning of the Bronze Age. (after Wenwu 1994.3, 83; Kaogu 1995.1, 38-38; adapted after Wang Tao, Antiquity 71 (1997).34). Whenever possible, the calibration follows the lists published in Zhongguo Kaoguxue Zhongtan Shisi Niandai Shujinji 1965–1991 (Radiocarbon dates in Chinese Archaeology 1965–1991). Beijing 1991. New excavations and new analyses, however, may slightly alter these $^{14}C$ dates and even the final name of the earliest cultures.***

Wan-nian County, Jiangxi Province. They yielded one Epipalaeolithic and five Neolithic phases, the uppermost being identified as Lungshanoid (LN). Pottery appeared in the first Neolithic phase, still together with wild fauna and flora. Dog, however, was domesticated, and there may be some evidence of domesticated rice dated to c. 11 700 BP (*Zhao et al. 1995.52*).

There are potential indications of an incipient ceramic phase in the Middle Huanghe region at one single and very early site, Nanzhuangtou, in Hebei (c. 8600–7700 BC), where 15 coarsely made sherds were discovered in a possible transitional Epipalaeolithic/Neolithic context, together with limited domesticated fauna and the remains of various types of wild flora (*Jia & Xu 1992*).

Early Neolithic cultures have not yet been excavated, either in the Upper Changjiang, or in the southwestern part of China (Map 2).

## 1. ANIMAL DOMESTICATION

In contrast to what happened in the Near East, the domestication of animals, i.e. the genetic transformation of a limited range of wild species, appears to have preceded plant domestication in China (*Miller 1992.50-54*). The latter requires sedentism, while the former does not.

With the exception of the dog and the pig, the earliest Chinese domesticates were somewhat different from those in the Near East. It is also worth noting that these early Chinese animals (dog, chicken and pig) can either follow a tribe still partly on the move, or be easily transported from one location to another. As plant domestication occurred after animal husbandry at the local early Neolithic sites, the choice of animal may imply a longer tradition of wandering-gathering in China than in the Near East, where there is solid evidence of settlements during the Epipalaeolithic and Natufian period which were built to last much longer than the simple seasonal periods (*Henry 1983; 1989; Yakar, this volume*).

### Dog

As in the Near East, the domesticated dog (*Canis familiaris*) is present from the earliest times in the Neolithic settlements in China at Nanzhuangtou (*Baoding et al. 1992.965*) and at Wangdong, Xienrendong (*Redding 1995.53*). Although no systematic analyses of butchering marks have been conducted on the Chinese osteological evidence, dogs may have been bred for hunting, as sacrificial animals, or as food. The latter assumption is quite plausible, especially if we consider that dog is still eaten in modern China.

The dog appears to have been the earliest domesticated animal in the Near East (*Bökönyi 1994.392*). The evidence from Natufian tombs (Epipalaeolithic period) at Mahalla, where men were buried under floors with canids (*Henri 1989.215*), suggests, however, that dogs may have been raised for hunting, or even as pets, although the possibility that they could have occasionally been eaten cannot be ruled out. Their use as sacrificial animals has also been advanced (*Bökönyi 1994.391*). Domesticated dogs have been found at the lowest PPNA level at Çayönü, in the Eastern Taurus (*Braidwood & Braidwood 1986.8*).

### Chicken

As a domesticate, the chicken *(Gallus gallus domesticus*) is possibly present in a ninth millennium BC context, both in the North, at Nanzhuangtou (*Jia & Xu 1992.964*) and in the South, in the Wangdong and Xienrendong caves (*Reeding 1995.56, 58*). However, the most reliable evidence so far is for the early sixth millennium BC, at Cishan (*Chow 1981.340*).

The domesticated chicken was present in southern Europe possibly as early as about 5000 BC (in Rumania), but much later (c. 3900–3800 BC) in the Near East, at Tepe Yahya, Iran (*West & Zhou 1988.520-521*). The genetic change in fowl seems to have occurred locally, although the possibility of diffusion to the West, probably via Eurasia rather than India, has recently been suggested (*West & Zhou 1988.528*).

### Pig

As one of the local basic food animals, the pig (*Sus scrofa*) was domesticated very early in China. It can be bred easily, even within a woody environment. The samples from the South, in the Wangdong and Xianrendong caves, show that a genetic change had already taken place in the ninth millennium BC (*Reeding 1995.56*). Domesticated pigs are reported from the Cishan, Peiligang and Hemudu cultures (*Smith 1995.139*).

In the Near East, the earliest evidence for domesticated pig comes from Jarmo (Zagros), around the middle of the seventh millennium BC (*Stampfli 1983. 454*).

### Cattle

*Bos exiguus Matsumoto*, an Asiatic species of cattle, has been reported from the EN site of Cishan, and dated to the late early sixth millennium BC (*Chow 1984. 364*). However, it is not considered to have been completely domesticated. As a full domesticate, it became more and more common from the Yangshao cultural period (MN; c. fifth millennium BC) onwards.

In the Near East, the local wild cattle, *Bos primigenius*, was possibly domesticated at Bouqras (Syria) and at Çatal Hüyük (Anatolia) around the late eighth millenium BC (*Perkins 1969*).

### Sheep

In China, sheep (*Ovies*) are first found for certain in the mid-fifth millennium, in a MN context (Hemudu culture). The Chinese domestication data is still not definitive as to the existence of a local wild progenitor in the region, and the archaeological reports are

often unclear on this point; the species is even suspected to have been imported from Western Asia (*Chang 1986.65-94*). As no detailed osteological analysis of the material was apparently conducted at the time of the excavation, it is doubtful whether the bones identified in a Majiayao context in Gansu (third millennium BC) really belong to the *Ovies* species (*Andersson 1943.43*).

In the Near East, domesticated sheep (*Ovis aries*) are already present in the archaeological record at Ali Kosh, in the Zagros mountains, in a ninth millennium BC context (*Hole & Flannery 1967*).

**Goat**

In China, domesticated goats (*Capra hircus*) do not appear early in the archaeological record. The earliest archaeological evidence was excavated at the Miaodigou II site, from the second half of the third millennium BC (*Chow 1984.365*). For the same reasons mentioned above for sheep, it is doubtful whether the bones identified in Gansu, in a Majiayao context (third millennium BC), really belong to the *Capra* species (*Andersson 1943.43*).

The wild goat of Iran *(Capra aegagrus*) has now been accepted as the wild progenitor of the Near-eastern domesticated goat (*Capra hircus*). To date, the earliest domesticated animals have been excavated at Ganj Dareh and Jarmo (c. eighth millennium BC), both in the Zagros (*Smith 1995.58-61*).

## 2. PLANT DOMESTICATION

The categories of the earliest plants domesticated in China are completely different from those in the Near East. This, however, only indicates that the genetic transformation of the native wild progenitors was adapted to local ecological environments. Contrary to what happened in the Near East, plant domestication occurred after animal domestication in China.

**Millet**

Broomcorn millet (*Panicum miliaceum*) and foxtail millet (*Setaria italica*) were the first cereals domesticated in China. They were present as main crops in the earliest Neolithic setttlements (possibly including Nanzhuangtou, during the ninth millennium BC, although there are still some doubts about the validity of the evidence), and were apparently cultivated parallel to each other. Green brittlegrass (*Setaria viridis*), which is presumed to be the wild ancestor of foxtail millet, originates, among several other areas, in the Huanghe valley.

Broomcorn millet (*Panicum miliaceum*) is not identified with certainty in Western Asia (Iran) until the fifth millenium BC (*Zohary & Hopf 1988.78*), while the archaeobotanical evidence indicates that it was fully domesticated in the sixth millennium BC in Austria (*Kreuz 1991.67, 70, 81, 82, 164, 207*), and also possibly at the same time in the Caucasus (*Lisitsina 1984.288*). The earliest known occurence of Central European foxtail millet (*Setaria italica*) was dated to the second millenium BC, while at this time it was still unknown in the Near East (*Zohary & Hopf 1988.81*). Although *Setaria viridis* occurs in eastern Turkey, it does not seem to have been cultivated as a domesticate until the Iron Age (c. seventh century BC) in the region, at Tille Höyük (*Nesbitt & Summers 1988.86, 92*).

**Rice**

Domesticated rice (*Oryza sativa*) was fully cultivated in the early phase of the Hemudu culture (fifth millennium BC), in the Lower Changjiang region. Domestication seems to have occured locally in the region as early as the eighth millennium BC, as wild rice grows normally in the Middle and Lower Changjiang zones (*Chang 1983.70-77; An 1989a.647; Zhao et al. 1995.52*). Consequently, it was not an import from third millennium India, as previously believed (*Chang 1983.70*). Samples of what may be cultivated rice were also excavated in the late 1980's at the Early Neolithic site of Pengtoushan (Middle Changjiang) and were dated to the late eighth/early seventh millennium BC (*Hodges & Chen 1994*), but the degree of domestication is apparently still under discussion (*Glover and Higham 1996.430*). A little further south, however, two caves in the Dayuan Basin of Wan-nian County, Jiangxi Province, were recently excavated by a Sino-American team, and yielded possible evidence of domesticated rice dated to around the twelfth millennium BP (*Zhao et al. 1995.52*).

In the Near East/Europe, rice is a fairly recent import from southern Asia, i.e., the Indian sub-continent. To date, the archaeological and archaeo-botanical evidence indicates that it was present in the second millennium BC at all the Harappan sites (modern Pakistan), from where it possibly spread into the Near East and eventually into Europe (*Zohari & Hopf 1988.215*).

**Wheat**

Wheat (*Triticum monococum*) was one of the earliest domesticated cereals in the Near East, apparently in the Karacadag mountain (*Heun et al. 1997; Heun, this volume*). It was excavated around the early ninth millennium BC at Mureybit (Middle Euphrates), Jericho (Levant) and Çayönü (eastern Taurus).

Wheat does not appear in the Chinese archaeological assemblage until the first millennium BC, and is strongly suspected to have been imported from elsewhere, probably Western Asia, as no wild progenitor is yet known to be indigenous to the Far Eastern region (*Chang 1977.1-21, 25-52; Chang 1983.65-94; An 1989a.643-649; Crawford 1992.8*).

## 3. POTTERY

It is most interesting to note that, contrary to what happened in the Near East, China does not seem to have gone through a Pre-Pottery Neolithic (PPN) phase.

It must be noted, however, that there is a slight dilemma with the Near- eastern term "Pre-Pottery Neolithic" (PPN). The term PPNA was originally devised by Kathleen Kenyon for the first levels with a Neolithic economy, but without pottery which she excavated at Jericho (*Kenyon 1957*). Extended to the following phase (PPNB), one must be aware that, since then, pottery which cannot always be classified as primitive was unearthed in the Middle Euphrates (at Tell Assouad), and in the Syrian Desert (at Bouqras) from an already late PPNB economy (c. mid-to-late eighth millennium BC), and everywhere during the Final PPNB/PPNC (c. seventh millennium BC).

If we exclude the very few small (4-7 cm high) containers of lightly fired clay from Mureybit IIIA (c. 9500 BC), which appear to have come from an isolated and short-lived experiment in the Middle Euphrates (*Cauvin 1994.64*), the earliest vessels of properly baked clay excavated so far were in the same region, at Tell Assouad, and are $^{14}C$ dated to about 7500 BC (*Cauvin 1994.200*). They were manufactured nearly one and a half millennia after the beginning of an economy which was largely based on agriculture.

In Neolithic Greece, the function of the earliest pottery was not primarily related to processing the results of the new economy, i.e. domesticated foodstuffs, over a fire (*Björk 1995; Perlés & Vitelli 1994; Vitelli, 1989; Yiouni, 1996*). The long period of one-and-a half to two millennia of plant domestication and animal husbandry, in the absence of clay pots, speaks against a direct relationship between the new economy and the invention of containers made of baked clay devised for cooking, although no technological and functional analyses of the earliest Near-eastern pottery have yet been published.

The earliest pottery from the Near East was coil-made, tempered with sand or grass, low-fired, and most of the time well burnished. The shapes were simple, often globular, and with or without ring-bases. Large vessels were often made out of clay slabs (*Vandiver 1987*).

There are no vessels made of lime plaster or gypsum (*Vaisselle Blanche*) in China. The pyrotechnology involved in the manufacture of the necessary "raw" material, and the technique for making these containers are recognised to have been crucial for the transition between pots made of plaster and those made of ceramic in the Near East (*Kingery et al. 1988.240*). It is doubtful whether plaster technology was known in Neolithic China, as the "plaster floors" found in the Early Neolithic houses at Peiligang and Cishan were actually made of mud-plaster which was first simply air-dried, then fire-hardened (*Shih 1992a.127*).

According to the archaeological evidence, pottery and animal domestication were contemporary in China. Pottery even appears to have preceded plant domestication in the earliest Neolithic settlements (at Nanzhuangtou and in Southern China). Due to the quality of this early ware, it seems doubtful whether the earliest Chinese vessels were really designed for processing plant species over a fire. It must be noted that, up to now, no advanced technological analyses have been conducted on Chinese pottery vessels to discover their exact functions.

The case of pottery preceding plant domestication is not, however, specific to China. Although synchronic neither to the Chinese data, nor even to each other, the archaeological evidence from Japan (*Ikawa-Smith 1970; Imamura 1996.442*) and South-America (*Legros 1990*) testifies to the production of pottery prior to a Neolithic economy.

The earliest pottery from Nanzhuangtou was crude, and the size of the 15 small sherds recovered during the trial excavation did not yield any definitive

information on the size or shape of the vessels, even if the pots are presumed to have been jugs or bowls (*Baoding et al. 1992.963*). The material, porous, permeable, very sandy, fired very low (below 573° C) and not burnished (*Li et al. 1995.3; 1996.69*) does not seem to suggest any real use in cooking, since it is accepted that porous and permeable vessels were unsuitable for boiling liquid over a fire (*Rice 1987. 231*).

The pottery from Peiligang and Cishan was also coil-made, but was better fired, that is between 820° C and 1020° C (*Li et al. 1995.3; 1996.89*) and possibly in kilns, since one was excavated at Peiligang (*Li et al. 1995.4; 1996.90*). Some of these vessels were burnished or decorated with knobs or impressions (comb-ware). Most of the containers were bowls or bottles, with or without ring-bases, and the great variety in shape and quality of the ware suggest various functions.

In the Near East, in contrast with China, feet under a vessel were extremely rare and the very few examples (MN) are small and usually made of stone. To date, the earliest Chinese tripod bowls (ding) made of clay have been excavated at Laoguantai Peiligang and Cishan (EN). Such a shape seems to be a important marker, with strong symbolism attached to it throughout the following millennia in China. Although flat and round bases have been recognised as necessary for cooking-pots in other cultures (*Rice 1987.237*), nothing prevents these early ding from having been used as such, as this was clearly their function in later cultural periods in the country.

## 4. STONE IMPLEMENTS

The sophisticated manufacture of certain stone tools found in China is extremely rare in the Near East. Although the prevailing technology used to produce flint blades may be somewhat related in both areas, the shapes of sickles and querns is not, even though it would be expected that these essential instruments for processing cereals, whenever employed, would be formed in more or less the same way.

Near-Eastern querns were usually flattish, thick stone slabs, with the pestle very often being a suitable, roundish or oval stone. The quality of the stone was, however, carefully chosen, and was often non-indigenous to the region. This can be taken as proof not only of contacts with other areas, but of an apparent knowledge of mineralogy.

The early Chinese equivalents were completely different. At Cishan and Peiligang, the querns were about 40 cm long, flat, oval (a little like miniature "skateboards") and resting on four small feet cut out of the stone. The pestles were long and shaped like thin rolling-pins (Cishan, Peiligang), while the sickles (bone at Cishan, stone at Peiligang) were crescent-shaped, flat, up to 17 cm long and 5cm wide, with an almost regular dentation on one side (*Henan Working Team 1984.31*).

Originating from eastern Turkey (Lake Van, Bingöl) or from Cappadocia, obsidian has been excavated throughout the whole of the Near East from c. 14 000 BC onwards (*Cauvin 1994.127, fig. 32*). Technological analyses have pinpointed the exact origin of the tools excavated in most of the principal Near-eastern settlements in the eighth millennium BC, essentially indicating a diffusion towards the South, the South-west and the West. Irrespective of whether this was a case of some down-the-line exchange or of direct procurement, the diffusion of such raw material indicates the beginnings of a permanent inter-regional network of "trading routes" which could even have been used for other goods, as is suggested by the type of stone selected for querns (*Yakar, this volume*).

In China, obsidian tools were discovered in Neolithic and Bronze Age (Xingcheng culture) contexts (c. 3000 to 1300 BC) only at Jingu and Daliudaogou in eastern Jilin (*Liu 1995.91; Liu 1995.219*) and at Yinggeling in eastern Heilongjiang (*Tan et al. 1995. 126*). The raw material has been identified as coming from the Changbai mountains on the border with modern North Korea (*Nelson 1995.89*). Its absence elsewhere in China, even in other settlements in Heilongjiang and Jilin, indicates that inter-site contacts in the North, and wider, North-South, inter-regional contacts did not develop during these periods. This is also confirmed by the interaction spheres based on the relationship between sites in the same region (*Chang 1986.235; Yan 1987.47*).

## 5. SETTLEMENT PATTERNS: ARCHITECTURE

Whether in the Near East or in China, the earliest human dwellings were caves. As soon as people settled down in groups on plains, shelters were circular and semi-subterranean, forming a new settlement pattern: a village. Buildings situated directly on the ground, with straight walls inside and outside, as well as more or less rectangular houses, were devised much later.

In the Near East, this evolution is best studied at Mureybit, a settlement on the Middle Euphrates (modern northern Syria), although the evidence is similar in practically all the regions (at Beidah and Tell Ramad, for instance). Excavated by the French in the late 'sixties and late 'seventies, it shows that in Phase I (belonging to the Natufian (Epipalaeolithic) culture) shelters were circular or oval, semi-subterranean and with flat roofs. During Phase II, a transitional period between the Epipaleolitihic and the PPNA, they were still circular, but were built directly above the ground, the few inner walls being curved. During Phase III (PPNA culture), the houses were still circular and built above ground, but the inner walls were now straight. It is from the end of Phase III B and during the following Phase IV (PPNB period) that the first rectangular houses, with several rooms, were excavated (*Cauvin 1994.60-64*). They were built mostly in pisé, with stone foundations. However, from the Middle Neolithic period, Near-eastern people had already begun to use stone walls and mud-bricks.

In China, the house-building technique and material does not appear very different from the Near Eastern dwellings, although the evolution of architectural forms was not as systematic. The earliest houses, excavated at Peiligang and Cishan, were either semi-subterranean or built directly on the ground. They were constructed in pisé on stone foundations, and sometimes with mud-plaster floors. Most of them were circular, with a diameter between 2 and 5 m., although a few were almost rectangular and apparently larger than the circular structures. This construction technique was used well beyond the Neolithic period. Mud bricks were not used until the Late Neolithic Longshan period (*Chang 1986.263*), and stone walls (including fortification walls) were a rarity in China untill well into the Iron Age (fourth-third century BC).

## 6. FIGURINES

Figurines appear early in the Near East. The first isolated examples were zoomorphic (small grass-eating animals, birds and dogs, i.e., the first domesticated animals); they were found in the southern Levant, and dated to the Natufian period. Associated with fertility because most represent large females, Near-Eastern anthropomorphic figurines had already appeared in large quantities in the PPNA period (c. 10$^{th}$ millenium BC) in the Levant (*Cauvin 1994*).

Few figurines are present in the Chinese Neolithic data, whereas they exist from the earliest period in the Near East. The earliest figurines in China were all zoomorphic and connected to domesticated animals. Anthropomorphic representations do not appear in China until the MN period, although they were not exactly figurines as such; they were either painted on the inside or the outside of pots, or modelled as heads only and used as lids (Yangshao, c. middle of fifth to the end of the fourth millenium BC). The first real anthropomorphic figurines do not appear in China until the end of the Middle Neolithic period, and only then in the northern part of the country (Hongshan culture, middle of the fourth to the middle of the third millennium BC).

As they are the first female representations discovered in a Chinese archaeological assemblage, they have been associated with fertility cults, on the sole ground that such an interpretation is traditionally accepted for similar figurines in the prehistoric Near East and Europe.

## 7. BURIALS

In China, from the Early Neolithic period onwards (at Peiligang, Cishan, c. eighth-seventh millennium BC), burials seem to have been systematically performed in large cemeteries outside of settlements, with one individual per tomb and with grave-goods. Flexed positions appear to have preceded supine, and intramural burials are extremely rare, seemingly reserved for babies who were inhumed in pots placed closed to the entrance of the house (at Banpo, MN, for example).

Variation in burial systems over time, but within the same region is often accepted as proof of local foreign immigration, and/or of evidence of different religious beliefs. If this is always the case, the apparent systematic uniformity of Chinese burials, both in time and space, would suggest that similar metaphysical concerns were generally accepted throughout a vast area with differing ecological environments. Consequently, a certain elementary "religious unity" may already have been present in China at the beginning of sedentism, which was at that time a very new way of life. It is then possible to suppose that this form of burial may originate from the previous cultural phase.

The Near Eastern schemes for burying the dead vary according to place and time. Primary and sec-

ondary single burials, without specific orientation, but with grave-goods (personal jewellery only, never with stone vessels or tools), existed during the Epipalaeolithic/Natufian period (*Mellart 1975. 38*). Whenever recovered, the evidence indicates that Neolithic burials were mostly without grave-goods, in flexed or semi-flexed position, most of the time without the skull, which was plastered and used for cultic purposes (Jericho, Ain Ghazal). They were more often under the floor of the house, as secondary burials (Jericho, Mureybit, Beidah, Çatal Hüyük) rather than outside in adjacent courtyards (Abu Hureyra). Grave goods appeared later and in limited quantities, mainly in regions more to the West than the Levantine core areas (at Çatal Hüyük, in Anatolia). Cemeteries outside villages are often found in regions far from the coast (Jarmo, Halaf), although this does not seem to be an absolute rule, since intro-mural burials were carried out at the same time at Halaf and Samarra. Regular grave goods do not seem to appear until the early sixth millennium BC at Halaf and Samarra (Ubaid cultural period).

## 8. INTER-SITE CONTACTS

Inter-site contacts appear very early in the Near East (during the Epipalaeolithic period) with the emergence of obsidian blades in many settlements from the fifteenth millennium BC onwards. Technological analyses have narrowed their origin to only three sources – Bingöl, Lake Van and the Cappadoce, all of which are located in Anatolia (*Cauvin 1994.127*). The diffusion/exchange of domesticated plants and animals from at least two core areas towards the rest of the Near East confirms the continuity of these early "trade routes".

Any possible contacts with exogenous cultures from the Chinese side, cannot be considered earlier than the appearence of new elements in the archaeological material. The present archaeological evidence indicates that inter-site contacts began at a very limited regional level during the Early Neolithic (EN) period in China. The extremely limited diffusion of obsidian, occurring only in eastern Jilin and Heilongjiang, illustrates this clearly (*Nelson 1995.89*).

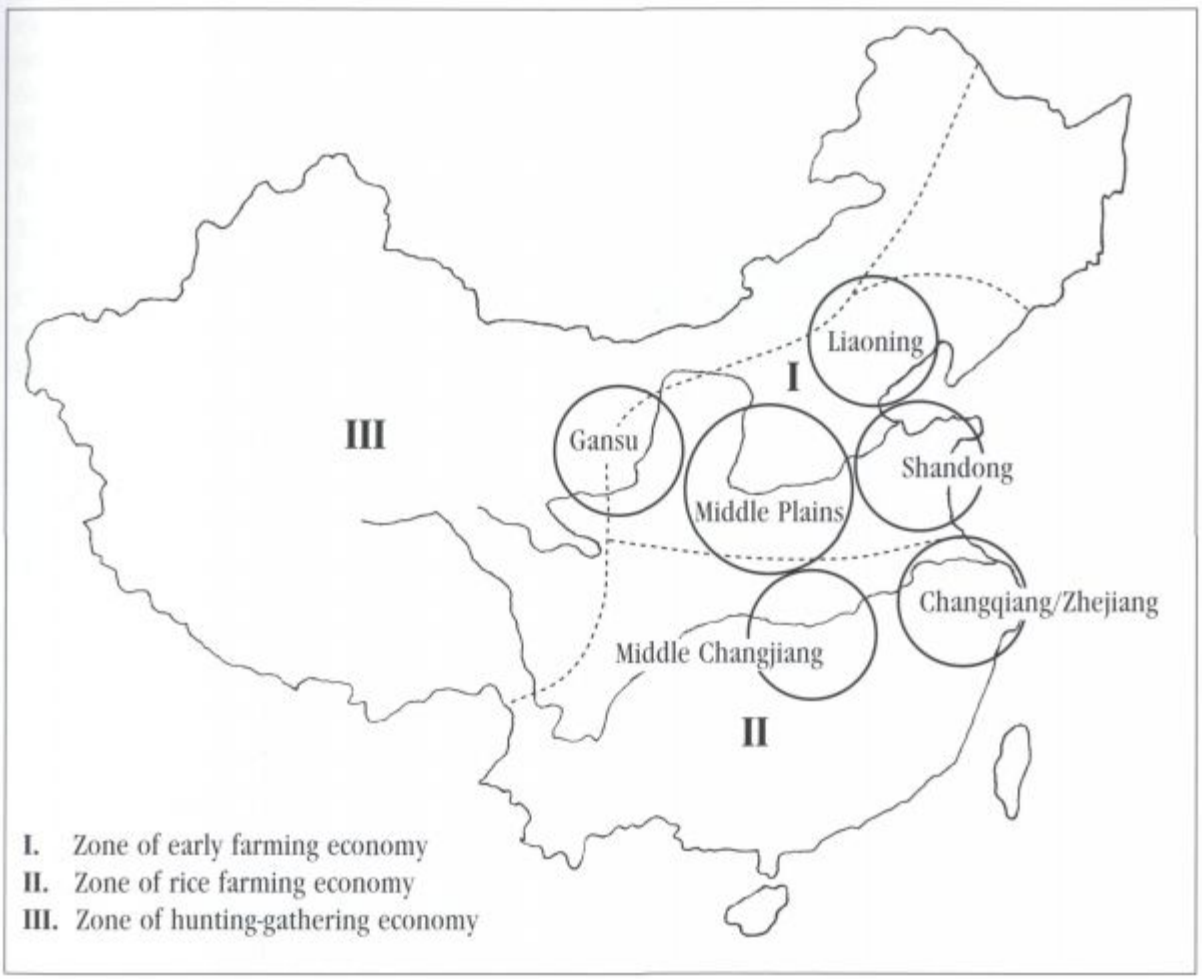



***Fig. 1. General distribution of the Early Neolithic cultures in China (after Yan Wenming 1987.47).***

The spheres of interaction established a little more than a decade ago (*Chang 1986.235; Yan 1987.47*) stress the indigenous, cultural impact of China's basic geophysical zones (Fig. 1). These spheres slowly started to establish wider contacts with each other only from the Middle Neolithic period (MN), slowly breaking down the barriers between these cultural zones.

## V. SUMMARY

The basic material problems for a transition between a hunting-gathering and sedentary way of life appear to have been similar in the Near and the Far East. However, beyond the ecological constraints which dictated the selection of plants and animals to domesticate, the adaptative solutions to this new economy are different. A synopsis of the two sets of data clearly shows the similarities and differences which occurred at both ends of Asia (Tab. 3).

### Similarities

The species of both domesticated plants and animals follow a similar pattern both in western and eastern Asia, although differences in the choice of domesticates were obviously dictated by ecological parameters. The early Chinese husbandry points however to species closer to a non-sedentary way of life than in the Near East. The fact that animal domestication preceded that of plants also fits this trend.

Considering a more general level of Neolithisation, the evolution of settlement patterns (from cave to village) and house-building systems seems to be related in both regions, even if the eastern Asian evo-

| | China | Near East |
|---|---|---|
| **Animal domestication**: | **before** plant domestication | **after** plant domestication |
| Dog | c. 12th mill. BC | c. 14th mill. BC |
| Chicken | c. 6th mill. BC | c. 2nd mill. BC (Iran) |
| Pig | c. 9th mill. BC | c. 7th mill. BC |
| Cattle | c. 6th mill. BC | c. 8th mill. BC |
| Sheep | c. 5th mill. BC | c. 9th mill. BC |
| Goat | c. mid-3rd mill. BC | c. 8th mill. BC |
| **Plant domestication**: | **after** animal domestication | **before** animal domestication |
| Millet | c. 8th mill. BC | c. 5th mill. BC (Iran) |
| Rice | c. 9th mill. BC | c. 2nd mill. BC (Pakistan) |
| Wheat | c. 1st mill. BC | c. 9th mill. BC |
| **Pottery** | before plant domestication (no plaster vessels) | after plant domestication (plaster vessels before pottery) |
| **Implements** (stone/bone) | sophisticated (sickle/quern) | un-sophisticated (sickle/quern) |
| | obsidian **only** in northern sites from c. 5-3000 BC | obsidian **everywhere** from 14000 BC onwards |
| **Settlement pattern** | cave to village | cave to village |
| **Architecture** | round to square (unsystematic) | round to square (systematic) |
| | semi-subterranean (round) **with** above ground (round) | semi-subterranean (round) **to** above ground (round) |
| | **with** above ground (rectangular) | **to** above ground (rectangular) |
| | stone walls rare until end of BA | stone wall common from MN |
| **Figurines**: | few | many |
| zoomorphic | yes | yes |
| anthropomorphic | no (untill MN) | yes (from beginning) |
| **Burial** | flexed to supine | flexed or supine (unsystematic) |
| | cemeteries (one/several per grave) | intramural (several) to |
| | very few intramural (children) | few cemeteries (unsystematic) |
| | primary, rare and late secondary | secondary to primary |
| **Grave goods** | always (from 8th mill. BC) | none untill 6th mill. BC |
| **Inter-site contacts** | EN onwards: limited to low regional level | Epipalaeolithic onwards: multi-regional level |

*Tab. 3. Synopsis of Early Neolithic data for China and the Near East.*

lution from circular to rectangular dwellings does not exactly follow the somewhat more rigorously systematic, western Asian evolutionary model.

### Differences

The differences are, however, to be found in two very important areas which reflect people's creativity as well as their anxiety about the unknown: in technology and metaphysics.

On the technological level, the manufacture of tools (of stone and even bone) is related not only to the economy, but also to the creative ability of the local population. The shape and manufacture of Chinese querns and pestles are very different from those in the Near East, in spite of the fact that this type of implement is directly connected to the processing of cereals. Any direct exchange of ideas related to the preparation of a similar category of staple food between the two ends of Asia does not seem to have taken place during the Early Neolithic period.

Pottery preceded the new agricultural economy everywhere in China. There is no transitional period in the country, either in time (no Pre-Pottery Neolithic period), or in technology (no manufacture of plaster vessels). Nevertheless, the differenciation of pottery technology, typology and, consequently of function, appear earlier in China than in the Near East.

On the metaphysical level, the very early emergence of well organised cemeteries with grave-goods (Peiligang and Cishan) in Neolithic China seems to indicate a concern with the problems of the after-life which was different from that in the Near East, with secondary internment (Jericho, Mureybit, Çatal Hüyük) and plastered skull cult (Jericho, Ain Ghazal). It even seems that a very early social differentiation, which does not seen to have existed in the Near East at an identical cultural level, could have occurred in China.

The occurrence of figurines, generally associated with cultic purposes at each end of Asia, is also very different. In the Near East, they appear early, and being mostly female, seem to relate exclusively to fertility cults, while in China, being mostly zoomorphic, they seem to be more associated with the quest for food. Such an interpretation would not, however, exclude religious purposes, possible related to an early form of shamanism, for the Chinese figurines (*Chang 1992.217*).

## VI. CONCLUSION

If the basic principles for sedentism and the domestication of local plants and animals were similar in western and eastern Asia, the specific solutions chosen by the Neolithic populations in China to solve similar problems to those which arose more or less at the same time in the Near East, point to a most interesting result. This is clearly demonstrated by the idiosyncrasy shown by the choice of technology and typology of the implements (tools/pottery) required by the new economy, and also by the metaphysical aspects (burials/figurines). Such reactions point to fundamentally different responses to identical problems.

These respective adaptive strategies show not only the originality of each human group, but even that direct cultural contacts or some mutual exchange of influences could not have taken place between both ends of Asia during the Early Neolithic period. We can then conclude that the transition between a hunting-gathering and a food producing economy occurred independently in China and in the Near East.

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UDK 903(3–11)"633/6342"
Documenta Praehistorica XXV (Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji XXV)

# The socio-economic structure of Prehistoric communities in the Southern Levant, ca. 13000–8000 BP

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ABSTRACT – *The bearers of the Natufian Culture which probably descended from the Geometric Kebaran developed a complex hunting and foraging mode which allowed them to exploit relatively small seasonal habitats without having to move very long distances. It took well over two thousand years for this culture complex to develop further into the so-called PPNA where a more settled way of life with some emphasis on cultivation appeared in parts of the Levant.*

POVZETEK – *Nosilci kulture Natufian, ki verjetno izvira iz kulture geometrični Kebaran, so razvili kompleksen lovsko-nabiralniški način gospodarstva, zaradi česar so lahko izrabljali razmeroma majhna sezonska okolja, ne da bi morali prepotovati velike razdalje. V več kot dveh tisočletjih se je ta kulturni kompleks razvil v tako imenovani PPNA. Takrat se je v nekaterih delih Levanta pojavila stalnejša naselitev, določen pomen pa je dobilo tudi obdelovanje polj.*

The Levant, which extends from the southern flanks of the eastern Taurus in the north, down to the Sinai peninsula in the south, defines a territory ca. 1300 km long and 350 km wide. The Northern Levant includes the region encompassing the north-eastern Mediterranean littoral and the valleys of the Orontes, Middle Euphrates and Balikh in Syria. The region defined as the Southern Levant encompasses the territory crossed by the valleys of the Litani and Jordan, including the Mediterranean littoral extending from Lebanon to northern Sinai. Moreover, the Negev, the Sinai peninsula and Jordan are considered parts of this vast region.

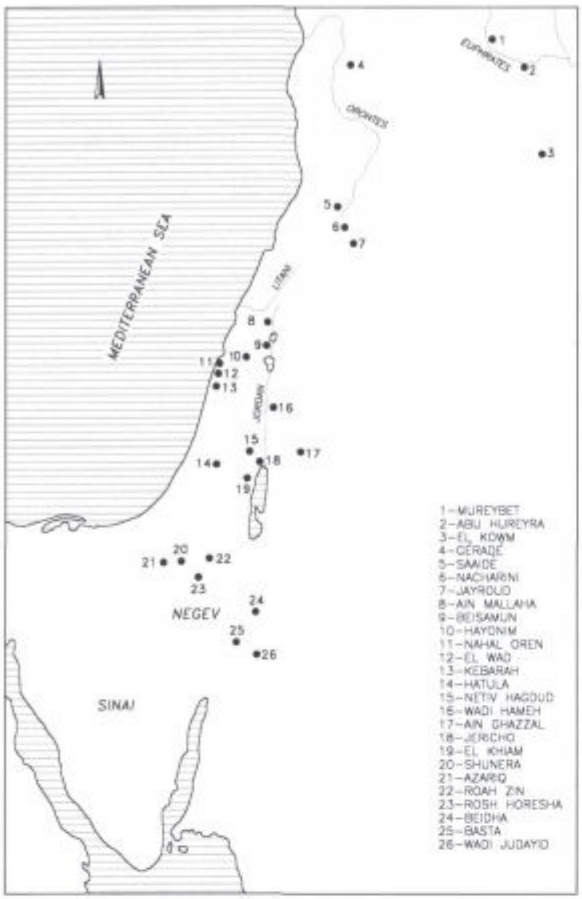
The material culture remains of Epipaleolithic and Pre-Pottery Neolithic communities of the Southern Levant are rather well documented, thanks to the large number of excavations[1].

The early phase of the Epipaleolithic in the Levant is, in a way, a continuation of the regional Upper Paleolithic lithic traditions. However, as far as subsistence base, site size and settlement pattern are concerned, these give the impression of being slightly more developed and complex than those maintained by the Upper Paleolithic groups. In the later phase of the Epipaleolithic in the Levant, hunter-gatherer communities, having adopted a more selective hunting strategy, started to consume more wild cereals in their diet. These economic adaptations would have no doubt required changes in settlement pattern, subsistence-related activities and, eventually, in the social structures of Late Epipaleolithic groups.

Although the various lithic assemblages produced by different Epipaleolithic groups in the Levant share a number of traits, they can nevertheless be differentiated by regional characteristics developed during the so-called industrial sub-phases. Among these assemblages, those produced by groups in northern and central Palestine, Lebanon and Syria show a wider distribution than those produced by groups centred in the Negev or Sinai (e.g. the Mushabian, the Negev Kebaran and the Harifian).

Generally speaking, the lithic assemblages of the Epipaleolithic groups in the Southern Levant reflect a subsistence economy in an environment rich in

1 It is important to emphasise that in the Levant, the term Epipaleolithic is used to include all the microlithic industries that postdate the Levantine Aurignacian C and predate the Pre-Pottery Neolithic (*Bar-Yosef 1975.363*).




***The Distribution of Major Late Epipaleolithic and Pre-Pottery Neolithic Sites in the Levant.***

fauna and flora. Palaeo-ecological records further confirm the existence of such a rich environment. Palaeo-ecological records of the Levant generally indicate that in the Late Pleistocene humidity rose considerably and, as a consequence of this, the Mediterranean woodlands expanded northwards, eastwards and southward, creating new habitats in upland areas with enriched flora (*Baruch and Bottema 1991; Bottema and Woldring 1984; Leroi-Gourhan et Francine Darmon; 1991; Rognon 1987; van Zeist et al. 1975*). This in turn allowed the hunter-gatherer bands to expand their subsistence exploitation areas well beyond the limits of their former habitats. Indeed, most of the Epipaleolithic sites in the Southern Levant are located in the Mediterranean woodland zone. A smaller number of sites, however, are located at the present steppe zone, which may have been slightly more humid and richer in vegetation at the time.

In terms of plant and animal domestication, as well as the emergence of communities living in permanent villages, the question often asked is whether or not the Neolithization process in the Southern Levant occurred slightly earlier than in the Northern Levant. Concerning the Southern Levant, archaeological records clearly demonstrate the close link between the Early and Late Epipaleolithic complexes in terms of basic economic exploitation modes and lithic industries. The best example of this is the Early Epipaleolithic Kebaran complex, which later developed into the Geometric Kebaran sometime before ca. 13000 BP

The Geometric Kebaran culture is the most widespread of the Levant's Late Epipaleolithic complexes. The artifactual variability of this complex reflects the adaptive responses of the Geometric Kebaran groups to different environments, which included not only the Mediterranean woodlands, but the arid zones of the interior as well[2].

By exploiting several, closely packed, but vertically differentiated resource zones, these communities were able to subsist within small territories. Consequently, this mode of economic exploitation reduced the extent of their cultural dispersion and prompted the emergence of relatively small enclaves.

Sometime after 13000 BP the Geometric Kebaran groups started to undergo an evolution in their socio-economic organisation. No doubt this was the result of the climatic changes mentioned above which expanded the Mediterranean woodlands and as a result created additional sources of food. This in turn encouraged sedentism. Like its contemporary, the Mushabian complex, in north-eastern Sinai, southern Negev and southern and eastern Jordan, the Geometric Kebaran Complex is dominated by chipped stone artefacts[3].

2 Group I, which is characterised by geometric microliths and backed bladelets, with the latter predominating, has a relatively wide distribution in the Southern Levant (*Kaufman 1987; Muheisen 1988*). Characteristic of Group II is a tool-kit dominated by backed bladelets and geometric microliths. Scrapers, burins, notches and denticulates appear in lower frequencies in the individual lithic assemblages as seen in the Central Negev sites. In the Group III microlithic assemblages triangles usually dominate, as long observed at Ein-Gev, Kfar Darom and Nahal Oren. The existence of marine shells in the inland sites suggests that contact was maintained between the coastal region and the hinterland groups. In Group IV the microlithic assemblages of Eastern Jordan and Judean Hill sites are dominated by lunates.

3 The tool-kit of the Mushabian complex is dominated by arched-backed bladelets, scalene bladelets, lunates, triangles and micro-burins (*Marks and Simmons 1977*).

In addition, the Geometric Kebaran assemblages sometimes include bone or stone tools and ornamental marine shells. The locations and composition of Geometric Kebaran sites indicate an annual cycle of transhumance into the uplands during the spring and summer months where water sources were more abundant. This was followed by a migration to lowland settings in the autumn and winter. The period spent in the uplands would have coincided with the period of new plant growth. During the spring-summer segment of the annual cycle the Geometric Kebaran communities would have dispersed into smaller and therefore more mobile groups. At the end of the summer, returning to their long-term base-camps, these groups would have re-created the larger social units they maintained in the autumn and winter. Such base-camps are identified mainly by the presence of plant processing tools like those found at the sites of Hefsibah, Neve David, and Ein Gev IV. Assemblages rich in plant processing tools indicate the presence of a subsistence economy with an emphasis on storable foods and therefore a more sedentary phase in the annual foraging cycle. This lowland transhumant segment of the Geometric Kebaran groups later developed into the more settled Natufians.

Unlike the Mushabian Complex, the origins of the Geometric Kebaran are, generally speaking, well understood. The latter grew out of the Kebaran and ultimately evolved into the Natufian within an interval of some 2000 to 2500 years. Although the Geometric Kebaran, with its temporally and spatially differentiated four industries, continued the basic economic, demographic and social patterns of the Kebaran, it differed from the preceding complex in its geographic distribution and material culture. The Geometric Kebaran was initially limited to the core Mediterranean zone, but with the improvement of climatic conditions some 14000 years ago it expanded into the interiors of Southern Levant, which constitutes the present steppe-desert zone.

In the Late Pleistocene of the Levant, two types of hunting-gathering strategies, based on simple and complex foraging seem to have existed. Simple foraging, which is defined as a risk minimizer, required a high group mobility which allows timely access to food resources. Complex foraging, on the other hand, could be regarded as a resource maximizer (*Gould 1982*). Its adoption would have allowed more permanency in settlement, since the hunter-gatherer groups using this strategy stored food plants and obtained certain food and other products through reciprocal exchange from other foraging groups.

The transition from simple to complex foraging within the Levant may be related to an increase in temperature that in turn caused an expansion of the Mediterranean woodlands into the uplands some 13 000 years ago (*Henry 1989.30*). This is a logical assumption, since the depressed Last Glacial temperatures would have confined cereals and other food resources associated with the Mediterranean woodlands to low elevations and warmer latitudes in the Levant (*Wright 1977*). For instance, wild barley, which is the most widespread of the Near Eastern cereal grasses, grows better on well-drained, deep loam, calcareous soils with a high nitrogen content (*Renfrew 1973.80–81*). Thriving under conditions of moderate rainfall, it does not tolerate extreme cold, and is confined to elevations below 1500 m, where the ripening season is relatively long and cool. As for wild emmer wheat, less arid-tolerant than barley, it thrives in areas receiving between 500–750 mm of rainfall annually (*Redman 1978.123*). It also grows in abundance on well-drained clay loam, calcareous soils and thus has a preference for basaltic and limestone regions. In the Levant, wild emmer has the more restricted primary habitat of the cereal grasses, for dense stands are restricted to the slopes and uplands of the Galilee and Golan Plateau overlooking the upper Jordan valley. Although the best areas for emmer are elevations below 900 m, with relatively high winter temperatures, elevations as high as 1600 m on the east face of Mt. Hermon support a slender, late-maturing variety *(Zohary 1969.49)*.

Complex foraging, involving the intensive collection of wild cereals and nuts, is particularly associated with the bearers of the Natufian culture[4].

The generally accepted view concerning the Natufian culture complex is that it emerged within the core Mediterranean zone between 12 800 to 12 500 years ago. Geographically, Natufian sites are found in the hill zone of Israel, Lebanon, and Jordan. The

4 The Natufian culture, which is the richest and best-known of the Epipaleolithic complexes of the Levant, was discovered by Dorothy Garrod 70 years ago during the excavation of the cave of Shukbah situated in Wadi Natuf. By the mid-thirties, additional cave-sites such as El Wad (*Garrod and Bate 1937*) and Kebara (*Turville-Petre 1932*) on the Mediterranean coast in the vicinity of Mt Carmel, and several sites in the Judean Hills south of Jerusalem (*Neuville 1934; 1951*) had been excavated.

contemporary sites in Syria, such as Mureybet (*Cauvin 1977; 1978; 1979*) and Abu Hureyra (*Moore et al. 1975*) fall outside the main cluster of the Natufian sites, although they share certain similarities in assemblages.

The Natufian chipped stone industry provides a great deal of information concerning the economic basis of this culture. The Natufian lithic assemblages are characterised by a microlithic technology that produced broad bladelets from multi-platform cores. In an average tool-kit, backed bladelets, burins, scrapers, and nothces-denticulates are evenly represented. Geometric microliths, with lunates accounting for between 60 to 98 percent of this category, dominate the microlithic assemblage. Sickle blades, generally accounting for less than 5% of a tool kit, are consistently present in Natufian assemblages, which also contain a diverse range of groundstone tools. Such tools further reflect the increased dependence of these communities on wild cereals and nuts. These include heavy stone bowls and pestles, bedrock mortars, and various other groundstone implements used for grinding and pounding.

In a sense, the Natufian horizon represents not only the earliest sedentary hunter-gatherer societies, but perhaps also the incipient phase of agriculture in the Southern Levant, at a time when a milder climate with a marked increase in annual precipitation replaced the conditions of the Late Glacial Maximum in the region. In the Natufian pattern of settlement, the hunter and gatherer communities showed a preference for higher elevation campsites mainly situated to the south and south-east of the lowlands. At a local scale, Natufian base camps, or hamlets shared several environmental and topographic features. They were located near the boundary separating level grassland settings (e.g. coastal plain, broad interior valley) from the wooded slopes of the Mediterranean hill zone. The strategic location of Natufian settlements allowed their inhabitants easy access to open habitats favoured by gazelle, and a forest habitat containing deer, cereals and nuts. Such settings also furnished a predictable water supply, along with sources of flint in the wadi gravels and limestone deposits.

This culture complex rapidly amalgamated several regionally distinctive Geometric Kebaran groups into a tightly bound culture. In the next 1500 years, population increases resulted in the colonisation of areas on the very margin of the Mediterranean zone. This acted to bring an expanding Natufian population into contact with simple foraging, late Mushabian groups in the Southern Levant and, very probably, similar groups elsewhere along the fringes of the Mediterranean woodlands.

In the Natufian culture the most important conceptual change concerns the relation between sedentism and foraging, as clearly demonstrated at Ain Mallaha, where the economy was based on the intensive collection of cereals and on hunting, but without the domestication of plants and animals.

Not all Natufian sites can be classified as base-camps consisting of habitation units, built-in installations for heating and food processing, and graves. In other words, Natufian sites with architectural remains and installations do not always reveal burials. A number of Natufian sites were probably only short-lived transit-camps. These usually reveal only lithic assemblages and animal bones. In fact, the larger base-camp sites are few and mainly located in the Mediterranean vegetation belt (*Valla 1975; 1981; Bar-Yosef 1981; 1982*).

The architectural characteristics of Natufian villages are best known from Ein Mallaha (*Perrot 1966; Valla 1981*), Hayonim Cave (*Bar-Yosef and Goren 1973*) and Rosh Zin (*Henry 1976*). Additional examples have been found at El Wad, Hayonim Terrace (*Henry and Leroi-Gourhan 1976*) and Wadi Hammeh 27 (*Edwards 1991*). In the Southern Levant, semi-subterranean circular and curvilinear structures, built with unmodified stones have been found, arranged either in a linear pattern or clustered.

Generally speaking, Natufian communities were larger and more permanent than their simple foraging predecessors or other contemporary groups. More than 200 skeletons recovered from El Wad, Kebara, Nahal Oren, Hayonim Cave, Ein Mallaha, Shukbah, and Erq el Ahmar (*Henry 1989.206*), provide the data-base on which some of the conclusions on Natufian society are based. The mortuary patterns indicate that Natufian society was stratified. During the Early Natufian, the dead were buried together in small groups[5]. The Early Natufian burials at El Wad reveal two distinct patterns of internment. In the cave area, a group burial contained skeletons of adults, children and infants in an extended position, accompanied by grave furniture, limestone blocks and hearths; but none were adorned with dentalium.

5 In the Late Natufian, the deads were buried individually in cemeteries.

On the terrace of the cave, five separate groups of burials contained skeletons of adults and children in a flexed position with one member of each group always wearing dentalium; but hearths and limestone were absent from these burials. The individuals wearing dentalium shells included men, women and children. The Early Natufian burials at Erq el Ahmar (*Neuville 1951; Vallois 1936*), Ein Mallaha (*Perrot 1966*) and Hayonim Cave (*Bar-Yosef and Goren 1973*) also show a similar mortuary practice, especially concerning highly decorated burials. It has been suggested (*Wright 1978*) that this may have involved a socially distinct subgroup of a Natufian community, perhaps to denote the transfer of high social status through inheritance. In the Late Natufian period, mortuary practices had changed to predominantly single interments. This shift, recorded at El Wad, is also seen at Shukbah (45 individual burials) and Nahal Oren (50 individual burials).

Long-range contacts within the Levant are evident during the Natufian period. Basalt objects are common in Natufian sites, far from the source of this material in eastern Galilee, dentalium shells were traded from the Mediterranean Sea inland and from the Red Sea northward.

Through their ability to store food surpluses in their permanent settlements Natufian groups took on the general appearance of early farming communities some two to three millennia before the first evidence of agriculture. However, since complex foraging resulted in intensive hunting and gathering, it would have eventually exhausted the food resources in a number of habitats[6].

The collapse of the Natufian complex and the dissolution of Natufian society in general can be attributed to population growth in the face of declining resources. In fact, at the peak of their expansion, Natufians began to experience a general deterioration in their habitat, especially along the southern and eastern margins. In conjunction with continued population growth, the dramatic reduction of the Mediterranean zone with its cereal and nut resources destabilised the Natufian adaptive system. As a consequence of this, Natufian settlements in the marginal areas were abandoned, their communities returning to a more mobile, simple foraging subsistence strategy. Only those living next to permanent water sources were able to continue a sedentary mode of existence by incorporating agriculture as an important part of their subsistence economy.

Complex foraging could not have lasted for a very long time mainly for climatic reasons. The renewed aridity in the region would have required a return to a less intensive mode of hunting and gathering. With the progressive deterioration of climate, Natufian communities on the margin of the Mediterranean woodlands were unable to sustain permanent settlements. Relying more and more on storable food, Natufian foragers lowered their resource ceilings in favour of the intensive exploitation of a more restricted range of food resources.

Although they maintained a less intensive foraging pattern and still depended heavily on the resources of what remained of the woodland habitat at the highest elevations, they were obliged to disperse their population into small, mobile groups during part of the year. Archaeologically, this transition is reflected by the Harifian industry, which is found in the arid zone of the Southern Levant. It shares strong techno-typological similarities with the Natufian to the extent that it is often included in the same cultural complex[7].

However, being geographically isolated, they were unable to maintain ties with contemporary Natufian communities to the north. Unlike the Natufian sites, Harifian sites are distributed in both lowland and upland settings in northern Sinai (*Bar-Yosef and Philips 1977*), the Negev (*Marks 1973; 1975; Marks and Scott 1976; Goring-Morris 1987*), and the southern Judean Hills (*Bar-Yosef, et al., 1974*). Although the type-site of Abu Salem, located on the Harif plateau of the Highland Negev and the nearby site E8, represent seasonal hamlets, the remainder of Harifian occurrences consist of small, ephemeral camps. The Harifian population would have been organised in small groups at lower elevations, and larger groups at the higher elevations, where they spent a longer time.

6 It has been suggested that the fact that Natufian culture lasted as long as it did, was mainly because the flora and fauna in the Southern Levant were not entirely depleted. This was perhaps due to the economic inefficiency of the exploitation methods of food resources (*Henry 1989.5*).

7 With a return to mobile foraging, the Harifians, emerging as a relatively short-lived complex (ca. 200 years) some 10 400 years ago, appear to have retained many aspects of the earlier Natufian tradition. Even the architecture of the Harifian complex shares similarities with the Natufian.

## THE PRE-POTTERY NEOLITHIC HORIZON IN THE LEVANT

At the end of the Natufian horizon a new period known as the Pre Pottery Neolithic A (ca. 10 500–9300 BP), marks the emergence of small village communities of hunter-farmers in the Levant. These PPNA villages are found in a relatively narrow territory extending from the Damascus basin in the north to the Jordan valley and Transjordan in the south. Although agricultural activity may have intensified at a number of fertile habitats at this time, generally speaking, subsistence economies, especially in the arid parts of the Southern Levant, including the mountains of Lebanon, still relied largely on hunting and gathering. Fruits and wild seeds were intensively collected, and emmer wheat may have been cultivated on the plains. In the PPNA the lithic industry shows differences from the previous Natufian assemblages. The microliths decrease in quantity and burins become rather common. Sickle blades and bifacial tools appear in larger quantities, except in desert sites, where they are absent.

The PPNA in the Levant contains two distinct industries: the Khiamian and the Sultanian. The Khiamian industry, with its strong techno-typological ties to the Natufian, may be slightly earlier than Sultanian, although there is a good deal of overlapping between the two. The Natufian tradition survives in the lithic artefacts of the Khiamian industry, especially in its microlithic technology. This industry, with its characteristic points, is well represented in the lithic assemblages at Nahal Oren, Salibiya, Hatula and Mureybet Ib. The characteristic Khiamian lithic assemblages also include large tools such as picks and adzes, as well as ground stone artifacts such as mortars, bowls and querns. The Khiamian settlements, which measure between 1000 to 3000 $m^2$ in area, are usually found near water sources and in relatively low altitude areas. In most sites, architectural remains are rather poorly preserved, except for obvious cup marks. Faunal remains suggest a particular preference for gazelle. Generally speaking, the Khiamian groups continued the Natufian hunting tradition.

In contrast to the Khiamian lithic tradition, the Sultanian lithic industry lacks a strong microlithic character, having been based more upon blade production and bifacial tools. Large, heavy tools such as picks, adzes, tranchet axes form a substantial part of the Sultanian tool kits, along with sickles and burins, etc.. The presence of El Khiam points in low percentages at most Sultanian sites producing Helwan points (e.g. Mureybet) suggests ties between the bearers of these two lithic traditions.

In general, the lithic industry gives the impression of increasing specialisation. For the first time distant raw material in the form of obsidian coming from Anatolia indicates the extension of the reciprocal exchange mechanism to include distant lands. In the Sultanian assemblage, polished axes of limestone and basalt make their first appearance. Other ground stone items such as mortars and querns continue the earlier Natufian tradition.

Small semi-subterranean structures, round to oval in plan, characterise the domestic architecture at the Sultanian sites, as seen at Jericho PPNA, Nahal Oren Stratum II, Gilgal I, Netiv Hagdud in the Southern Levant and Mureybet II in the Northern Levant. These single room dwellings with plastered floors were usually furnished with hearths. The examples from Mureybet and Jericho suggest that such houses were sometimes internally divided.

Except for Nahal Oren, which was a small village or base-camp ca. 2000 $m^2$ in area, consisting of 15 semi-subterranean houses built in rows on a terraced slope, most Sultanian settlements are 1–3 hectares in size and therefore much larger than Khiamian sites. The Sultanian settlements too, like the Khiamian villages, were established at elevations not exceeding 300 m above sea level. Having said this, it is important to emphasise that both the Sultanian and Khiamian sites are located outside the natural habitats of wild cereals. In other words, wild cereals harvested during the summer in higher areas were carried and stored in the main village. It is quite probable that some Sultanian communities attempted to plant the wild cereal seeds near their settlements. This could perhaps explain the presence of cultivated cereals at some of the PPNA sites in the Levant. At Jericho, for instance, the remains of domesticated emmer wheat (*Triticum dicoccum*) and hulled two-row barley (*Hordeum distichon*) were found in the Sultanian levels (ca. 10 000 BP).

Further north also at Mureybet II, the source of the wild cereals such as einkorn and barley consumed by the PPNA inhabitants was in the uplands some 100–150 km north-west of the site[8].

8 At Mureybet there is an uninterrupted sequence extending from Final Natufian (IA), through Khiamian( IB-II) and Sultanian (III). See *van Loon 1968; Cauvin 1977; 1978.*

In Level IIIA the village of Mureybet expanded considerably, becoming a settlement of up to 3 hectares in area. In Level IIIB the construction of silos suggests that the cereals, although mostly wild, became rather important in the diet of the population.

It is the PPNA village at Tell Aswad, situated between lakes of Hijjane and Ateibe in the Damascus basin which produced the earliest domesticated emmer wheat in Syria. Although the current levels of precipitation in this region, which is less than 200 mm a year, is not sufficient for the dry farming of wheat, in the Early Holocene, conditions may have been more humid. In the earliest occupation (Phase IA: 9800–9600 BP), the village consisted of semi-subterranean round houses, ca. 3 m in diameter. The El Khiam type arrowheads may indicate that a people of Khiamian tradition introduced the stage of incipient cultivation, perhaps from further south (*de Contenson 1972; 1976; 1983*). This village revealed in addition to domesticated emmer, wild barley, which grew some 50 km away from the settlement, peas (*pisum sativum*) and lentils (*lens culinaris*).

Although most evidence for domesticated cereals comes from the Northern Levant, the emmer sample from PPNA Jericho, presumed to be the earliest so far recovered, has long been used as evidence that the cultivation of wild cereals started in the Southern Levant earlier than in the north. While this hypothesis accords well with the assessment that arid conditions in the Levant started earlier in the south than in the north, and therefore, the inhabitants of the south, experiencing difficulties in maintaining their former exploitation levels, cultivated cereals, it raises some questions. Indeed, if arid conditions prevented the regeneration of wild strains of cereals in their natural habitats, then the same insufficient levels of precipitation would have made the cultivation of wild wheat locally quite difficult.

In the following, PPNB period (ca. 9300–7800/7500 BP) climatic conditions continued to be favourable for agriculture. Although most sites remained relatively small, some developed into large settlements of over 10–12 hectares in area. Among the large sites are Abu-Hureira in Syria, Çayönü in south-eastern Turkey, Ain Ghazal, Beisamun and Basta in Jordan. The village economy at this time was based on the cultivation of domesticated species of cereals and legumes, and the collection of wild seeds and fruits. The hunting of gazelle, roe deer, fallow deer, wild boar and hare was supplemented by raising goats and sheep. In this period, bifacial tools such as axe/adzes and celts saw some changes through time. Rounded retouches and polished working edges are among the characteristic features at this time. In the PPNB, burials are found under floors and open spaces. The skulls of adults were removed and sometimes plastered. In a few sites, skulls were stored in special places and buildings.

The collapse of the PPNB in the Southern Levant manifested either as a major break in cultural continuity or abrupt changes in the settlement pattern, may have been due to the deterioration of environmental conditions. At the site of 'Ain Ghazal, near Amman, this phase is known as PPNC. A community involved in goat husbandry and agriculture established this village in ca. 9250 BP, during the PPNB period. The villagers seem to have supplemented their subsistence requirements by hunting and foraging (*Rollefson 1989*).

Some ten generations after its foundation Ain Ghazal more than doubled its 2 hectares of habitation area. By 8250 BP, or thirty generations later, towards the end of the PPNB, the village had become approximately 10 hectares in area. This constant expansion of the community no doubt adversely affected the natural vegetation cover surrounding the settlement. At that time an average house at Ain Ghazal with plastered floors and walls was 50 $m^2$. The construction of such a house required, among other materials, a large quantity of burnt lime. Since the plastered floors were ca. 6.6 cm thick, and walls and ceilings were plastered with ca. 3 mm of lime, each house would have required 3.3 tons of plaster. This quantity of plaster could have only been obtained by burning at least six average-size oak trees. Considering that additional 4 oak trees would have been used for the construction of each house (*Edlin 1976*), the damage to the tree cover near the village becomes obvious. Although the scarcity of wood at this time may have been a local phenomenon, it could have been one of the reasons for the change to a local architecture now characterised by houses with small, cell-like rooms.

In the following 500 years during the PPNC, the village grew further, reaching more than 12 hectares in area. After 7750 BP the village was finally abandoned. It was resettled several centuries later by nomadic pastoralists of the Yarmoukian phase of the Pottery Neolithic period.

The faunal and botanical data from 'Ain Ghazal is particularly illuminating concerning the subsistence

economy of the PPNB and PPNC inhabitants. Domestic goat, gazelle, wild cattle, pig, hare, fox, turtle were consumed in that order of preference.

As for food plants, which provided up to 50% of the daily food consumption, these consisted of field peas, lentils, emmer, einkorn, bread wheat, domestic, two-row hulled barley, chickpeas, pistachio, figs and vetch. Therefore, assuming that an 'Ain Ghazal adult required 2500 calories per day, half of this being obtained from food plants, at least 125 kg of grain and legumes per person had to be produced by this community annually (*Rollefson and Kohler-Rollefson 1989.75*).

Considering that half an acre of land could have produced 125 kg of food plants, then the community of Ain Ghazal would have cultivated/harvested a considerable amount of land.

Once agriculture was given prominence in local economies, it would not have been very long before soils, at least within the 3–4 km radius of farming villages, became exhausted, especially if on sloping terrain which is prone to erosion. In such terrain, after 500 years of constant cultivation, the fertility of the soil declines considerably (*Hole et al. 1969. 346–347, 350*). Moreover, the close browsing habits of goats grazed on arable lands would have removed the protective vegetation cover before the onset of the rains.

In the PPNC the inhabitants of 'Ain Ghazal depended more on domesticated species, which included sheep, cattle and pig. However, becoming more sedentary than before did not prevent this PPNC community from organising long-term hunting expeditions to obtain fresh meat, skins, and furs. The rarity of grinding stones during the PPNC suggests less emphasis was placed on agriculture at that time.

## DISCUSSION

The assumption that the bearers of the Natufian culture comprised the first sedentary hunter-gatherer society in the Levant is solely based on cultural attributes, such as the existence of large base camps with stone architecture and food processing installations, and the communal burial grounds located near some of them. Moreover, the diverse methods of adorning and burying the dead could indicate that the Natufians were a ranked society. The Natufian communities, by pursuing a year-round exploitation of the local fauna and avifauna, placed more emphasis on selective hunting to ensure the long-term viability of their subsistence strategy. In fact, the highly selective culling of male wild gazelle was a step short of the actual domestication of animals such as wild sheep and goat (*Cope 1991; Tchernov 1991*). The domestication of the dog (*Davis and Valla 1978*) is also a strong indication that the Natufians brought about an economic change during the last phase of the Levantine Epipaleolithic period. The intensive exploitation of plants is reflected in an abundance of harvesting and food-processing tools and storage facilities (*Wright 1991; Bar-Yosef and Belfer-Cohen 1989; Garrod 1957; Valla 1981*). The increasing reliance on wild food plants at this time is further corroborated by dental studies of human skeletal remains (*Smith 1991*). According to macrobotanical studies carried out on plant remains, it seems that the Natufian hunter-gatherers consumed mainly the seeds, nuts, and fruits of Mediterranean trees (*Lev-Yadun and Weinstein-Evron 1994.391; Hillman et al., 1989; Garrard et al., 1988; Edwards 1989*). However, despite the intensification in the exploitation of food plants, the domestication of cereals did not begin before the Pre-Pottery Neolithic period. The question is, however, when and where were wild cereals first domesticated? This question is particularly important, given that the wild relative of domesticated einkorn wheat (*Triticum m. monococcum*) is the wild einkorn wheat (*Triticum monococcum subsp. boeticum*), whose primary habitats are said to occur in the northern and eastern parts of the Fertile Crescent (*Heun et al., 1997*). The fact that domesticated einkorn found at Abu Hureyra is dated earlier than the southeast Anatolian samples found at Pre-Pottery Neolithic settlements closer to the primary habitat of wild emmer in Karacadağ could perhaps indicate that, in the Late Pleistocene, stands of *Triticum m. boeoticum* may have temporarily existed further south in northern Syria (*Hillman 1996*). Although, the Karacadağ mountains are now considered the likely location of einkorn domestication, it is pointed out that the "localisation of the precise domestication site of one primary crop does not necessarily imply that the human population living there at the end of the Paleolithic played a role in establishing agriculture in the Near East. Nevertheless, it has been hypothesised that one single human group may have domesticated all primary crops in the region" (*Heun et al., 1997.1313*). In view of this new DNA fingerprinting study concerning the site location of einkorn wheat domestication in the Near East, the assumption that the domestication of food plants started in the

Southern Levant should be reconsidered by weighing the possibility that some of the cultivated einkorn wheat consumed by the PPNA population of Southern Levant (e.g. Jericho) was obtained from more distant sources in the north. This in turn could suggest that the PPNA communities in the Levant in general and in the Southern Levant in particular were socio-economically more developed than previously envisaged. In other words, through their reciprocal exchange mechanism these communities were able to obtain not only prestige goods and raw materials such as obsidian for certain artifacts but also certain food staples which later on they cultivated themselves. What is almost certain, however, is that the seeds for such a complex society with a well-organised, subsistence economy were sown in the Natufian period.

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UDK 575:633.1(392/393)"6342"
Documenta Praehistorica XXV (Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji XXV)

# Einkorn wheat domestication site mapped by DNA fingerprinting*

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ABSTRACT – *Wild relatives of the 'founder' crops of the European agriculture, chickpea, lentil, pea, barley, Emmer and Einkorn wheats, bitter vetch (Zohary and Hopf 1993) continue to grow in the Fertile Crescent. The study of the genetic relationships between cultivated types occuring outside their natural habitat and their wild relatives clarifies important aspects of plant domestication. For example, by comparing – based on DNA fingerprinting – cultivated lines with wild relatives collected in defined areas, we have been able to pinpoint precisely the place of origin of Einkorn wheat within the Fertile Crescent (Heun et al. 1997), a puzzle which archaeology alone has been unable to solve. Similar studies of other Fertile Crescent crops might answer whether the Neolithic revolution in this part of the world had a common origin, or whether the above mentioned other crops were domesticated independently. DNA analyses can contribute to archaeology; more interaction is needed.*

POVZETEK – *Divji sorodniki prvotnih pridelkov evropskega poljedelstva (čičerka, leča, grah, ječmen, žiti Emmer in Einkorn, grenka grašica (Zohary in Hopf 1993) še danes uspevajo v Rodovitnem polmesecu. Raziskave genskih povezav med gojenimi tipi, ki se pojavljajo izven njihovega naravnega okolja, in njihovimi divjimi sorodniki pojasnjujejo pomembne vidike udomačitve rastlin. Na primer, na osnovi primerjave prstnih odtisov DNK gojenih vrst in divjih sorodnikov, ki smo jih nabrali na znanih območjih, smo lahko natančno določili izvor žita Einkorn znotraj Rodovitnega polmeseca (Heun et al. 1997), in tako rešili uganko, ki je sama arheologija ni mogla razrešiti. Podobne raziskave drugih pridelkov z Rodovitnega polmeseca bodo morda odgovorile na vprašanje, ali ima neolitska revolucija v tem delu sveta skupni izvor ali pa so bili zgoraj omenjeni pridelki udomačeni neodvisno drug od drugega. DNK analize lahko prispevajo k arheologiji; potrebno je večje sodelovanje.*

## INTRODUCTION

DNA techniques provide powerful tools for studying evolution and domestication. However, use of DNA techniques is limited when only small amounts of high quality DNA can be extracted, as is the case with ancient samples. Although this limitation can be overcome to some extent (*Brown et al. 1994*), an alternative approach to addressing questions about the domestication of plants is to use modern seed samples. Einkorn wheat is a forgotten crop, to which no modern breeding has been applied, and has been cultivated for several thousand years outside its natural habitat.

Wild Einkorns still occur in nature (*Zohary and Hopf 1993*), and large samples of these wild lines are stored in gene banks around the world. Therefore, a representative collection of cultivated Einkorns, geographically well isolated from their wild relatives, can be used to identify the closest wild relative in a defined geographic area. As a result, the possible Einkorn wheat domestication site was pinpointed within the Fertile Crescent (*Heun et al. 1997*).

## THE PLANT MATERIAL

Einkorn wheats are diploid, self-pollinating plants (2n = 2x = 14), belonging to the family Poaceae and carrying the A genome. *Triticum monococcum ssp. monococcum* (*T. monococcum*) and *Triticum monococcum ssp. boeoticum* (*T. boeoticum*) are the respective Latin names of the domesticated and the

* see acknowledgements

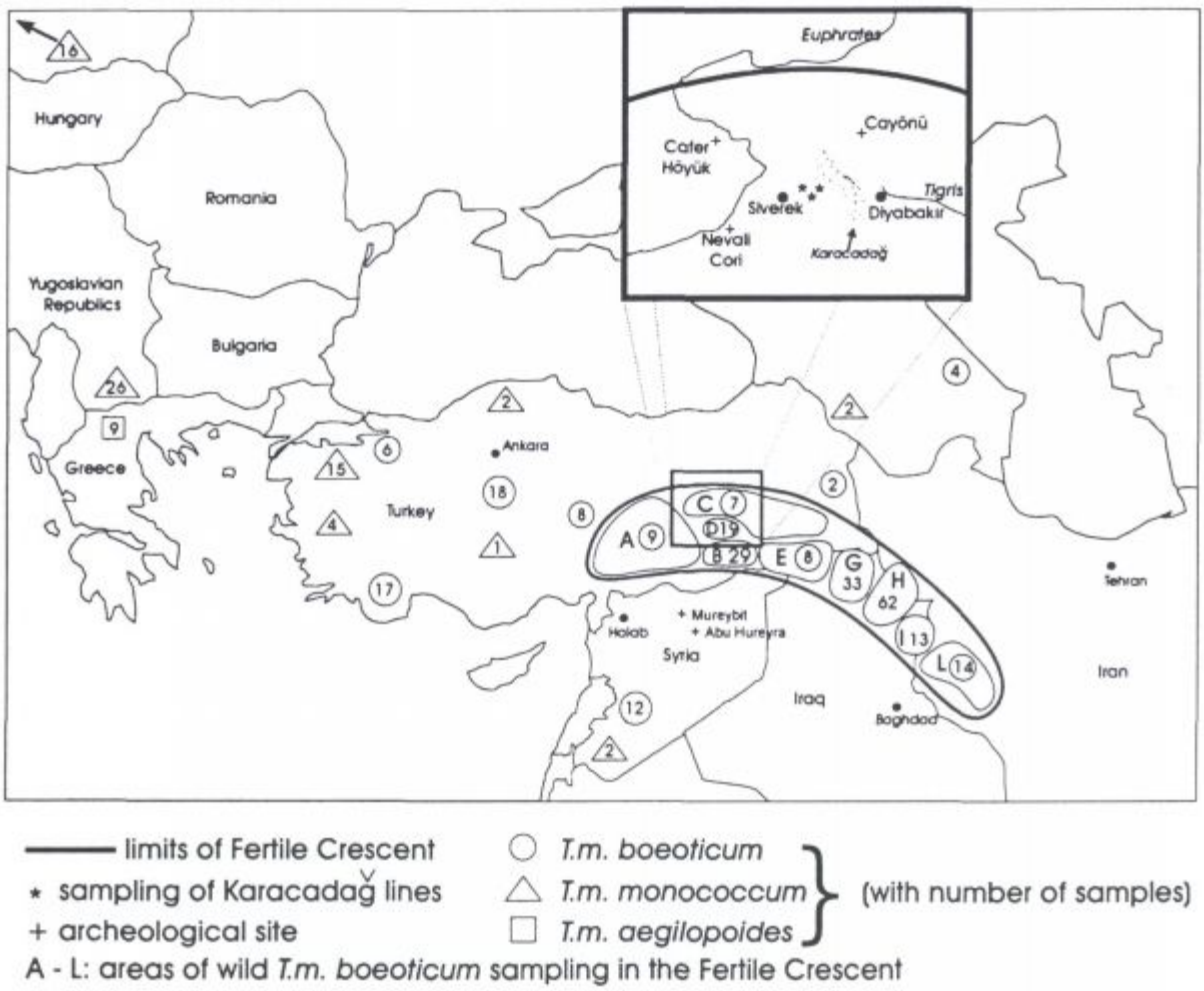


***Fig. 1. Sampling sites of 338 Einkorn wheats. Insert: the Karacadağ region. For the area of the Fertile Crescent, where Einkorn occurs in primary habitats, nine groups were formed (see Heun et al. 1997 for details). Reprinted with permission from Science, 14 November 1997, Volume 278, p. 1313, Fig. 1. © 1998 American Association for the Advancement of Science.***

wild Einkorn wheat. *Triticum monococcum ssp. aegilopoides (T. aegilopoides)* is another Einkorn wheat which is fully fertile with the two other Einkorns. *T. aegilopoides* occurs in the wild mainly in the Balkans, and is of interest because it shows domestication traits similar to those of *T. monococcum*. Ten gene banks world-wide (see *Heun et al. 1997* for details) provided Einkorn wheat samples. In total we obtained 1362 lines, then verified their taxonomic assignment and evaluated their agronomic performance. The collection sites for about 900 of the samples were provided by some gene banks. For the Fertile Crescent samples, as well as for most of the samples from Turkey, only lines for which the collection site was known within ± 5 km were considered. Outside the primary habitat of wild Einkorn, most lines are frequently known only by their country of origin. Moreover, since agriculture led to the spread of cultivated types, consideration of their sites of collection could be misleading. The geographic distribution of the *T. boeoticum* and *T. aegilopoides* lines present in our collection is in agreement with the distribution of wild Einkorn as published in Harlan and Zohary (*1966*). In their Fig. 3, the primary habitats of *T. boeoticum* are shown to include the Taurus-Zagros region from South-eastern Turkey through North-eastern Iraq into Western Iran (i.e., the Eastern half of the Fertile Crescent). *T. aegilopoides* grows wild mainly in the Balkans and Western Anatolia, where it occupies marginal habitats. In Central Anatolia and Transcaucasia the two wild Einkorns occur in marginal habitats together with cultivated Einkorns (*Zohary and Harlan 1966*). West of the Balkans, only cultivated Einkorns occur.

## FORMING GROUPS

The *T. boeoticum* samples collected in the Fertile Crescent were divided into nine geographic groups

(A, B, C, D, E, G, H, I and L). All *T. aegilopoides* samples were included in the 'Aegi' group and the cultivated Einkorn in the 'Mono' group. To test for the monophyletic origin of the cultivated types, this last group was also separated into four subgroups based on their geographic origins (Central Europe, the Balkans, Mediterranean countries and Turkey). Figure 1 (from *Heun et al. 1997*) shows the sampling sites of the 338 Einkorns used for DNA fingerprinting. To reduce our collection to 338, samples were randomly chosen within the above mentioned 11 groups.

## DNA FINGERPRINTING DATA

Amplified fragment length polymorphism (AFLP) markers were generated (*Vos et al. 1995*) for all 338 lines. A total of 288 stable and reliably readable AFLPs were scored for presence vs. absence. Different genetic distance estimates were used to construct several phylogenetic trees based on neighbor-joining and restricted maximum likelihood estimation methods. Almost identical topologies were detected by all methods employed. Finally, a consensus tree based on ten different tree-building procedures was obtained (see *Heun et al. 1997* for details).

## WILD ANCESTORS OF CULTIVATED EINKORN

Figure 2A shows that the nine geographic groups of *T. boeoticum* collected in the Fertile Crescent can be distinguished genetically. Group D, originating from the Karacadağ Mountains in Southeast Turkey, is the most distant group. By adding the cultivated Einkorns (Mono) and the wild Einkorns from the Balkans (Aegi) to these nine groups, we obtained the results in Figure 2B. Cultivated Einkorn appears closely related to *T. aegilopoides*. Group D links 'Mono' and 'Aegi' with the remaining eight groups. This result is a major achievement, since for the first time cultivated Einkorns can be traced back to a group of wild Einkorns showing all the characteristics of a wild species, whereas the lines that grow wild in the Balkans show clear signs of domestication. It is concluded that *both T. monococcum* and *T. aegilopoides* are derived from group D wheats. Figure 2C clearly demonstrates the monophyletic origin of the cultivated Einkorn and strongly suggests that *T. aegilopoides* is a derivative of the cultivated forms. Group D is again positioned between *T. monococcum* and all other *T. boeoticum* forms. The second major result that emerges from our studies is that all group D lines were collected from a relatively small area on the slopes of the Karacadağ Mountains. A gradient ranging from high to very high relationships within the 19 representatives of group D is evident (Fig. 2F).

## CONNECTING DNA STUDIES WITH ARCHAEOLOGY

The localisation of the origin of cultivated Einkorn to the Karacadağ Mountains stimulates questions concerning the human community which achieved this domestication: are there neighboring human settlements with signs of early Einkorn cultivation? It is known that Cafer Höyük, Nevali Cori and Cayönü are all located in the vicinity of these mountains. These are among the oldest settlements at which palaeontologists have found wild and domesticated Einkorn seeds in different horizons. In Table 2 of Nesbitt and Samuel (*1996*) all archaeological data relevant to the origin of agriculture are summarised. From these it becomes evident that the cultivation of Einkorn began between 7800 and 7500 BC in the settlements cited. At the excavated sites in the Jordan Valley mentioned by Jones et al. (*1998*), no decisive (concerning general identification problems see *Hillman et al. 1993*) earlier remains of cultivated Einkorn have been found (*Heun et al. 1998, Nesbitt 1998; Nesbitt and Samuel 1998*), emphasising the importance of the Northern Fertile Crescent in Einkorn domestication. In the case of other excavated sites, such as Abu Hureyra and Mureybit in Northern Syria, wild seeds of *T. boeoticum* seem to have not been collected locally (*Zeist and Casparie 1968; Zeist and Bakker-Heeres 1984*).

## SUMMARY

Wild ancestors of cultivated Einkorn have been localized in the Karacadağ Mountains of Turkey. The archaeological evidence from neighboring excavations implies that Einkorn domestication was initiated there about 9500 years ago. The genetic data also indicate that the domestication event was monophyletic (see also *Zohary in press*) and that the cultivated lines differentiated to a limited extent (quickly achieved by domestication, *Hillman and Davies 1990*) during the spread of agriculture to Western Europe. *T. aegilopoides* is probably a feral form of the cultivated types which reached the Balkans as a result of the spread of agriculture.

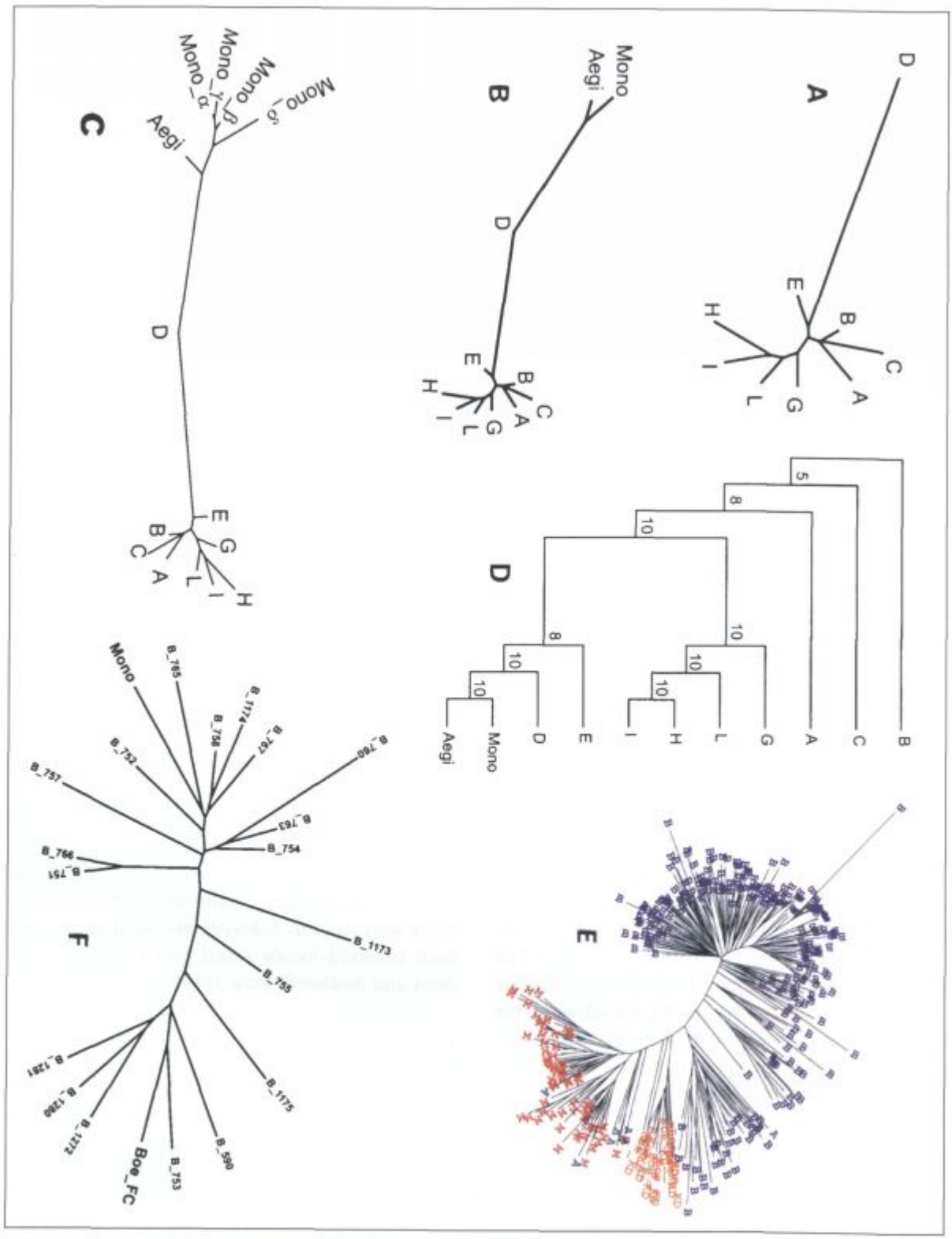


*Fig. 2 A, B and C: Unrooted trees with the nine* T. boeoticum *groups alone, with the same nine groups plus* T. monococcum *(Mono) and* T. aegilopoides *(Aegi) and the tree resulting from splitting up the Mono group into four distinct subgroups. D: Consensus tree summarising the results with the nine* T. boeoticum *groups and the groups Mono and Aegi. E: Unrooted tree with all fingerprinted lines. red: cultivated Einkorns, green:* T. aegilopoides, *orange:* T. boeoticum *from the Karacadağ, blue: remaining* T. boeoticum. *F: Unrooted tree for the 19 Karacadağ lines aligned to one consensus genotype of the remaining* T. boeoticum *and one consensus genotype of the cultivated Einkorn. For details on the tree building procedures see Heun et al. (1997). Reprinted with permission from Science, 14 November 1997, Volume 278, p. 1314, Fig. 2. © 1998 American Association for the Advancement of Science.*

**ACKNOWLEDGEMENTS**

This review is based on Heun et al. (*1997* in *SCIENCE*) and is a shortened version of a review by Heun et al. (in press, *ENCYCLOPEDIA GENETICS*). The persons acknowledged there provided seeds, data on collection sites and help. Please refer to the original SCIENCE article containing the originals of the figures. Thanks for corrections on the English are due to John Einset, NLH, Norway.

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UDK 903.27:75(391/393)"633/634" 903.3:7.045(391/393)"633/634"
Documenta Praehistorica XXV (Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji XXV)

# Çatalhöyük, Turkey: a summary of some recent results

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ABSTRACT - *Recent (since 1993) work at Çatalhöyük has allowed re-evaluation of the reasons for the complex symbolism at the site. It is suggested that the art at the site had a domestic context. Closer understanding of the role of symbolism can be gained from the detailed excavation and analysis of Building 1 in the North area of the East mound. Here geometric wall painting occurs in the cleaner part of the building, associated with burial, especially the burial of young people. Different types of art at Çatalhöyük probably had different functions, but some wall painting seems have had a function linked to death, contacting or protecting from the dead.*

POVZETEK - *Novejša izkopavanja v Çatalhöyüku (od leta 1993) so omogočila, da na novo ocenimo razloge za kompleksni simbolizem na tem najdišču. Menimo, da je imela umetnost tega najdišča družinski kontekst. Vlogo simbolizma lahko bolje razumemo na osnovi natančnih izkopavanj in analiz stavbe 1 v severnem delu vzhodne gomile. Tu najdemo v čistejšem delu stavbe geometrične stenske slikarije, ki so povezane s pokopi, predvsem s pokopi mladih ljudi. Različne vrste umetnosti v Çatalhöyüku so verjetno služile različnim namenom, toda nekatere stenske slikarije so bile očitno povezane s smrtjo, ali so varovale pred njo ali pa nevezovale stik z njo.*

The 9000 year old site of Çatalhöyük in central Turkey was first excavated by James Mellaart (*1967*) between 1961 and 1965. It quickly became of international importance for a number of reasons. For example, there is its early date. There are $^{14}C$ results from the site and dendrochronological studies suggesting a range of dates from the mid seventh to the mid sixth millennia bc (uncalibrated), although 5 metres of occupation which occur below Mellaart's lowest level (XII) indicate an earlier foundation for the site. Initially these early dates indicated the importance of areas outside the Fertile Crescent for the early development of agriculture. Discoveries since the 1960s have, however, demonstrated that many earlier sites exist in Turkey with large settlements or agriculture. But Çatalhöyük retains an importance in terms of its symbolic complexity. While similar symbolic themes such as the bull, the vulture, the removal of heads, and female figurines, have now been found widely from the Near East into southeast Europe, Çatalhöyük stands out in terms of the complexity and density of its use of these themes.

There are certainly other reasons for pointing to the complexity of Çatalhöyük. For example, the artifacts demonstrate widespread exchange (e. g. obsidian, Mediterranean shells) and technical proficiency or even specialisation (as seen in polished obsidian mirrors and finely flaked flint daggers). However, recent evidence suggests that there are other reasons for arguing for a limited degree of complexity. We remain unsure of the degree of dependence on domesticated plants and animals, but certainly an important component of the subsistence was wild resources such as tubers and equids. The continued dependence of early, large settled sites on wild resources is seen at a number of other sites in Turkey (e. g. Asikli Höyük and Çayönü). At Çatalhöyük, intensive use of wild resources may have been facilitated by location in a wetland environment along the Çarsamba River. In addition there is no evidence of central administration, ceremonial centres or public buildings, although in a site 13.5 hectares in size (Çatalhöyük East), such evidence may prove difficult to find (Fig. 1). Overall, Çatalhöyük stands out not so much in terms of its size or political, economic or social complexity, but in terms of its symbolism.

New work began at the site in 1993, under the auspices of the British Institute of Archaeology at Ankara. The first three years of fieldwork concentrated on studies of the surface of the West (Chalcolithic)

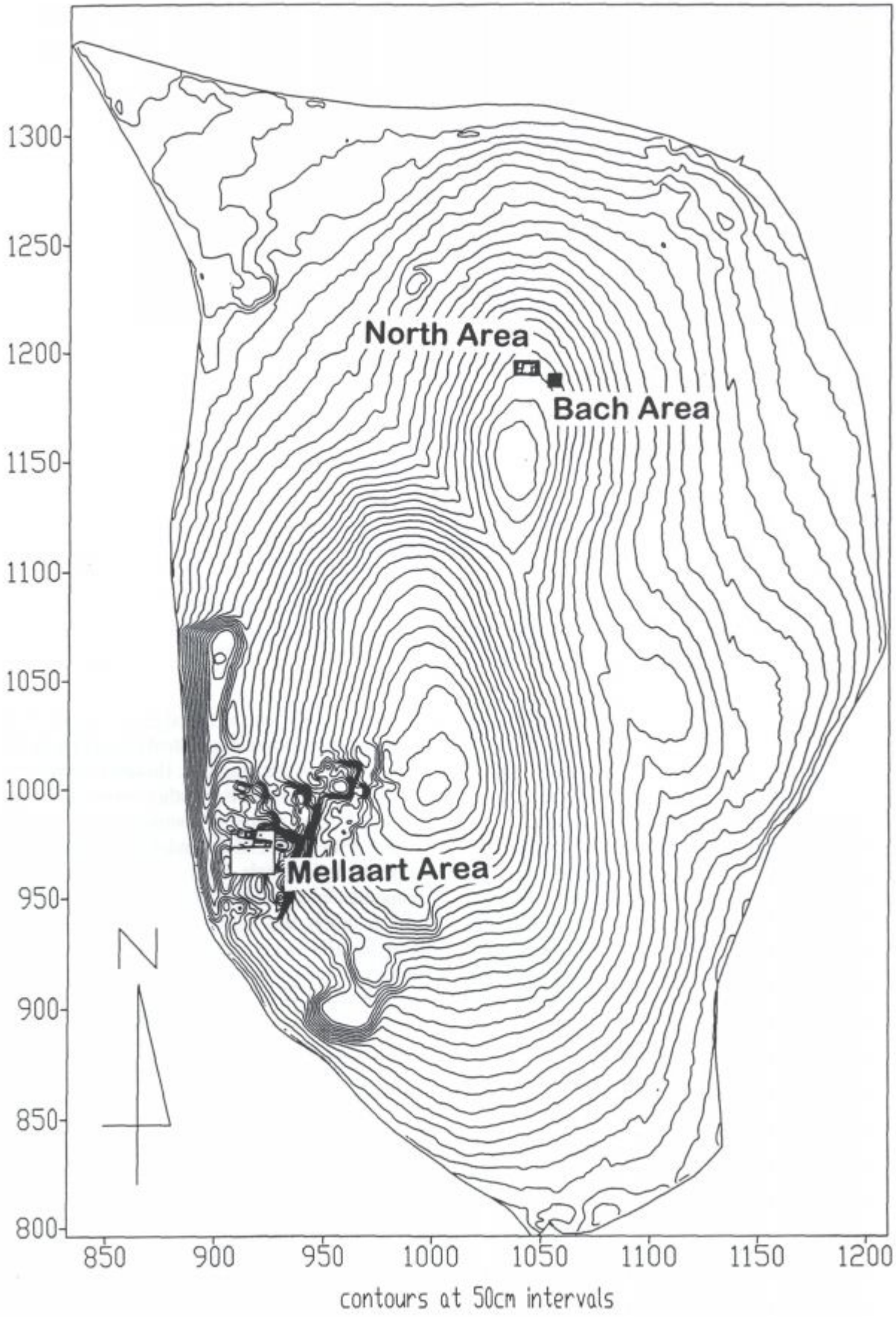


*Fig. 1. The excavation areas on the East mound at Çatalhöyük.*

and East (Neolithic) mounds (published in *Hodder 1996*). Since 1995 excavation has been undertaken in the areas identified in Figure 1. One of the aims of this work is better to understand the art and symbolism at Çatalhöyük East.

## BUILDING 1

I wish to provide an example of the social character of art at Çatalhöyük East by discussing the first building that we have excavated in detail – Building 1 in the North area of the site.

Scraping of the surface of the mounds at Çatalhöyük had earlier proved successful in establishing the overall arrangement of architecture on the Neolithic East mound. Despite some later (Hellenistic and Byzantine) occupation, in many areas on the top of the mound removal of the plough-soil immediately exposed plans of Neolithic buildings. These results and the supporting geophysical prospection are described by R. Matthews (*1996*) and Shell (*1996*). It became clear that the upper levels of occupation on the East mound consisted largely of densely packed small buildings and extensive midden areas. The small rectangular buildings recalled closely those excavated by Mellaart (*1967*) in the southwestern part of the mound. Indeed, the scraping technique suggested that these buildings, even well away from the area excavated by Mellaart, included elaborate examples with complex internal fittings. This suggested that the so-called 'shrines' occurred in different parts of the site at a high density. Rather than envisaging a priestly elite in one quarter of the site, it became necessary to think of domestic cults widely spread.

Further study of the material excavated in the 1960s, including the artefacts housed in museums in Turkey, suggested a more complex picture (*Hodder 1996*). A continuum of variation could be identified between more and less architecturally complex buildings. The more complex buildings with more platforms, bins, pillars, sculpture and painting also tended to have more bifacially flaked obsidian points and more obsidian cores. They also tended to be more innovative in the use of ceramic forms, and to have more figurines. It was also clear that the more elaborate buildings in one phase would often continue to be more elaborate when rebuilt in ensuing phases. There are many difficulties with the definition of such variation between more and less elaborate buildings because of the limitations of the surviving records. In any case, what variation occurs is within a narrow band, and micromorphological work (*W. Matthews et al. 1996*) indicated that even the more elaborate buildings (termed 'shrines' by Mellaart) had traces of a wide range of domestic activities on their floors.

In approaching Building 1, therefore, we were of the opinion that the art at Çatalhöyük had a domestic context but that certain buildings played a slightly more central role in the generation and transmission of cultural elaboration. Unfortunately, the preservation of Building 1 proved to be relatively poor since the walls and upper fills had been subject to millennia of erosion on the top of the North mound, and since the plasters on the surviving walls and floors (the latter only 50 cm from the surface of the mound) had been affected by roots, animal burrows and freeze-thaw action. Nevertheless, the building yielded a large amount of information, resulting from detailed data collection. All soil from the site was dry-sieved, and 30 litres from each deposit were wet-sieved in a flotation system. The heavy residues from this were collected in a 0.5 mm mesh, were dried and then sieved through 4 mm, 2 mm and 1 mm meshes before hand sorting. The resultant heavy residue plots from the floors in Building 1 will be discussed below. (The results from the organic and inorganic chemistry analyses of the floor samples are not available at the time of writing.) This work on micro-artefact distributions on the floors at Çatalhöyük is needed because the floors were carefully swept clean in antiquity. Macro-artefacts (above 4 mm) occur rarely on or beneath floors, and when they do they appear to be special foundation or abandonment deposits or material which has fallen from roofs or walls.

Up to 40 layers of replastering were found on the walls and floors of Building 1. We believe, on the basis of correlations with dendrochronological sequences, that these replasterings occurred annually (*Kuniholm and Newton 1996*). The use of the building has been divided into the 8 phases summarised in Figure 2a–c. The following is a brief summary of the story of these phases. During the construction of the building (phase one), clean foundation deposits were placed between the walls and burials were placed within these deposits. In particular, a row of three neonate burials was placed just in front of what was to be the entrance from the western room (Space 70) into the main eastern room (Space 71). In the first occupation phase (phase two) a fire installation was constructed within the south wall of Space 71. Adjacent to this were the traces of a lad-

der which allowed access to the building, presumably through the same roof hole through which the smoke from the fire escaped. The western room (Space 70) contained a fire installation in the southwest corner. In the centre of the west side of Space 71 a relief sculpture was placed on the wall, although since this was later removed (see phase eight) we do not know what this consisted of. Certainly there was a frame of vertical plaster edges within which the relief sculpture was placed. Although traces of red paint were found elsewhere on the walls of Spaces 70 and 71, the only concentration of painting and the only evidence of designs and motifs occurred around and on the northwestern platform (Platform 13) in Space 71. Here some of the early layers of plaster were painted in geometric designs in various hues of red and in black.

In order to understand the social role of painting in Building 1 we need to try and determine what activities were taking place in the building, particularly around the northwest platform. The micro-artefact distributions suggest a wide range of activities, as do the micromorphological studies by W. Matthews (*et al. 1996*). It is clear that micro-traces survive of obsidian knapping, fish processing, wood-working, bone implement manufacture, hearth sweeping, plant storage, within the buildings at Çatalhöyük. There are indications of animal dung, even on the cleaner floors, although this may derive from dung used as fuel (*ibid.*). However, in Building 1 most of these activities occurred in the southern part of Space 71 and in the western room (Space 70), as is indicated by the micro-artefact plots. The floors in the north and east parts of Space 71 had thicker and cleaner plaster and fewer artefact residues. It is possible that this differentiation into 'clean' and 'dirty' floors resulted from the placing of carefully woven reed mats on the floors of parts of the building (the imprint of such mats having been recorded by *Mellaart 1967*).

The painting in Building 1 thus occurred in a domestic context. And in particular it occurred in the 'cleaner' parts of the building away from the main food preparation and storage areas. In order to understand these areas better, and in order to understand what particularly was happening on the northwest platform, we need to continue on to the second occupation phase (phase three). In this phase, the fire installation in the south wall of Space 71 was blocked up. A small basin (F27), perhaps used for grinding (grinding stones with traces of red ochre were found within it) was placed in the southern part of Space 71. A wooden bin, perhaps for storage was built within Space 70. In this phase, the same division in the use of space between the southwest and the northeast parts of the building occurred, as seen in the micro-artefact distributions and micromorphological studies.

In phase four, the third phase of occupation, a substantial fire installation was built in the southwest corner of Space 70. A grinding installation was also constructed in this room. A storage bin used mainly for lentils was placed on the south wall of Space 71. The entrance between Spaces 70 and 71 was remodelled and a cattle horn set within the western wall of Space 71.

What activities were occurring in the 'cleaner' parts of Building 1 (that is in the north and west parts of Space 71) during these first three occupation phases? One important activity seems to have been burial. At least 64 individuals have been found in a series of graves beneath the northwestern platform, beneath the floor immediately to the east of the northwestern platform, and beneath the main eastern platform. Study of the human remains (*Molleson and Andrews 1997*) has indicated that most of the burials were placed in small graves while still fleshed, the bodies tightly flexed and often wrapped in cloth or braids. As later bodies were added into graves, earlier bones were disturbed, moved aside or removed. This repeated cutting and recutting of graves has made phasing of the grave sequence difficult, as will be discussed below. But bodies seem to have been added to the building throughout the phases of occupation.

The spatial patterning of the ages of the individuals buried in different parts of the building is informative. The northwest platform has not only the highest concentration of burials. It also has the highest proportion of young individuals. So the painting in Building 1 is associated with burial, especially of young people. If this spatial link can be established, what of the temporal link between the painting and the burials?

The fourth phase of occupation (phase six) occurs after a serious fire, perhaps deliberately controlled, had destroyed the southern half of the building. As a result, the building was remodelled (phase five). A wall was constructed to separate the rubble in the southern half of the building from the re-occupied northern half. The eastern platform was rebuilt as a separate small room (Space 110) and a small, per-

haps storage room, was built in the northeast of the building (Space 111). A fire installation was placed near the northwest platform.

The micro-artefact distributions suggest that even in this remodelled space the west was kept for food processing and other 'dirty' activities, while the eastern spaces were kept 'clean'. Burial continued especially under the floor of the eastern room (Space 110), and declined beneath the northwestern platform (Platform 13). Perhaps this was because this latter platform had come to be used for domestic activities. Indeed, the last floor surface on this platform was associated with a concentration of fish bones. It is thus of interest that the latest layers of plaster around this platform do not seem to have been painted.

There is thus both a spatial and a temporal link between the painting around the northwestern platform in Building 1 and burial, especially of young people. What can we say about the traces of relief sculpture on the west wall of Space 71, including the cattle horn set into the wall here? In the first three phases of occupation the sculpture is not associated with a particular activity area. Instead it seems to be centrally located, looking out into Space 71 as a whole. Behind it is the food storage and preparation taking place in the smaller western room. Unlike the painting which has a short, annual cycle of use, the relief sculpture has a life cycle linked to the building itself. Fixed to the wall it is less easy to change and transform. As Mellaart often remarked (*1967*), the relief sculptures are integral to the architecture of the Çatalhöyük buildings, being attached to upright beams and pillars.

The sculpture in Building 1 is centrally placed in the building and it has a life cycle which spans the building as a whole. That 40 year cycle in Building 1 seems to follow the life of an extended family. There are too many individuals buried in Building 1 to have been produced by deaths within a small nuclear family in this time period. We assume that a larger, extended group had rights of burial in this building. However, the early burials are predominantly of young individuals and the later of older individuals. It would appear, therefore, that the building was constructed by a young family which suffered a high death rate among its young children. Most of these young deaths were accommodated beneath the northwestern platform. But as the family matured, some individuals lived on within the building, they had fewer children, and the building was abandoned after the burial of the last old family head beneath the floor in Space 110.

The relief sculpture thus seems to be related to this longer family/house cycle. A specific relationship between this sculpture on the west wall of Space 71 and the house cycle is indicated by the final phases of use of Building 1. We do not know what happened to the sculpture in the fourth occupation phase. This is because, after the abandonment and infilling (phase seven) of the fourth occupation in the building (phase six), a pit was dug down against the west wall of Space 71 and the sculpture removed (phase eight) leaving only traces and fragments. Small deposits of bone points and obsidian blades were left as offerings against the wall. The pottery from the robbing pit suggests that the removal of the sculpture occurred in the Neolithic, not long after the abandonment of the building.

This social concern with the sculpture on the west wall of Building 1 is reflected in numerous similar acts at Çatalhöyük. In Building 2 in the Mellaart area of the site (*Hodder 1997*), the west wall had been violently destroyed, and in the debris around the wall a very large wild bull's horn was found. Mellaart (*1967*) had noted a repeated pattern of destruction of the west walls of buildings. These actions can be seen as destructive, or as attempts made to recover sculptures of great social significance. Whatever the specific interpretation, it does seem that the end of the use of a building was often linked in some way to the relief sculptures within it. As already noted, the sculptures are often found integrated into the architecture of the buildings. And the buildings themselves are built and rebuilt as part of family cycles.

## CONCLUSION

Clearly we do not yet have a full answer to questions regarding the meanings of the unique flowering of art at Çatalhöyük. So far we have made only short steps. But the approach being followed is to contextualise the art and by doing so we have seen that the art had a social character.

The life of the houses in which the art occurred may relate to the life cycles of extended familes. Some of the art, especially the relief sculpture on the western walls, seems to be related to these longer cycles. It seems to have been used and destroyed as the house was used and abandoned, and as family heads grew

from young to old. The destruction or recovery of relief sculpture from central points in abandoned buildings perhaps suggest a concern with the passing on of authority, rights of access, or ancestral ties.

Other aspects of the art, in this case the geometric wall painting, seem to be linked to shorter cycles of activity. The painting in Building 1 is placed on plaster which is annually renewed. Any particular painting is quickly covered over. Mellaart (*1967*) records examples of repeated repainting of similar motifs. But the best examples of this are on relief sculptures such as leopards and bulls' heads. Our own observations are that most walls have some painting but that this is infrequently applied, to different degrees in different parts of a building. The motifs painted are much more varied than the relief sculptures. It is thus of interest that in Building 1, the painting around the northwestern platform seems to be related to specific events rather than to the life cycle of the building as a whole. The painting here seems to be related to concentrations of burials, especially the burials of young people. Perhaps this spatial and temporal link implies some generic association between painting and young people, say between painting and the initiation of young people. On the other hand, the painting may be related specifically to the death of young people.

Because of the link to young people under the northwestern platform, it seems unlikely that the painting (perhaps in contrast to the relief sculpture) is associated with ancestors. Rather, the painting may have something to do with protecting the inhabitants of the building from negative spirits surrounding young death, or the painting itself may have helped directly to calm or control those spirits (as happens in many small-scale, shamanic societies - *Humphrey and Onon 1996*).

Jean Clottes (pers. comm.) has pointed to the way in which animals in some southwestern French Palaeolithic art seem to be 'coming through' the walls in the deep parts of caves. David Lewis-Williams, in his work with the Çatalhöyük project, has suggested that the bulls' heads and some other relief sculpture at the site may be seen as 'coming through' the membrane of the walls in the interior parts of buildings. Certainly, there is much evidence of vulture beaks, jaws of fox and weasel and the tusks of wild boar protruding through the walls into the interior spaces at Çatalhöyük (*Mellaart 1967*). It is possible that much of the art and symbolism at Çatalhöyük has little to do with representation and symbolism at all. It may be more like a tool, used to control or communicate with animals, spirits and ancestors. The common use of the hand motif at Çatalhöyük may suggest the idea of touching or reaching through the walls. The location of the images deep in buildings does not suggest a concern with communication or display to other people. Rather its suggests a concern to control or communicate with another world.

We must await further excavation at Çatalhöyük in order to see whether the patterns so far identified in Building 1 are repeated elsewhere. We still have little idea of the degree of conformity to social norms at the site. Hopefully further analyses in Building 1 and further excavation of other buildings will allow a fuller contextualisation of the imagery. In this way can the different types of 'art' be related to the differing social rhythms of life at Çatalhöyük, and perhaps to conceptualisations of the world very different from our own..

**ACKNOWLEDGEMENTS**

The work at the site is undertaken with a permit from the Turkish Ministry of Culture, and is funded by the British Academy, British Institute of Archaeology at Ankara, Newton Trust and McDonald Institute. The main sponsors are Visa, Boeing and Koç-Bank, the long term sponsor is Merko, and the co-sponsors are British Airways, Shell and GlaxoWellcome. The official tour operator is Meptur. I would personally like to thank and acknowledge all the project members whose collaborative efforts make articles like this possible. In particular I wish to thank Roger Matthews and Gavin Lucas for their painstaking work on Building 1.

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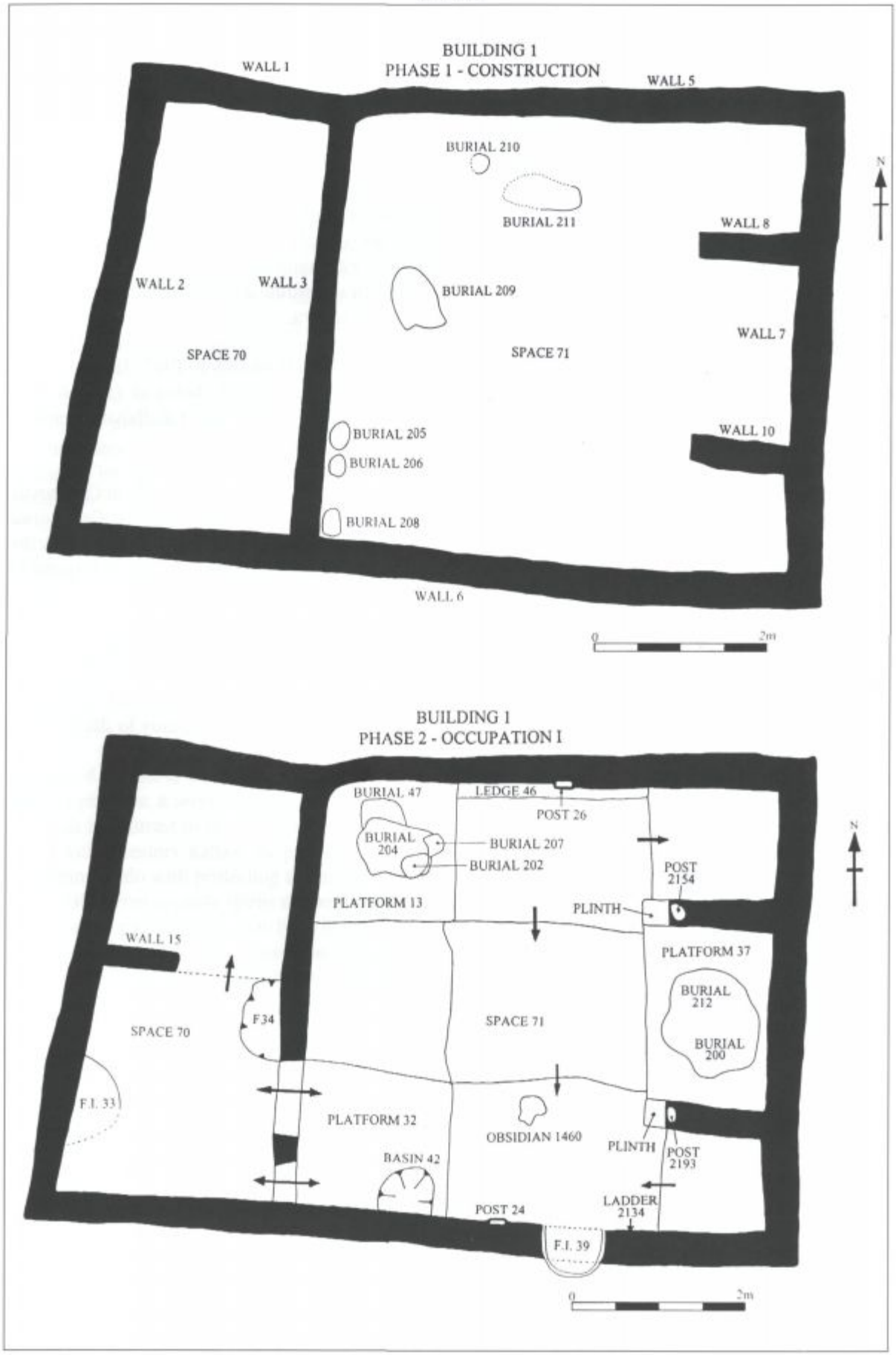


*Fig. 2a. Building 1 at Çatalhöyük. The eight phases of use are summarised.*

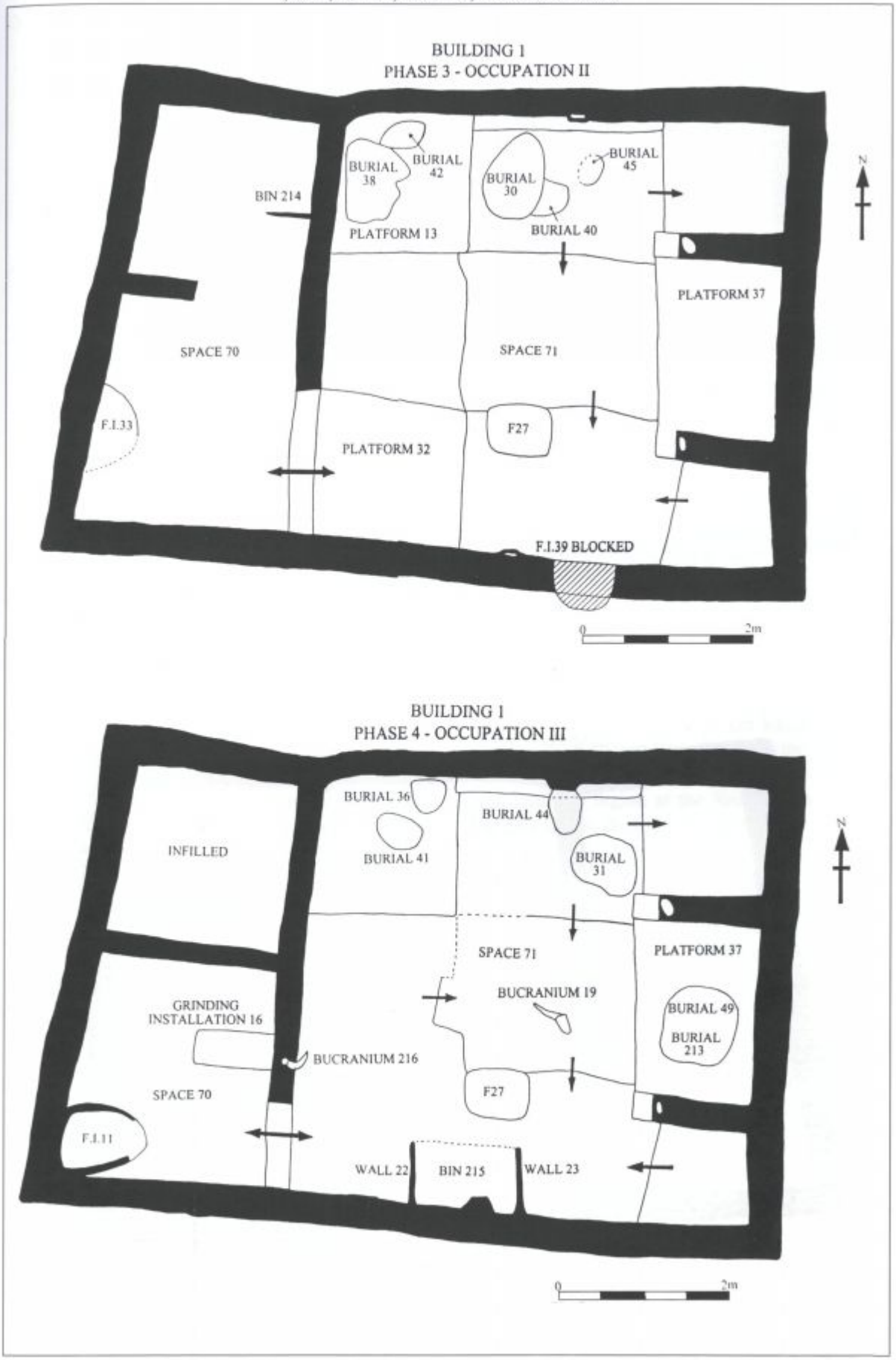


***Fig. 2b. Building 1 at Çatalhöyük. The eight phases of use are summarised.***

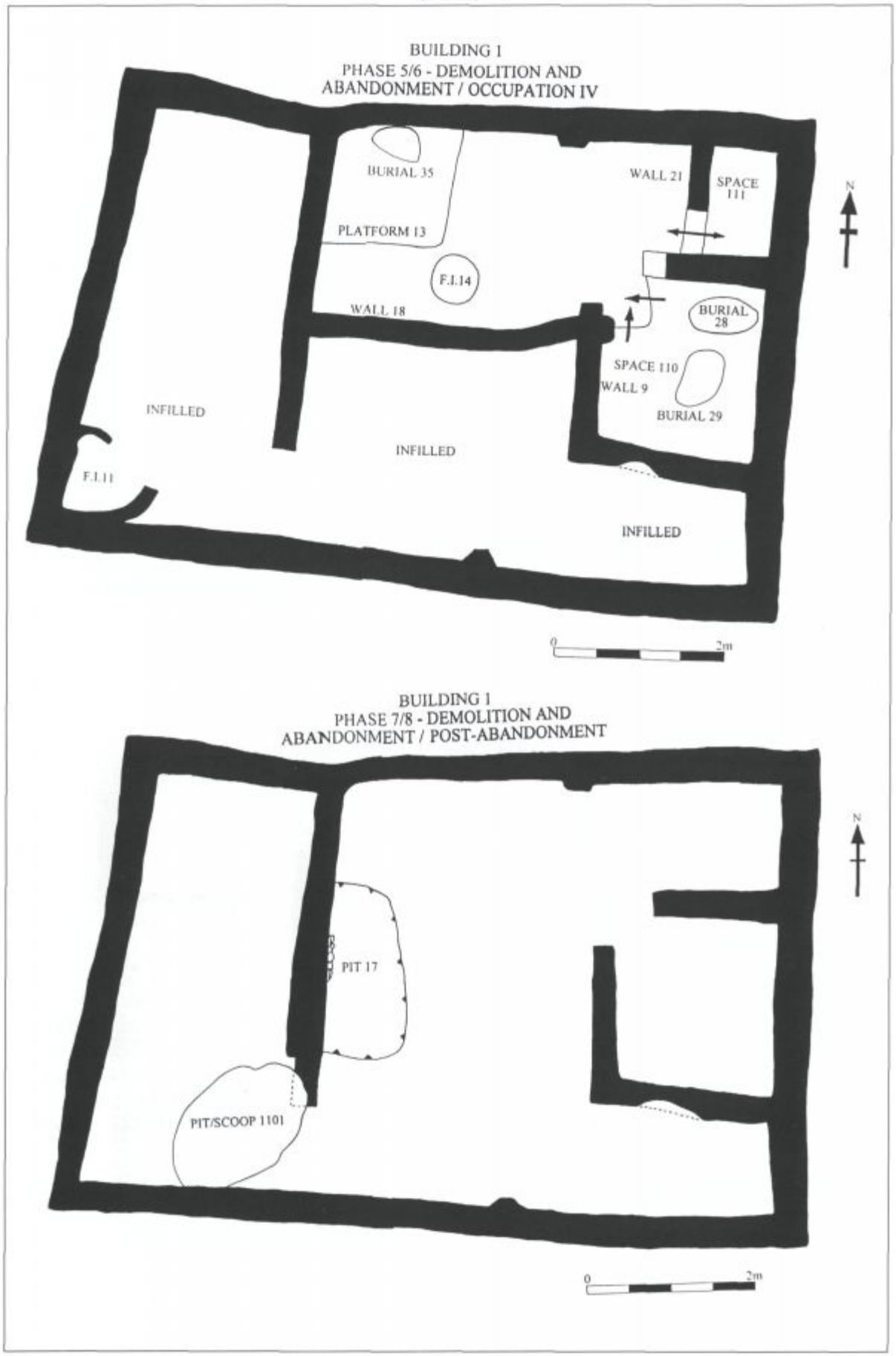


***Fig. 2c. Building 1 at Çatalhöyük. The eight phases of use are summarised.***

UDK 903(392/393)"634"
Documenta Praehistorica XXV (Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji XXV)

# The Circumpontic cultural zone during the 6th millennium BC

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ABSTRACT - *The Circumpontic cultural zone developed during the time of the Balkan Neolithic and covered the territories around the southern and western coast of the Black Sea. The new data presented describes it as a zone of active two-way contacts between north-western Anatolia and the eastern Balkans during the 6th millennium BC. The paper emphasises the role of Thrace as a generator of formative and ornamental ideas for the pottery production of the gradually enlarging Circumpontic zone.*

POVZETEK - *Obpontska kulturna cona se je razvila v času balkanskega neolitika in je obsegala območje južnih in zahodnih obal Črnega morja. Novi podatki jo kažejo kot cono aktivnih dvosmernih stikov med severozahodno Anatolijo in vzhodnim Balkanom v času 6. tisočletja BC. V članku poudarjamo pomen Trakije, ki je bila "generator" oblikovnih in ornamentalnih idej pri izdelovanju keramike v postopno naraščajoči obpontski coni.*

The system of chronological relations lies at the basis of every cultural and historical study. New archaeological excavations, as well as the study of old collections, create a steady accumulation of facts that, from a certain point on, lead to a more or less significant change in ideas about the pattern of past material culture in a given region or area. A change in ideas about the chronology of settlements, layers or finds usually leads to a need to up-date or fundamentally change existing cultural and historical interpretations. Therefore, the recurrent "improvement" of the chronological pattern is of heuristic importance.

The most complete (according to our potential) study of the pottery related or possibly related (under the pattern valid until recently) to the Karanovo III culture, brought about the development of a new periodisation and chronology of post-Early Neolithic cultural phenomena in Thrace, and to an approximate definition of the territorial range of the culture known already, as well as of the newly defined cultural periods (*Николов 1998*).

The Early Neolithic pottery assemblage of Karanovo I covered the whole territory of Thrace, from Vetren and Kovačevo to the west, to Glufišево and Asagi pinar to the east, from Banja and Kazanlak to the north to Muldava and Hoca Çesme to the south and south-east, i.e., covering almost the whole Maritsa basin and the region at the Mesta's upper course. The chronologically following pottery assemblage in the western and southern parts of this region was Karanovo III–IV, belonging to the middle stage of the Late Neolithic. It also covered the north-eastern parts of Thrace, but it had been preceded by three other, consecutive pottery assemblages in the region: the Early Neolithic Karanovo II, the Middle Neolithic Protokaranovo III and Karanovo III, related to the beginning of the Late Neolithic. These three periods chronologically matched, therefore, later and the latest phases of the Karanovo I period in the rest of the region. The last stage of the Late Neolithic in the western parts of Thrace was represented by a variant of the pottery assemblage Karanovo III–IV, which continued to develop, while at the same time the pottery assemblage Karanovo IV existed in the eastern parts of Thrace, to the east from the Kazanlak-Haskovo line, including Asagi pinar.

The introduction of a new Thracian chronological system in the chronology scheme of North-western Anatolia and South-eastern Europe is causing and will continue to cause revisions of ideas about the

chronology of the material culture of the area during the second half of the 6th millennium BC. This paper is only an attempt at an introduction to the chronological system of the Thracian Neolithic and the related pottery assemblages and the great problems of the relations between Anatolia and the Balkans during the time of the Balkan Neolithic.

This problem has various dimensions for each prehistoric period. The most debatable aspect of the chronological period under study is the concept of the origin and distribution of the black (grey-black), very well smoothed, burnished and sometimes polished pottery. Research on this subject followed at least some main directions related to the origin of the cultural communities with dark pottery in Southeastern Europe that replaced (with a few exceptions) the early cultures with coloured (predominantly red) painted pottery in the middle and the third quarter of the 6th millennium.

The first assumptions about the significance of the black, burnished pottery as a reliable mark for migrations within the Balkan territory (from Greece to the Danube region) were those of H. Frankfort and W. Heurtley, but the globalisation of the problem of the origin of this pottery in the Balkans as a result of migrations from the Near East was stated by V. G. Childe (*1936–1937*) and supported later by V. Miloj-čić (*1949*). Three decades later, M. Garašanin presented his concept of the Balkan-Anatolian complex of the Late Neolithic, a concept which, though modified, is maintained up to now (*Гарашанин 1966; 1973; Garašanin 1979*). The concept included as a specific element a slow, continuous migration from Anatolia to the Middle Danube area. Close to this comprehensive idea were the views of other archaeologists studying particular details of the problem (*Тимов 1974; Lichardus, Lichardus-Itten 1989–1990*). The idea that the origin of the Vinča culture was the result of migrations from the east (via Thrace) is shared by D. Srejović (*1963*), B. Jovanović (*Јовановиц 1962–1963*), V. Dumitrescu (*1980*), G. Lazarovici (*1973*), T. Efe (*1990*), etc. The origin of the black, burnished pottery that appeared in Middle and Northern Greece during the transition from the Middle to the Late Neolithic was related traditionally to migrations from the east (*Holmberg 1964; Gallis 1987*). The appearance of the Late Neolithic, dark, burnished pottery (and the origin of the Dudeşti culture) to the north of the Danube was ascribed also to migrations via the valleys of the Vardar and Morava, or to a movement of groups of population over the large area from the Black Sea to the Central Balkans (*Comsa 1987*). The origin of the black, burnished pottery of the Paradimi group was sought also in Anatolia (*Bakalakis, Sakellariou 1981*). Some pre-historians also accepted that the Karanovo III culture was not of local origin in Thrace (*Radunceva 1978*).

The concept of the autochthonous origin of the black, burnished pottery in the Balkans and the cultures reproducing it has had far fewer supporters. G. I. Georgiev always insisted on the local origin of the Karanovo III culture in Thrace (*Georgiev 1971; Георгиев 1974*). H. Todorova suggested that at the end of the Early Neolithic (i.e. at the time of the Karanovo II culture) there was a break in the contacts between Thrace and Anatolia, and the culture of the former area continued to develop without eastern influence (*Тодорова, Вайсов 1993*). J. Chapman stated his belief in an autochthonous development that led to the emergence of the Vinča culture and its black, burnished pottery (*Chapman 1981*). Similar conclusions were presented by V. Leković (*1990*). Other experts also shared "autochthonous" views regarding the origin of this culture (and its pottery) (*e. g. Boroneant 1990; Séfériadès 1990*).

The concept proposed in recent years by M. Özdoğan for the existence of a prehistoric Anatolian-Balkan cultural zone also had its supporters. This was his personal opinion on the problem: "... from the beginning of the Neolithic period in the Balkans, up to the beginning of the Bronze age, we tend to consider most of the Balkan peninsula, Western and Central Anatolia as a single cultural formative zone, distinct from the areas of the Levanto-Mesopotamian tradition. In considering vast geographical areas, extending from Central Anatolia to the Danube, we imply neither that identical cultural assemblages existed throughout this region or that a cultural homogeneity was due to the impetus of diffusion. The model we are suggesting manifests a large cultural formation zone, developing together with the same trend, but also displaying a considerable diversity in the composition of cultural and artificial assemblages." (*Özdoğan 1993.177*). The evidence presented by M. Özdoğan was completed and partially developed by L. Thissen (*1993*) in his analysis of the Neolithic and Chalcolithic pottery from Northwestern and Central Anatolia, and by S. Steadman (*1995*) on the basis of publications on the prehistoric development of the same region.

It is not possible to mention all the components of the above-mentioned aspect of the problem of cultural and demographic relations between Anatolia

and the Balkans during the second half of the 6th millennium, but what has already been stated reflects the three main trends in the scientific efforts at using black, burnished pottery as an argument or reason for solving the problem. The possibility, however, of expressing different and even self-contradictory theses concerning one and the same subject indicates insufficiently strict methodology or a crisis in the research approach. This concerns mainly pure "migrationists" and "autochthonists", which is why the idea of the existence of an Anatolian-Balkan cultural zone, although it could not be a cure-all in itself, is certainly an example of a fruitful, non-traditional idea.

The problem of the reasons, the nature, and the mechanism of the serious changes that caused the emergence of cultures with black, burnished pottery in South-eastern Europe could be the subject of a comprehensive study. I would like just to present briefly some of my observations concerning the problem that resulted both from my recently completed study of post-Early Neolithic pottery and my long research work on Early Neolithic development in the area.

There is no doubt that the origin of the Early Neolithic cultures with painted pottery in the central parts of the Balkan Peninsula was related to South and especially South-western Anatolia. Important indications for this include not only the indisputable typological similarities between the material cultures, but also the geographic link between the two regions that, together with the Aegean Islands, form a clearly detectable arc from the Taurus Mountains to the Carpathian basin. Two other regions, Northern, and especially North-western Anatolia, and the eastern parts of the Balkan peninsula (up to Moldavia), remained between this "exterior" arc and the Black Sea; the Early Neolithic in the "interior" arc was characterised by dark, unpainted (with certain exceptions) pottery. Theoretically, there could be three possible Balkan contact areas of the two zones (from south to north): Western Thrace/Eastern Macedonia, Thrace, and the Lower Danube basin. In fact, only Thrace developed in this way.

The European part of the so called "exterior" arc or the South Anatolian-Central Balkan zone developed a little bit later than the Anatolian part, but within a comparatively short period. The interactions within the range of the "exterior" arc are demonstrable for the whole period of its existence, i.e., for the period of the production of the early painted pottery, which lasted for at least a millennium in almost the whole area of the zone. After that time, a material culture with black, burnished pottery (Vinča and Vinča groups) originated and dominated for a rather long period in the most northerly parts of the zone; in the other parts of the zone (to the south and south-east), painted pottery continued its development (though with some innovations).

The formation processes of the "interior" arc (Northern Anatolian/Eastern Balkan or the Circumpontic zone) started a little bit later, and their development was considerably slower. The formation area of the Circumpontic zone was probably somewhere around the Sea of Marmara and in Northern Anatolia to the east.

According to the present stage of research, I can relate the sites Fikirtepe I, Pendik I, Ilıpınar X, Çanakkale (the early materials), Demircihüyük (at least the so-called Fikirtepe ware), Orman Fidanlığı I–III, etc. to the earliest period (Karanovo I) of that zone (see Fig. 1 for all sites mentioned in this paper). Some contemporaneous sites will probably be discovered in the future further to the east. During the Karanovo I period, a culture with painted pottery (Karanovo I) spread gradually from western to eastern Thrace, up to the lower Tundza and Maritza rivers (*Nikolov 1989*). Meanwhile, though on a small scale, the reproduction of dark grey and grey-black, very well smoothed to burnished pottery also started to appear in the settlements of the eastern reaches of this cultural phenomenon (*Nikolov 1997*).

During the following period already (Karanovo II) the zone of the "interior" arc covered Eastern Thrace (a region where the process had probably started a little bit earlier, e. g. Yarımburgaz 5–4), the north-eastern parts of Thrace (Karanovo II) and reached the Fore-Balkan fields of North-eastern Bulgaria (Ovčarovo-platoto and Ovčarovo-gorata). Painted pottery vanished completely in the north-eastern parts of Thrace (i.e. the Karanovo I period ended) and the Karanovo II cultural phenomenon, with dark pottery, developed; the painted pottery tradition (Karanovo I) continued in the remaining parts of the same area (*Nikolov 1993.185–186; Nikolov 1993a.168–169*).

There is no data indicating a territorial expansion of the Circumpontic zone during the following two periods (Karanovo II–III and Karanovo III), especially as far as its European part is concerned. The relation of the Anatolian material culture to these periods is at

present unreliable. The Karanovo II–III and Karanovo III cultural phenomena, with dark (black) pottery, developed consecutively in the north-eastern parts of Thrace, and in the rest of Thrace the culture with painted pottery (Karanovo I) was reproduced (*Nikolov 1993a.186*).

The Karanovo III–IV period was a time of territorial expansion of the zone. It is difficult to estimate the dimensions of the expansion to the east because of unreliable data on previous periods; however, at the end of the period, the culture with black burnished pottery was already present in the central, inner and Black Sea part of Anatolia, as seen, for example at the beginning of Alaça Hüyük IVa, the beginning of Büyük Gülücek, and Ikiztepe II, at least layer 6. The European part of the zone expanded in the west and spread over the whole of Thrace, to Yasatepe and Kapitan Dimitrievo, for example (the Karanovo III–IV period), and also to the north, reaching the Da-


***Fig. 1. Neolithic sites in the Circumpontic zone and neighbour regions: 1. Ikiztepe; 2. Büyük Gülücek; 3. Alaça Hüyük; 4.Yazır Hüyük; 5. Orman Fidanlığı; 6. Demircihüyük; 7. Ilıpınar; 8. Pendik; 9. Fikirtepe; 10. Kumtepe; 11. Gülpınar; 12. Agio Gala; 13. Emporio; 14. Tigani; 15. Yarımburgaz; 16. Toptepe; 17. Aşağıpınar; 18. Paradimi; 19. Drama; 20. Karanovo; 21. Yasatepe; 22. Kapitan Dimitrievo; 23. Kačica; 24. Samovodene; 25. Hotnica; 26. Koprivec; 27. Ovčarovo; 28. Ussoe; 29. Goljamo Delčevo; 30. Malăk Preslavec; 31. Dudeşti; 32. Circea; 33. Gradešnica; 34. Supska; 35. Predionica; 36. Anzabegovo; 37. Vršnik; 38. Kremenik-Sapareva banja; 39. Bălgarčevo; 40. Sitagroi; 41. Dikili tash; 42. Arapi (made by S. Goshev).***

nube via the Yantra and Russenski Lom valleys (e. g. Koprivec AI).

The last of the studied periods, Karanovo IV, marked a time of great territorial expansion of the Circumpontic zone in South-eastern Europe. The black, burnished pottery displaced the painted type from almost the whole of the Central Balkan region (to the north from Thessaly, with a few exceptions), covered the whole of the Lower Danube region, Moldavia and Western Thrace/Eastern Macedonia. Its production in Northern Anatolia is also well documented, and to the south the zone covered almost the whole of the eastern Anatolian coast as well as Crete. Thrace was entirely within the range of the zone, as it had been during the previous period (the Karanovo IV cultural phenomena to the east and the final stage of the Karanovo III–IV to the west).

At the end of the Balkan Neolithic, the territory of the "exterior" arc no longer existed as a contact cultural zone. As well as in the Konya plain (Southern Anatolia), painted pottery continued its development in Southern and Central Greece, Thessaly, and the Lower Struma valley; in the European parts of the zone it is always found together with black-burnished ware.

*Interregional interaction within the Circumpontic* zone was only supposed, albeit very cautiously, in the third trend of ideas described above about the nature of Balkan-Anatolian contacts, but their directions and nature remain completely unexplored. The possibility of investigating this essential aspect of the character of the Circumpontic zone could be found in certain common, formative elements of the pottery assemblages in the area; two are especially significant and could be detected almost during its whole chronological range. These are vessels with one vertical pronged handle, and dishes with a thickened, inner part of the rim. Their significance had been noted many times in the literature (cf. *Efe 1990.110*). These or other vessels sometimes have cylindrical feet. The two main, significant formative elements appeared in the north-eastern parts of Thrace, which is why their distribution within the zone is an indisputable indication for directions of cultural interaction.

Vessels with vertical pronged handles (probably mugs only), dishes with thickened inner part of the rim and vessels on cylindrical feet appeared for the first time during the Karanovo II–III period in north-eastern parts of Thrace. At this time they developed only there, as a local phenomenon in the formation region. During the Karanovo III period these formative elements became indicative of the character of its pottery assemblage. They were still a local phenomenon of parts of north eastern Thrace, but their earliest sporadic distribution could be detected to the north, in the Yantra Valley (Samovodene).

The significant elements pointed out covered the whole of Thrace during the Karanovo III–IV period. Moreover, they reached the Struma Valley to the south-west (Kremenik – building levels IV) and probably the Vardar Valley (Vršnik IV); they spread to the Fore-Balkan fields in the north (Samovodene – building levels VI–V, Goljamo Delčevo I) and via the Yantra and Russenski Lom valleys reached the Danube (Koprivec AI); except for Eastern Thrace (Yarımburgaz 0), at the end of the period they penetrated the Anatolian part of the Marmara region to the south-east (the beginning of Ilıpınar VI, the beginning of Fikirtepe II, the beginning of Pendik II, Demircihüyük) and even further inland in Northern Anatolia (layers 6–5 of Ikiztepe II, the beginning of Büyük Gülücek, the beginning of Alaça Hüyük IVa).

During the Karanovo IV period (in the eastern parts of Thrace) the significant elements described remained typical of its pottery assemblage. They continued to be produced in the western parts of Thrace also (the final stage of the Karanovo III–IV period). They were typical of the pottery of Western (Paradimi I–III) and Eastern (Yarımburgaz 3–2) Thrace, though in smaller quantities. They could be found as single pieces in all areas around Thrace (as a whole): in the Anatolian part of the Marmara region (the end of Ilıpınar VI, the end of Fikirtepe II, the end of Pendik II, Demircihüyük) and in Northern Anatolia (Yazır Hüyük, Ikiztepe II, layer 4–2, the end of Büyük Gülücek, the end of Alaça Hüyük IVa) to the south-east; almost along the whole eastern coast of Anatolia and on the islands (Kumtepe IA, Koskuntepe, Gülpınar, Agio Gala-the Upper Cave, Emporio X–IX, Tigani Ib–II, Kalimnos) to the south; in Thessaly and Macedonia (Arapi layer in Arapi, Vassilika I, Dimitra I, Sitagroi I–II, Dikili Tash I, Anza IV, Bălgarcevo II–IIIA, Kremenik, building levels III–I) to the south-west; in the northern central Balkan zone (Supska 9–8, Predionica, Circea-Viadukt, Gradešnica-Lukanovo dărvo) to the north-west; in Northeastern Bulgaria (Samovodene – building levels IV–I, Ussoe I–II, Malăk Preslavec) to the north.

The conclusions following the observations presented on the time and the range of distribution of the

vessels with vertical pronged handles, dishes with a thickened, inner part of the rim, and vessels on cylindrical feet which appeared first in Thrace are unambiguous. It is obvious that after the aesthetic-technological idea of an eastern origin for the production of dark, unpainted pottery had established itself in the eastern parts of Thrace, the same area turned gradually into a generator of formative and probably ornamental ideas for pottery production that influenced for a long period the pottery "fashion" of the enlarging Circumpontic zone. An independent pottery design was developed in the north-eastern parts of Thrace during the time of the Karanovo II–III and III periods, and during the Karanovo III–IV and IV periods, Thrace participated actively in the exchange of ideas concerning material culture with neighbouring regions and in a way influenced the formative abundance of the pottery assemblages developing there. The conclusion for the deep penetration of significant Thracian pottery elements into Northern Anatolia not as imports, but as influenced by Thracian local pottery production is especially important in view of the concepts presented above about Anatolian-Balkan relations in the middle and the second half of the 6th millennium BC. It is obvious that the idea of a one-way Anatolian influence should be revised, at least for the period in question. The most probable model should include multi-directional contacts within the Circumpontic zone, and Thrace was the motive power for these contacts, at least as far as the European part is concerned.

The same concerns the Karanovo IV period, too. I will add some more details about the interrelations within the Circumpontic zone. During the period under discussion, the Karanovo IV cultural phenomenon developed in the eastern parts of Thrace and in some parts of Eastern Thrace, based on the previous development common to the whole Thrace (the Karanovo III–IV periods); in the western parts of Thrace there continued the reproduction of the earlier Karanovo III–IV type culture, although with some innovations to be discussed later. The reason for the changes in the pottery assemblage that differentiated Karanovo IV complex to the east of the Kazanlak-Haskovo line should probably be sought in an intensified two-way cultural exchange at this time from north to south and from south to north (between the Carpathian Mountains and the Aegean Sea). This exchange definitely included the Anatolian part of the zone, but the limited research there does not permit essential conclusions about the transfer of ideas along the east-west axis (between the Marmara area and the central northern parts of Anatolia).

Bearers of the Linear Band pottery and, precisely, of so-called Notenkopf pottery appeared in the north-eastern parts of Muntenia during the Karanovo IV period (*Drasovean 1996.184–186*). The Bojan-Bolintineanu cultural phenomenon resulted probably from contact with the local bearers of the earlier phases of the Dudeşti culture. Certain elements typical of this pottery assemblage (for example, negative field framed by pricked dots in channelled composition) penetrated the south and could be seen on pottery in the eastern parts of Thrace (for example, at Tell Karanovo). The distribution of some very specific ornamental elements of Notenkopf pottery as far as the central parts of Anatolia is of special significance for the study of cultural contacts within the zone. These are the "note" elements in the pottery decoration from Karanovo, Kalojanovec (the north-eastern parts of Thrace), Yarımburgaz (Eastern Thrace), Alaça Hüyük, Büyük Gülücek (Central Anatolia). The direction of penetration is indisputable in this case and coincides with the direction and the depth of penetration of the other, aforementioned formative elements, typical of Thrace (pronged handles, thickened rims and feet). Other ornamental elements, typical of the Linear Band pottery culture were discovered again in Eastern Thrace (Asagi pinar, Yarımburgaz and Toptepe) and probably at Ilıpınar also (to the south of the Sea of Marmara). By this I mean specific motifs consisting of connected spirals and meanders or wave motifs made by shallow incisions on the bodies of dark, thin-walled clay vessels.

E. Comsa suggested that the ornamentation, characteristic of the earlier phases of the Dudeşti culture – specific zig-zag bands hatched or filled with pricked dots – originated from similar decoration at Demircihüyük (*Comsa 1987.79–80*). This hypothesis is quite convincing, since such ornamentation was found at Tell Karanovo, though as an exception. The diffusion in this case was oriented undoubtedly from the south-east to the north-west.

A typical feature of some low, vertical, pronged handles (a "thumb-like", eccentric prong) appeared in Eastern Thrace (Asagi pinar). This peculiarity was also observed in the Yantra valley (Kacica, Hotnica). Here we must also mention some clay "altars" on three or four feet, having similar prongs at their corners. They appeared during the later phases of the Dudeşti culture in Muntenia, in North-eastern Bulga-

ria (Hotnica, Kacica, Malăk Preslavec), along the Lower Tundza valley (Drama) and Eastern Thrace (Asagi pinar). It is difficult to find supporting evidence of where these specific elements emerged in the region and the direction of their later distribution. The presented group of typical elements is, however, a very good addition to the abundant evidence for intensive cultural contacts within the Circumpontic zone and in this very case, its European part.

Predominantly in the Anatolian part of the zone, probably the region where the idea emerged, there are clay vessels with decoration, dry incised or incised after firing (Alaça Hüyük, Büyük Gülücek, Ikiztepe II, Demircihüyük, Fikirtepe, Pendik). The same decoration technique is also registered in the neighbour south-eastern region of the European part of the zone (Paradimi, Asagi pinar, Drama). Obviously, this ornamental-technological element travelled from the east to the west and north-west.

It is probable that there are more examples of cultural influences with moving in opposing directions within the Circumpontic zone during the Karanovo IV period. Undoubtedly, the progress of the study would provide an increase in, and higher precision of, such evidence. I think it is a very important fact that such contacts existed during the period, and that the movement of culture-formation ideas went in the two directions. What is more, Thrace as a whole was not only a transmitter, but also a generator of innovations for the material culture of the zone.

The pottery assemblage of the final stage of the Karanovo III–IV cultural phenomenon that developed in the western parts of Thrace contemporary with the Karanovo IV period indicates intensive contacts with the Central Balkan region. However, the stratified materials available are insufficient to provide a more precise analysis of these contacts to the northwest and south, or of relations with the related Karanovo IV cultural phenomenon to the east.

The observations presented above argue against both the pure migration and the pure autochthonous theories on the origin of the black, burnished pottery in South-eastern Europe in the middle and during the second half of the 6th millennium BC. The theory on the Balkan-Anatolian cultural zone is a good basis for speculation, but it is more than obvious that during the earlier stages of the Neolithic period two cultural (contact) zones existed, covering large territories of the two regions; the Circumpontic zone enlarged considerably in its European part as late as the last stage of the Balkan Neolithic, and this was the period of the Anatolian-Balkan cultural zone. Nevertheless, the classical range of the Circumpontic zone remained (as already described) autonomous to a great extent from the processes occurring in the western parts, and this perceptible cultural and territorial differentiation remained at least for the whole of the 5th millennium BC.

The aesthetics and technology of dark pottery production have their roots in Northern Anatolia. However, the implementation of this idea – the reproduction and development of dark and black-burnished pottery – was a very long process, that covered constantly expanding territory of South-Eastern Europe, and manifested itself as different cultural phenomena, all having two-way cultural contacts among themselves as well as with Northern Anatolia.

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UDK 903(392:234.42–11)"6343"
Documenta Praehistorica XXV (Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji XXV)

# On the problem of the Anatolian-Balkan relations during the Early Neolithic in Thrace

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ABSTRACT - *The paper concentrates mainly on the typological analysis and distribution of Early Neolithic painted pottery assemblages in Thrace and Eastern Rhodope Mountains. It is hypothesised that the Hoca Çesme cultural influence correlates with the processes of the setting up and development of Balkan early farming communities in Eastern Rhodope Mountains.*

POVZETEK - *V članku se osredotočamo predvsem na tipološko analizo in razprostranjenost zgodnjeneolitske slikane keramike v Trakiji in vzhodnih Rodopih. Domnevamo, da je nastanek in razvoj zgodnjih balkanskih kmetovalskih skupnosti v vzhodnih Rodopih povezan z vplivom kulture Hoca Çesme.*

This paper is not aimed at presenting a new concept of the Neolithization of the Balkans. It is rather an attempt to add new data to the complicated and still unclear processes of the setting up and development of Balkan early farming communities through the interpretation of a "special case". The archaeological excavations at the Neolithic site Hoca Çesme in Eastern Thrace, Turkey and the new evidence has provided the opportunity for a re-interpretation of some old finds from the Neolithic site at Krumovgrad in the Eastern Rhodope Mountains, Bulgaria.

## KRUMOVGRAD

The Neolithic site was situated on a low terrace on the left bank of the Krumovitza river, a tributary of the Arda river which now lies under the central part of the modern town of Krumovgrad in the Eastern Rhodope Mountains, Bulgaria. The site was located in 1974 because of some urban construction activity. The materials available were unearthed in a central excavation made for block foundations, covering 560 m$^2$, and two additional small trenches. As almost all of the deposits were scraped out by machines in the central excavation, trench 1, covering 12 sq. m, yielded the basic information on stratigraphy and the site sequence. A mixed layer, containing pottery from the Middle, Late Neolithic and Early Chalcolithic periods and the Early Bronze age, covered six Early Neolithic construction levels dated to the Karanovo I period; the average thickness of each level being 0.30–0.40 m. They yielded parts of houses with wattle and daub construction and plastered floors; hearths and domed ovens (one of them 1.40 m in diameter) made of stamped clay were found in the houses (*Кънчев 1994*). The pottery is typical of the Karanovo I period: coarse, semi-coarse and fine ware (Fig. 1). The surface of the coarse and semi-coarse ware is uncoated, smoothed or rusticated; sometimes decorated with plastic or incised ornaments. The pottery assemblage includes plates, bowls and necked jars with vertical string-hole lugs. The fine pottery is red slipped, brown or grey-black. All six construction levels yielded white painted pottery. The red or reddish-brown fine ware is white painted: open plates, bowls, tulip-shaped vessels, necked jars on pedestal bases and lids (Fig 1. 7–9). The channelled decoration and plastic knobs are registered on bowls and necked jars on pedestal bases. No $^{14}$C dates are available for the site. Certain shapes, considered typical of the Karanovo II period, are present in the Krumovgrad pottery assemblage; thus the Early Neolithic layer of Krumovgrad could be referred to the second half of the Early Neolithic period in Bulgaria.

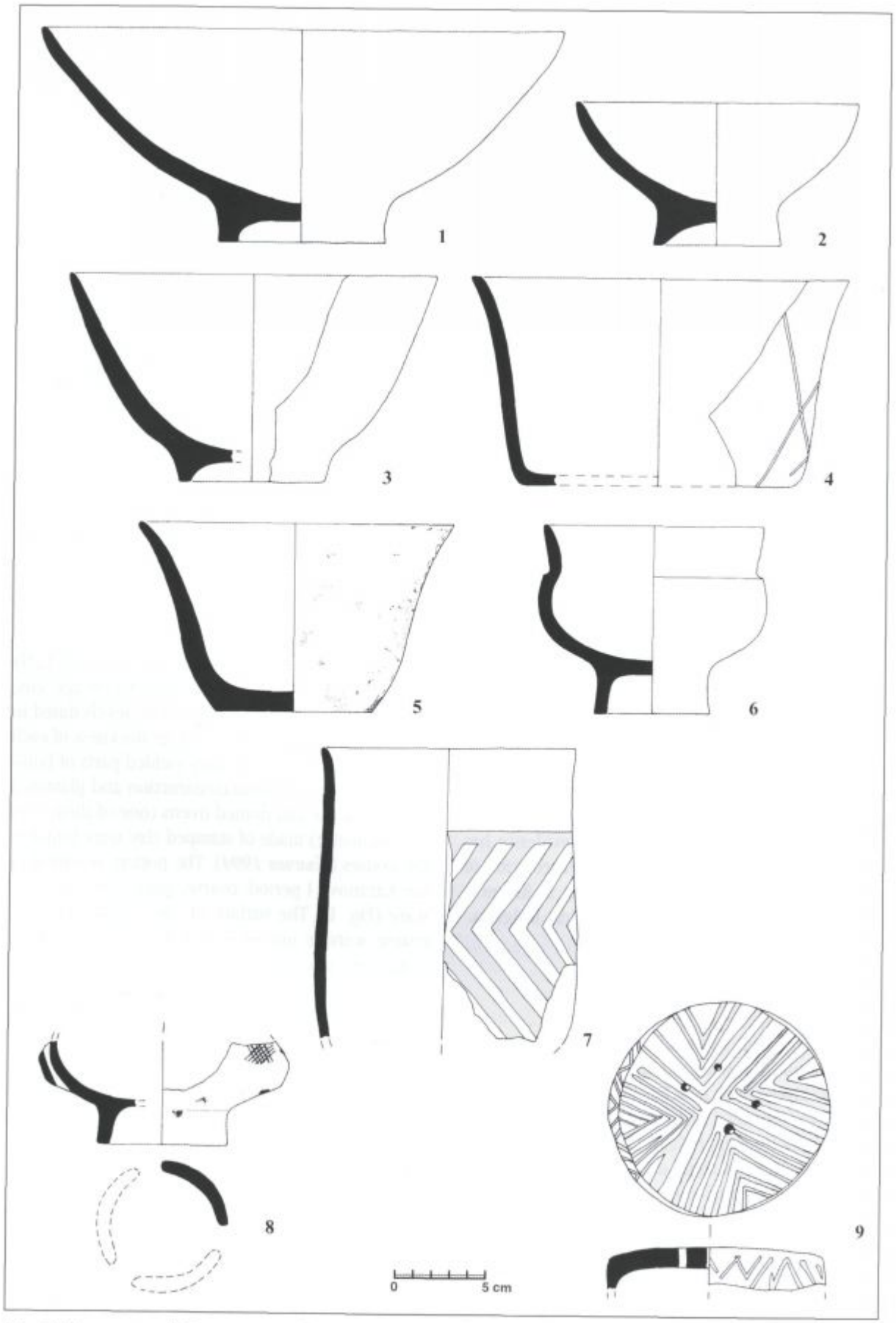
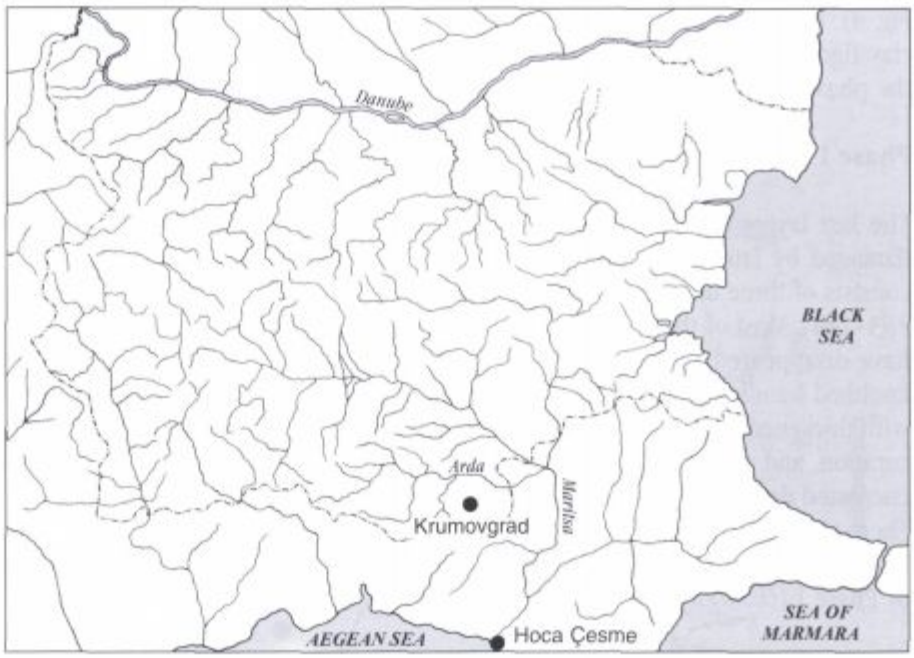



*Fig. 1. Krumovgrad. Pottery types from the Early Neolithic levels.*




***Map of southeastern Balkan showing the location of Krumovgrad and Hoca Çesme.***

**HOCA ÇESME**

The Neolithic site is located on a terrace by the estuary of the Maritza river, some 5 km inland from the Aegean. The site was excavated from 1990 to 1993 by an Istanbul University team, headed by M. Özdoğan. The cultural sequence was divided into four main phases, Phase IV being the earliest (*Özdoğan 1993.1997*).

**Phase IV.**

The earliest settlement is small, and heavily fortified by a massive stone wall (*Özdoğan 1997.24, Fig. 7*). The houses are circular and sit directly on the rocky surface, actually carved into it. The pottery assemblage is characterised by the total absence of coarse ware. The pottery is fine, thin-walled, with a lustrous red or black surface. Deep bowls, usually with "S" profiles, tubular or crescentic lugs, are common elements in this assemblage. The decoration consists mainly of vertical or curvilinear bands in relief; occasionally there are some fine grooved or incised pottery (*Özdoğan 1997.24-25*).

**Phase III**

It consists of two architectural layers; the buildings are again circular in plan. The massive, enclosing stone wall from the previous phase was still in use. The pottery assemblage is similar to that of Phase IV, although the wares are slightly coarser and thicker. A new type of ware, with a thick smeared red coating on a black surface, is represented by a very few sherds. This distinctive ware increases in quantity in Phase II. As for the vessel types, the difference from Phase IV is minimal. Stamped and incised decoration is now slightly more common than in the previous phase. There are some painted pottery (including white painted ones) from the end of the phase (*Özdoğan 1993 Fig. 4; 1997.25-26*).

**Phase II**

The phase consists of three distinct horizons. There is a marked change in the plane and the construction techniques of the buildings; they are rectangular, with plastered walls, similar to the typical Karanovo I period houses. Domed ovens on raised platforms, bins, and working platforms represent the new elements of this phase. In spite of changes in the architecture, the massive enclosure wall was still maintained and used, indicating continuity in the settlement organisation. The red and black wares of the previous phase continue, though in lessening amounts, and the quality of the burnishing is lost and the walls are thicker. There is an increasing amount of reddish-brown and matt-black pottery, the latter occasionally having a smeared red coating. Though minimal, there are some coarse, dully burnished pottery. There are a number of new vessel types in the pottery assemblage. Besides the decoration, typical of the previous phase, there are fine fluting and intentional mottling. Though very few, there are painted sherds: white on red or black, red on cream or black, and black on red (*Özdoğan 1993,*

*Fig. 4*). The so-called "pintaderas", bone spatulas and clay figurines are among the common elements of the phase (*Özdoğan 1997.26*).

**Phase I**

The last layers of Phase I and Phase II are badly damaged by later intrusions and erosion. Phase I consists of three distinct horizons (*Özdoğan 1993. 183–184*). Most of the wares of the previous phase have disappeared. Most common for the phase are knobbed handles, footed vessels, plates and bowls with thickened rims, sometimes with channelled decoration, and triangular vessels with incised and/or encrusted decoration (*Özdoğan 1993, Fig. 1, 2, 3*). There are some painted sherds, white on red and red on cream, the latter being from the earliest horizon of Phase I (*Özdoğan 1993, Fig. 4*).

Calibrated $^{14}C$ dates were published for the site (*Özdoğan 1997.27*). As the uncalibrated date were also available, Yavor Boyadziev from the Archaeological Institute in Sofia studied the information and proposed his own view (personal communication)[1].

| M. Özdoğan | Y. Boyadziev |
|---|---|
| Phase IV<br>6400–6100 BC | Phase IV<br>6200–6000 BC |
| Phase III<br>6000–5900 BC | Phase III<br>6000–5800 BC |
| Phase II<br>5800–5700 BC | Phase II<br>5800–5600 BC |

On the basis of the Hoca Çesme evidence, M. Özdoğan suggested the following interpretation of the site: a population from the Aegean part of Anatolia, being in close relations with the Central Anatolian plateau, moved northward and, reaching the estuary of the Maritza river, settled down. Hoca Çesme "... clearly demonstrates the gradual change and adaptation that an Anatolian type of colony settlement went through in a local environment. It is possible to follow not only the roots, but also the stages that led to the emergence of the Karanovo I culture from Phases IV and III of Hoca Çesme" (*Özdoğan 1997.27*).

The newly published Hoca Çesme evidence is of crucial importance for a better understanding of Neolithization processes in the Balkans. It provides a new basis for the reconsideration of several sherds from Krumovgrad. Four sherds which differ essentially from the rest of the pottery are available in the boxes containing the materials from the Krumovgrad site.

- A sherd from a jar with a bead rim; brown slipped and burnished surface; the wall is 3–4 mm thick; even brown scatter. The decoration consists of incisions and dots. There are traces of white matter in the dots (Fig. 2. 1). The sherd was found at 2.70 m (construction level IV). Sherds of vessels similar in shape or decoration were found at the end of Hoca Çesme Phase III and in Phase II.

- A sherd from a vessel with a vertical string-hole lug; there are traces of a red wash on the dark brown, very well smoothed surface; the wall is 5–6 mm thick. The decoration consists of two incised lines (Fig. 2. 2). The sherd was found in the scraped soil, therefore lacking a fixed stratigraphic position. The peculiar feature is the convex interior part of the lug, an element uncommon for the Krumovgrad pottery assemblage, but existing at the end of Hoca Çesme Phase III and the beginning of Phase II.

- A sherd from a necked jar; black burnished surface; the wall is 5–7 mm thick. The decoration consists of a "necklace" of dots and vertical bands of thin incised zigzag lines (Fig. 2. 3). The incisions were made on a semi-dry surface. The sherd was found at 2.70 m (construction level IV). Similar motifs were registered at the end of Hoca Çesme Phase III and in the beginning of Phase II, and similar motifs and incision technique in Yarimburgaz phase 4.

- A sherd from a plate with a slightly thickened rim; gray-black burnished surface. The wall is 6–7 mm thick. There are grooves on the rim and stamped decoration just beneath (Fig. 2. 4). The sherd was found at 1.90 m (construction level II). Sherds of vessels with similar decoration were registered at the end of Hoca Çesme Phase III and in Phase II. Thickened rims exist in Hoca Çesme Phase I[2].

1 I would like to thank Dr. Bojadjiev for the information he shared with me.

2 I am deeply indebted to Prof. M. Özdoğan for the opportunity he provided to me to work with the pottery from Hoca Çesme, and for the help and the stimulating discussions as well.

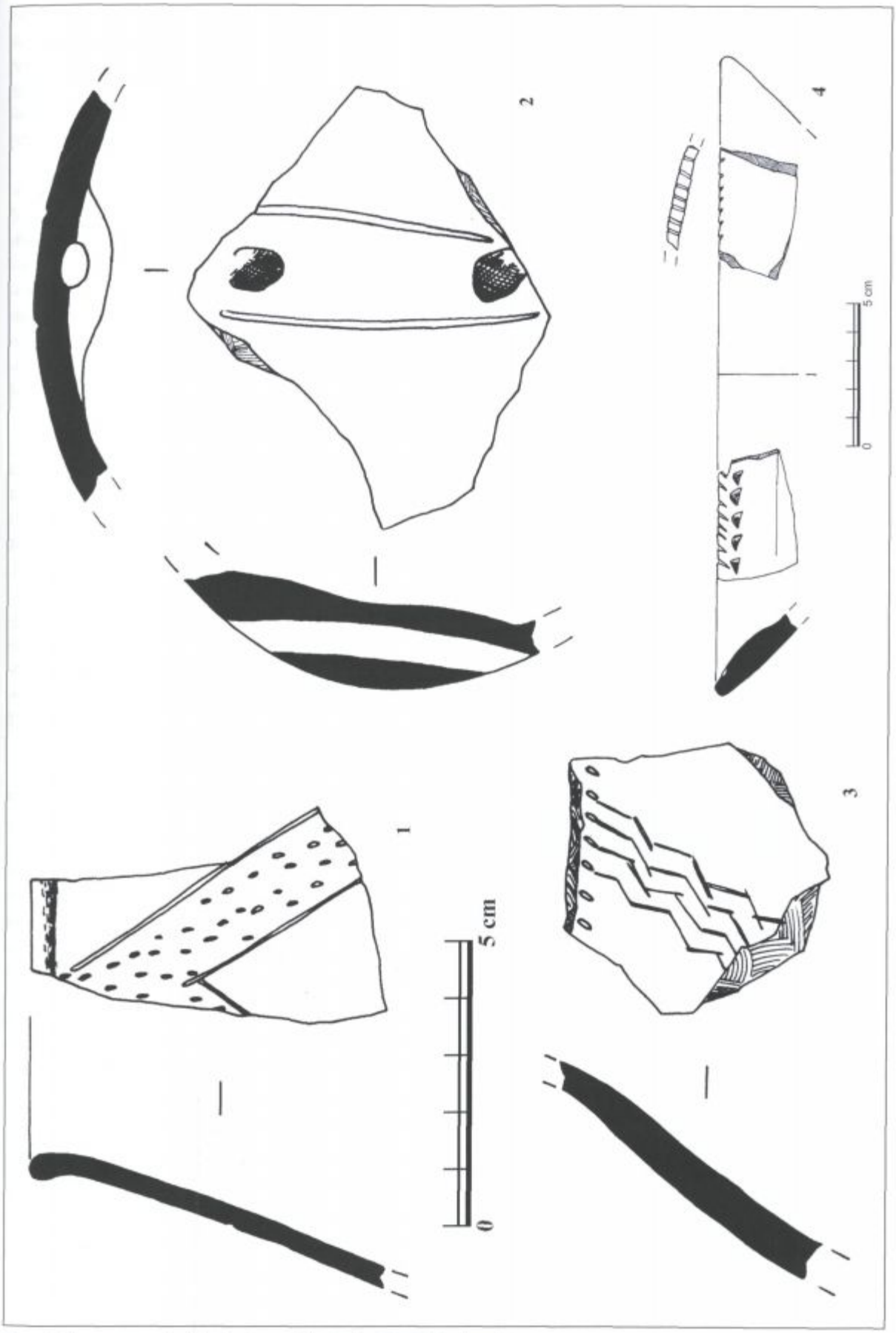



*Fig. 2. Krumovgrad. Sherds from the Early Neolithic levels.*

The few sherds presented are atypical of the Early Neolithic Krumovgrad pottery assemblage and of the Early Neolithic Karanovo I type of pottery as well. They differ in paste, surface colour, treatment, and decoration, which is why they could be regarded as imports. The only probable exception is the lug sherd; it could be a piece of local production under strong foreign influence.

The fact that sherds similar to the Hoca Çesme type of pottery were found in Krumovgrad provides grounds for a synchronisation of Krumovgrad construction levels IV–II with the end of Hoca Çesme Phase III and Phase II. The white, red or black painted pottery in the layers of the end of Hoca Çesme Phase III and Phase II support such an assumption. Some of the white on red sherds are identical to the white painted pottery of the Karanovo I type of pottery. In my opinion, they could be direct imports.

As was already mentioned, the lack of radiocarbon dates from Krumovgrad, makes the fixing of the absolute chronology of the site impossible. During the last decade, archaeological excavations of Early Neolithic deposits in Bulgaria have yielded a considerable number of radiocarbon samples. There are over 60 $^{14}C$ dates calibrated by a computer programme in the Institute for Prehistory in Frankfurt am Mainz. According to the results obtained, the development of the Karanovo I period was most probably between 5950 and 5600 BC (*Nikolov 1989.30*).

The studies of Early Neolithic pottery show that the Karanovo I period in Thrace consisted of at least two consecutive stages. The earlier stage is attested in the Mesta valley and the western parts of Thrace – Eleshnitza (construction levels I and II) and Slatina (the lowest levels of the sequence, the "Big House") – and the painted decoration is made with white paint only. The later stage is attested in a larger number of sites in the eastern parts of Thrace and in the lower parts of the Rhodope Mountains – in Karanovo, Simeonovgrad, Krumovgrad, Kardzali, etc. This stage is marked by the appearance of a small number of imported or local vessels with darkly painted or polychrome decoration, indicating that the stage was contemporary with the Starčevo type cultures in the Central Balkan area. At the time this stage developed in the Eastern Rhodope Mountains in sites such as Krumovgrad and Kardzali, the consequence of Karanovo II, II–III and III settlements existed in the eastern parts of Thrace (in Karanovo for example) *(Nikolov 1997; 1998a)*. The distribution of settlements belonging to different stages in certain areas supports the idea that the routes of the initial distribution of early farming groups followed the Mesta and Struma valleys in a northerly direction. Thrace was later "colonized" and the process took place from west to east, reaching as far as the lower courses of the Maritza and Tundza rivers *(Nikolov 1998a)*.

The presence of vessel types typical of the Karanovo II and II–III periods in the pottery assemblages of Krumovgrad supports the later chronological position of the site in the Thracian Early Neolithic sequence. If we accept the dates for Hoca Çesme proposed by Yavor Boyadziev, we see that Hoca Çesme Phase IV and the first half of Phase III should be contemporary with the stage with white painted decoration in the Central Balkans and the first stage of the Karanovo I period in Eleshnitza and Slatina.

The painted pottery (white on dark brown, white on red, red on black, black on red) at the end of Hoca Çesme Phase III and those (white on red, white on brown, black on red) in Phase II, refer the relevant phases to the second stage of the Karanovo I period.

Burnished ware decorated with bands of incised zigzag lines (similar to Fig. 2. 3) was registered in Yarimburgaz phase 4, as well, and the pottery assemblage of the phase is correlated with the pottery assemblages at the end of Karanovo I and Karanovo II periods *(Nikolov 1998.218)*.

To return to the "Hoca Çesme case", I would like to propose another point of view: an Anatolian population reached the Maritza estuary, settled down, and established the Hoca Çesme site. The people protected the village from the potentially hostile or merely unknown environment by a massive stone wall. The enclosing wall suggests that the newcomers found the area populated already, otherwise they would not have put so much effort into its erection and maintenance. The settlement developed as a closed community during Phase IV and the greater part of Phase III, and "domesticated" the newly acquired area by maintaining traditions: – living in the same type of houses as in the old homeland, making the same pottery, etc. Contact with the Karanovo I people must have been established earlier, but evidence appears at the end of Phase III – several painted sherds in Hoca Çesme and a few sherds of "foreign" pottery in Krumovgrad. Obviously it was a time of intensifying contact between the two cultural communities. A new house type (much more suited to the local climate and environment) appears in Hoca Çesme Phase II, a significant change, indicating

closer relations with the local people. At the very end of Phase II and in Phase I the similarities to the cultures of the Balkan Middle and Late Neolithic grew in number and the initial cultural identification of the Anatolian colony changed considerably changed.

Most probably, the roots of Karanovo I culture lie in that type of colony; the migrations of population and the transformation of cultural experience gave birth to a new phenomenon in the Balkans, but there is still not enough evidence that it happened via the Maritza valley. It does not seem likely that Hoca Çesme was a kind of "generator". It was rather a small colony, established on an area where the existence of the Karanovo I culture was an established fact (though it probably did not cover the lowest Maritza valley entirely). After some time, the two cultural phenomena established relations. These are detectable in the two directions from imports or local production under foreign influence. Hoca Çesme developed independently for some time, as is evident from the continuity of house and the pottery types, where Anatolian traditions dominated local trends. According to the available data, the cultural influence of Hoca Çesme was restricted to the relatively small region of Eastern Thrace and the Eastern Rhodope Mountains.

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UDK 903(234.42–11)"634"
Documenta Praehistorica XXV (Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji XXV)

# Neolithic sequence: the upper Stryama valley in western Thrace (with an appendix: radiocarbon dating of the Balkan Neolithic)

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ABSTRACT – *The study represents the Neolithic sequence in a newly investigated micro-region in the Balkans – the Karlovo Lowland in the upper Stryama valley (north-western Thrace). Recent evidence confirms that during the Early Neolithic III (the period of Karanovo II) in western Thrace the development of the Karanovo I culture continued. The village of Kliment-Banyata, with some similarity in the pottery to that of Karanovo II, probably represents the end of that stage in the Stryama valley. In addition the chronological definition and the sequences of the different Neolithic periods and key sites, based on available $^{14}C$ dates calibrated with Oxcal program, version 3.0 are presented.*

POVZETEK – *V članku predstavljamo neolitsko zaporedje novo raziskane balkanske mikroregije – nižavja Karlovo, ki leži v zgornji dolini reke Strjame (severozahodna Trakija). Novi podatki potrjujejo, da se je v času zgodnjega neolitika III (obdobje Karanovo II) v zahodni Trakiji nadaljeval razvoj kulture Karanovo I. Vas Kliment-Banyata, ki kaže nekatere podobnosti s keramiko Karanovo II, verjetno predstavlja konec te faze v dolini Strjame. V dodatku članka so kronološka definicija in zaporedja različnih neolitskih obdobij ter ključnih najdišč. Podatki temeljijo na dostopnih datumih $^{14}C$, ki so kalibrirani s programom Oxcal, verzija 3.0.*

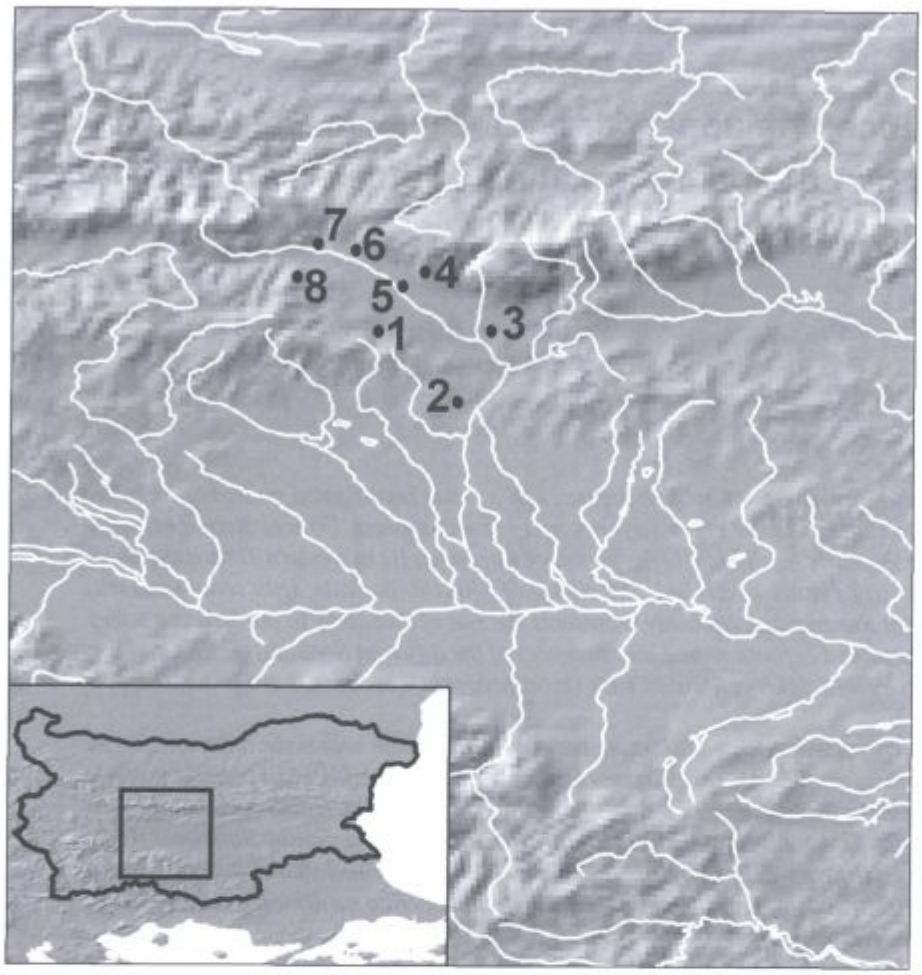
## INTRODUCTION

The Stryama River is a tributary of the upper Maritsa River, located in north-western Thrace (the central Balkans). Its lower basin overlaps with the Maritsa basin, but the upper course is localised in the lowlands of Hissar and Karlovo and in the Sredna Gora Mountains (Map 1).

The upper Stryama valley divides into three areas:
- The Hissar lowland, at the foot of the southern slopes of the central Sredna Gora Mountains;
- the Karlovo lowland, between the northern slopes of the Stara Planina Mountain and southern slopes of the central Stara Planina Mountain;
- the uppermost course of the river lies in the western Sredna Gora Mountains, where there is a third micro-region.

Through the Stryama River, the Karlovo and Hissar Lowlands are open to the south-east into the Maritsa valley micro-regions. There are no high hills between the Hissar Lowland and the upper Maritsa valley, so the southern slopes of the central Sredna Gora Mountains can be seen from the Yunatsite Tell when the weather is fine. The western parts of the Sredna Gora Mountains separate the upper Stryama basin from the Zlatitsa-Pirdop and Sofia Lowlands. To the east, through the Kaloffer Hollow, the Karlovo Lowland is connected with the upper Tundja Valley. Recently, winters have been mild there, and the summers are warm, but not very hot. Deluvial soils predominate. The region is suitable both for arable agriculture and stock breeding. The Sredna Gora Mountains and Stara Planina Mountain forests, rich both in wood and game, presented an additional favourable factor for settling this region in prehistory.

The Karlovo and Hissar lowlands, as well as the upper Maritsa basin (to the west of the Plovdiv region) are historical and geographical micro-regions whose cultural interactions were quite intensive in prehistory. The latter resulted in a unification of the




***Map 1. Maps of the Balkans with location of the upper Stryama valley and the Neolithic settlements documented there: 1 Hissar, 2 Chernichevo 3 Banya, 4 Karlovo, 5 Dubene – Leshtaka, 6 Dubene-Pishtikova Mogila, 7 Dubene-Popovka II, 8 Kliment-Banyata.***

material culture. In short, one and the same cultures developed there during the different prehistoric periods. Western Thrace is connected through the Maritsa and Tundja Rivers with different micro-regions of eastern Thrace and opens into the Turkish Thracian Plain. The easily accessible passes of the western Sredna Gora Mountains and the western and the central Rhodopes Mountains were not a serious barrier to contacts and interaction between the Thracian population with South-western Bulgaria, in the past as in the present. The Rhodopes passes connect western Thrace with the northern Aegean area as well. Therefore, the Karlovo Lowland, being located in the southern central region of Bulgaria, appeared as an important contact zone during the different prehistoric periods.

By the 90's, this micro-region was one of the least investigated prehistoric areas in Thrace. The only Neolithic materials originated from limited drillings of the Ploskata Mogila tell near the village of Banya (excavations of P. Detev and N. Madjev), where Karanovo I and Karanovo III layers (Early and Late Neolithic) were documented. A popular article recorded a destroyed settlement, discovered at the foot of the Stara Planina Mountain, in the suburbs of the town of Karlovo, but there is no surviving material from this site (*Krajchev 1970*). In 1992 a field survey and limited drillings on sites along the upper Stryama valley registered several prehistoric settlements, two of which belong to the Karanovo I culture from the Early Neolithic: the Dubene-Pishtikova Mogila tell and Kliment-Banyata open settlement (*Nikolova and Madjev 1993; Nikolova 1994*). A few Late Neolithic sherds were discovered in the area of the Leshtaka Mogila tell near the village of Dubene in 1996, to the north of the Dubene-Sarovka tell from the Late Copper and Early Bronze Ages.

In the Hissar Lowland, P. Detev performed test diggings of a tell near the village of Chernichevo. There is no publication of excavated material. According to the ceramics from the depot of the Hissar Archaeological Museum, levels from the Early Neolithic (Karanovo I Culture), the Late Neolithic (Karanovo III Culture), the Copper Age (Karanovo VI Culture) and the Early Bronze Age (Yunatsite Culture) were documented there. Few finds have been published from

| Period | Western Thrace | Eastern Thrace | Other cultures in the Balkans | Absolute Chronology BC |
|---|---|---|---|---|
| Late Bronze Age | Karlovo finds | Asenovec | Encrusted pottery<br>Brenica<br>Sabatinovka | Ca. 1500–1200/1150 |
| Middle Bronze Age | No evidence | ?<br>Gulubovo ? latest | Verbiciora<br>Tei<br>Vatin | 2000 – ca. 1500 BC |
| Early Bronze III | Dubene IIC<br>Yunatsite 8-1 | Ezero 3-1<br>Nova Zagora 5-1 | Hatvan<br>Kirklareli<br>Vinkovci/Maroš<br>Bubanj III/early Vatin | 2500/2450–2000 |
| Early Bronze II | Yunatsite 14-9<br>Dubene IIB | Ezero 10-4<br>Dolyama | Kostolac/Vučedol<br>Cotofeni II–III/Glina<br>Ezerovo/Sozopol | Ca. 3000–2500/2450 |
| Early Bronze I | Yunatsite 17-15<br>Dubene IIA<br>? | Detelina<br>Ezero 13-11<br>? | Cotofeni I/Orlea<br>Cernavoda III<br>Baden<br>Vajska - Hunyadihalom | Ca. 3300/3200–3000 BC<br>Ca. 4000–3600/3500 |
| Final Copper | Karlovo axe of Jaszladani type | Dolnoslav<br>Karanovo VI | Cernavoda I/Yagodina<br>Bodrogkeresztur<br>Tiszapolgar | |
| Late Copper | Karanovo VI | Karanovo VI | Gumelnita – Varna | Ca. 4500–4000 BC |
| Early Copper | Maritsa | Maritsa | Vinča – Pločnik, Boyan complex, later Hamangia | Ca. 5000/4900–4500 BC |
| Late Neolithic II | Kaloyanovets | Kaloyanovets<br>Karanovo III/IV (after V. Nikolov) | Hotnitsa,<br>earlier Boyan complex,<br>earlier Hamangia | Ca. 5250–5000/4900 BC |
| Late Neolithic I | Karanovo III<br>? | Karanovo III<br>Karanovo II/III | Vinča – Tordoš,<br>Starčevo – Cris IV | Ca. 5500/5450–5250 BC |
| Early Neolithic III | Karanovo I | Karanovo II | Gradeshnita-Circa<br>Starčevo = Cris III | Ca. 5750–5500/5450 BC |
| Early Neolithic II | Karanovo I | Karanovo I | Gradeshnitsa-Circa II<br>Starčevo – Cris I<br>Devetaki | Ca. 6000/5900–5750/5700 |
| Early Neolithic IB | ? | ? | Gura Baciului Ib-Donja Branjevina II | Ca. 6200–6000 BC |
| Early Neolithic IA | | | Krajnitsi, Koprivets I,<br>Gura Baciului Ia-Donja Branjevina III | |

***Tab. 1. Culture sequence and absolute chronology of Neolithic, Copper and Early Bronze Ages in the upper Stryama valley and northeastern Thrace.***

a settlement discovered in the area of the present-day town of Hissar belonging to the Karanovo III Culture (*Detev 1962*).

The present study initiates the systematic analysis of the Neolithic sequence in the upper Stryama valley in the context of the Balkan prehistoric development, based on new evidence from my excavation in 1992. Some finds were kindly given to me to publish by Mr. N. Madzhev, from his excavations in 1980's, and to whom I am extremely grateful. There is no evidence on the Early Neolithic I in Bulgarian Thrace (see the Appendix), so the earliest records originated from the Early Neolithic II-III, Karanovo I culture.

## THE EARLY NEOLITHIC II–III: KARANOVO I CULTURE

The prehistoric settlements of the Karlovo Lowland (Map 1) are situated at an altitude of approximately 300–450 m. The Early Neolithic settlements are located not far from the upper Stryama riversides, or at the feet of the mountains (the Stara Planina Mountain and Sredna Gora Mountains). Two of the Early Neolithic settlements possess thick cultural layers: the Ploskata Mogila, near the village of Banya, and the Pishtikova Mogila, near the village of Dubene. A test dig at Dubene-Pishtikova Mogila, revealed a preserved cultural layer of around 2 metres in height belonging only to the Early Neolithic, while the Banya-Ploskata Mogila disclosed layers from the Early Neolithic (Karanovo I Culture), Late Neolithic (Karanovo III Culture) and Early Bronze Age (Yunatsite Culture). The third settlement, Kliment-Banyata is located on a slope at the very foot of the northern slopes of the central Sredna Gora Mountains. It is situated at the immediate vicinity of an intercepted warm mineral spring, which probably also existed in Antiquity and preconditioned the rise of a settlement surrounded from the south by bare ravines. Warm mineral springs are also to be found near the Banya tell and Hissar site. The 1992 preliminary trenches demonstrated a destroyed cultural layer there reaching 1 metre in depth (excluding pits).

Three categories of pottery can be distinguished: coarse, ordinary and fine. It is made of clay, with fine or bigger sand admixtures. Small stone fractions appear in the biscuit of the coarse ware. A light red or wine red slip characterise the ordinary and fine pottery. All pottery is hand-made, with brown, brown-red and greyish-black surface after firing. As an exception, a beige surface is found on some bowls.

Jar vessels with corded vertical handles are widely distributed and typify the Karanovo I culture (Fig. 1). A vase-like spheroid vessel without handles, having a small cylindrical neck and equally cut rim, was also found on the tell of Pishtikova Mogila (Fig. 2). A small bowl with equally cut rim (Fig. 3. 1,2) and a cone-shaped plate on which lines and signs were secondarily cut over the outer wall (Fig. 4) are also characteristic of this culture.

***Fig. 1. Dubene-Pishtikova tell. Karanovo I Culture. Broken jar-like vessel with an S-shaped profile and four vertical, bud-like handles. Clay with sand admixtures. Well slipped surface, with a fine finish. Brown. Diameter of the mouth – 11 cm. Height – 21.5 cm. Dubene-Pishtikova Mogila. Fallow land.***

*Fig. 2. Dubene-Pishtikova tell. Karanovo I Culture. Fragmented vase-like vessel with a short cylindrical neck, rounded body and a ring foot. Clay with sand admixtures. Well smoothed and finished surface. Brown. Height – 19 cm. N. Subev's collection. According to the owner of the collection, the vessel originated from Dubene-Pishtikova Mogila.*

*Fig. 3. Kliment-Banyata settlement. Karanovo I Culture. A fragment of a spheroid bowl; preserved profile. Clay, abundant in sand admixtures. Height – 6.6 cm. Kliment – Banyata. A destroyed cultural layer from.*

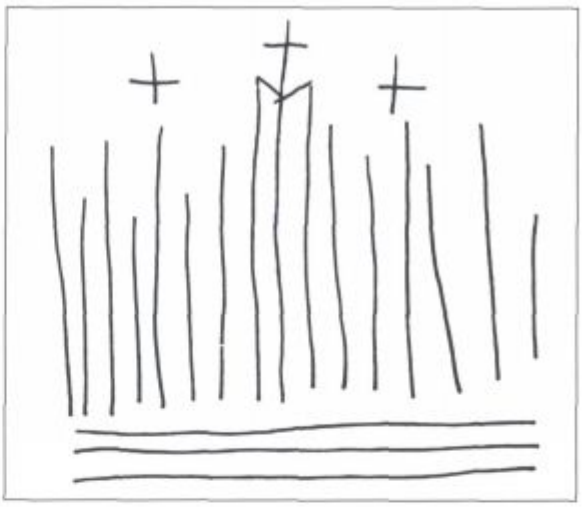


*Fig. 4. Dubene-Pishtikova tell. Karanovo I Culture. A fragment of a cone plate with a rounded mouth rim. Clay, abundant in large and fine sand. Traces of brown-red slip on the surface. Parallel lines and small crosses are incised on the wall face. 16 parallel lines, on one side of which three small crosses and one "M" turned to the left are incised. On the other side, three vertical parallel lines are preserved. Wall thickness: 0.7 cm. Dubene-Pishtikova Mogila. Surface find.*

Pottery painted in white was typical of the Dubene-Pishtikova Mogila and Ploskata Mogila tells near the village of Banya (Fig. 5. 1,2). Earthenware painted in dark-brown was found as an exception at Dubene-Pishtikova Mogila (*Nikolova and Madjev 1993. Fig. 6*) (Fig. 5. 3). The investigated area, however, was quite restricted. An exceptional find of two fragments of a lid with a greyish-black surface and a deeply incised spiral decoration with white encrustation was discovered at Dubene-Pishtikova Mogila (Fig. 5. 4a–b).

The white painted pottery was manufactured of well-refined clay, which sometimes contained fine sand or small stones. Cone-shaped broad plates and spheroid bowls, some of which have a foot, are most popular. Sometimes, the feet are detached. There are sherds of tulip-shaped vessels, but for the time being the evidence is scanty about this popular shape in Early Neolithic Thrace.

The prevailing number of painted earthenware has a wine-red slip, but pottery painted in white on an ochre ground was also found. Rare examples are known both from Dubene-Pishtikova Mogila (*Nikolova and Madjev 1993. Fig. 6*) and from Banya-Ploskata Mogila (unpubl.).

The painted pottery is characterised by a lozenge decoration pattern under the mouth. Geometric pat-

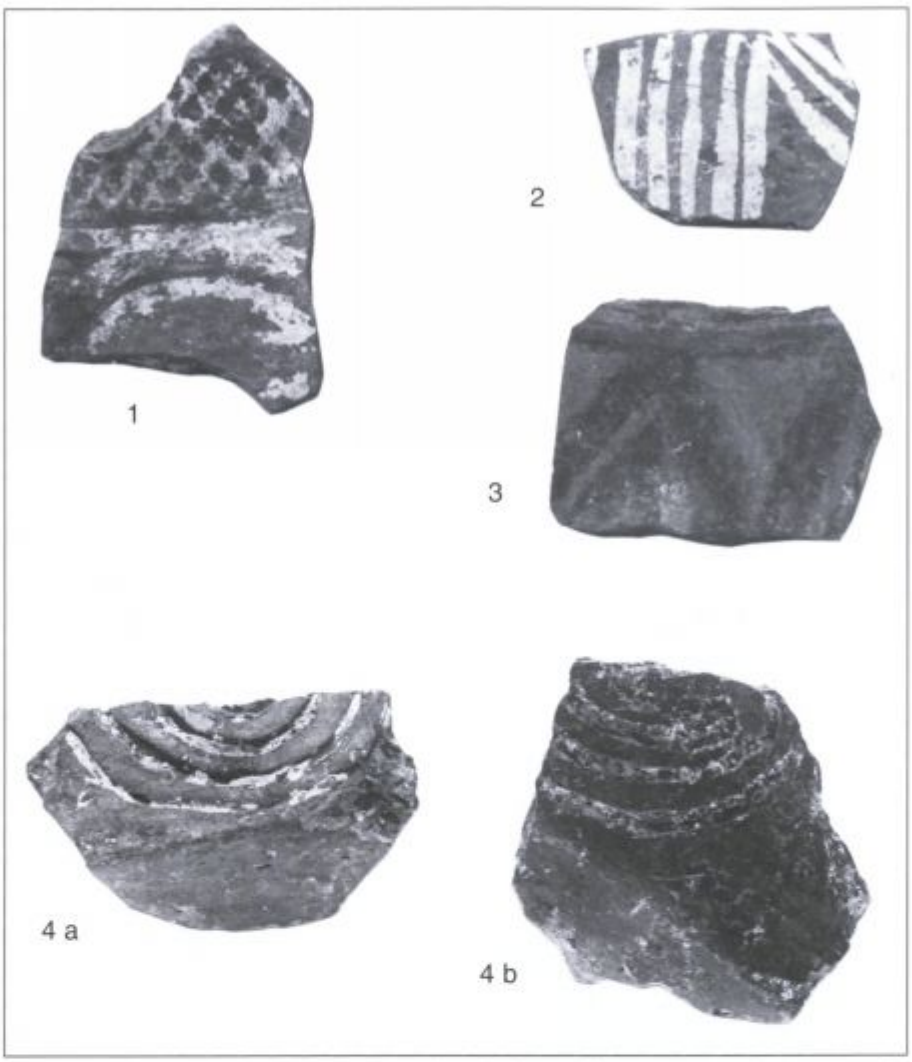



***Fig. 5. Dubene-Pishtikova tell. Karanovo I Culture. 1. A fragment of a vase-like spherical vessel with a cylindrical neck and evenly cut, rounded rim. Clay with sand and plant admixtures. Fine, dense cover of red-brown slip. Painted pattern in white. On the outer side of the neck: large lozenge pattern under the mouth; on the body: curved line decoration. Wall thickness: 0.5 cm. Dubene-Pishtikova Mogila. 1.90-2.10 m depth from the surface. 2. A mouth fragment of a plate with a rounded rim. Clay with small sand and plant admixtures. Brown-red slip. Painted pattern in white. On the inner side: a strip of wide lozenge pattern under the mouth. On the outer side: groups of parallel lines crossing at an angle. Wall thickness: 0.5–0.6 cm. Dubene-Pishtikova Mogila. 1.25–1.30 m depth from the surface. 3. A fragment of a jar-like vessel with spheroid body. Clay with sand and plant admixtures. On the outer wall: a painted pattern in dark brown. Clearly defined profile change, under which a painted band of concentric lines and upright triangles follow. Wall thickness: 0.6–0.9 cm. Dubene-Pishtikova Mogila. Surface find. 4a–b. Two fragments of a lid with an incised spiral pattern encrusted with white. Finely refined clay. Black polished surface. Wall thickness: 0.5 cm. Width of the encrustation channel: 0.3–0.5 cm. Dubene-Pishtikova Mogila.***

terns are typical of the body (Fig. 5. 1–3). Some of the feet bear concentric white painted strips.

The pottery fragments discovered in Kliment-Banyata were without preserved surface slip. The acid soil destroyed the ceramic surface, creating an impression that painted pottery is absent. But from the morphological point of view, however, the earthenware does not differ significantly from that found in Dubene-Pishtikova Mogila. Some jar-like vessels with rope handles have more elongated bodies. Impresso ceramics are typical. Therefore, the settlement probably followed chronologically the Dubene-Pishtikova Mogila. One herring-bone channelled fragment was discovered at Kliment-Banyata (Fig. 6) which has no parallels at Dubene-Pishtikova Mogila. It is probable that Dubene-Pishtikova Mogila and Kliment-Banyata represent the long duration of the Karanovo I culture in the Karlovo Lowland.

The cult objects so far discovered consist of fragments of small tables-altars. One of the pieces from the Dubene-Pishtikova Mogila bears a stamped pattern (Fig. 7. 1), and another has an attached zoomorphic foot (Fig. 7. 2). The small table from the Kliment-Banyata was completely restored (Fig. 8). The female idol from the Banyata-Ploskata Mogila is typical of the Karanovo I culture (Fig. 9).

Dubene-Pishtikova Mogila and Kliment-Banyata are the most northwestern Karanovo I settlements in Thrace (about Karanovo I see *Georgiev 1974 and*

***Fig. 6. Kliment-Banyata settlement. Karanovo I Culture. A wall fragment of a channelled herringbone vessel. The finish is missing. Clay, abundant in fine and coarse sand. Brown surface. Destroyed cultural layer.***

*Parzinger 1993.110*, and the a bibliography quoted there). They effectuated one of the communication lines between the upper Thracian Plain and the Zlatitsa-Pirdop and Sofia Lowlands. The pottery finds the closest numerous parallels at Chernichevo in the Hissar Lowland (unpublished), as well as in the upper Maritsa basin (Kapitan Dimitrievo: *Detev 1950. Fig. 5*). The upper Stryama valley is directly connected with the upper Tundzha region through the eastern Sredna Gora Mountain passes, where the closest parallels are to be found on the Kazanluk tell (unpublished). Stryama River also connects northwestern Thrace with the Maritsa valley, where the ceramic parallels reach as far as the region of Edirne (materials from the Archaeological Museum, Edirne).

Although the ceramics from all the investigated Karanovo I settlements have not been completely published, it could so far be assumed that this culture comprised the whole upper Thracian Plain, the northern Rhodopi Mountains slopes included. According to recent evidence, during its early stages the Karanovo I Culture occupied not only Bulgarian Thrace, but also south western Bulgaria: Kovachevo, Eleshnitsa (the Middle Strouma basin), Slatina, lower horizons (Sofia Plain), etc. (*cp. Pavuk 1993*). Earthenware painted in white from the upper Stryama valley finds parallels in settlements like Kovachevo (*Perničeva 1990. Fig. 7. 2; Fig. 9. 4*). But at the same time, there are some very close parallels to the site of Nevestino I in the middle Strouma basin (*Čohadžiev and Genadieva 1998.85; Fig. 1. 7, 16*) with earlier dot painted pottery at Donja Branjevina (*Brukner 1997. Fig. 3. 2; Karmanski 1968. Fig. 1. 6–7*). The later stages of the culture, however, demonstrate a strong influence of the Starčevo culture in the north western areas (Slatina, Gulubnik), which was reflected in the pottery style of the "mixed" Kremikovtsi group, including the Zlatitsa-Pirdop Plain (Chavdar) (*Garašanin 1966.19*) or recently named Starčevo. The pottery painted in brown and red from Dubene-Pishtikova Mogila and Chernichevo could be considered as influenced by the production of the Zlatitsa-Pirdop region. The cult tables have numerous parallels in the synchronous settlements in Southwestern Bulgaria: Priboj (*Chokhadžiev 1986. Fig. 10*), as well as in the Late Neolithic settlements (*Vandova 1997 with ref.*). Triangular tables were also typical of Gradeshnitsa A–C (Northwestern Bulgaria) where, however, a meander pattern prevails (*Nikolov 1975. Fig. 14*) which is not found in Thrace.

The northern boundary of the Karanovo I culture was the Stara Planina Mountain. Pottery painted in white is known from Vrtiste, Byala and the Devetaki cave (*Nikolov 1992.12 with ref.*), but recently it was discovered in the Danube areas of north western Bulgaria: Maluk Preslavets (*Panayotov et al. 1992. Fig. 4*) and Koprivets (unpublished), as well. According to V. Popov and I. Vajsov (*1992.10*), the

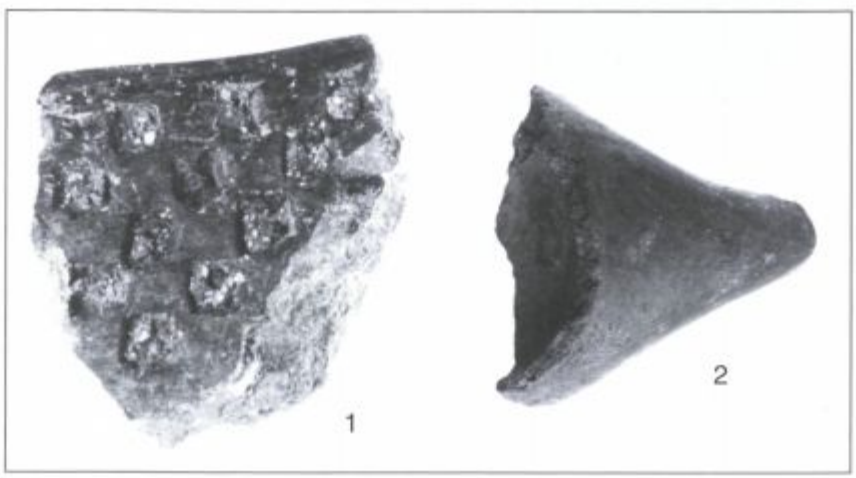



***Fig. 7. Dubene-Pishtikova tell. Karanovo I Culture. 1. A fragment of a cult table. Part of the wall is preserved with a stamp decoration. Clay with fine sand and stone admixtures. Dark brown surface with a finish. Wall thickness: 0.4–1.1 cm. Dubene-Pishtikova Mogila. 2. A fragment of a zoomorphic leg with a round-like basin. Clay with fine sand admixtures. Red slip. Wall thickness: 0.3–0.5 cm. Dubene-Pishtikova Mogila.***

*Fig. 8. Kliment-Banyata settlement. Karanovo I Culture. A fragmented cult table. Clay with fine sand and lime admixtures. Light brown surface. The basin is relatively deep, triangular in plan. The legs have triangular cross sections. Pierced metop-like pattern on the walls and on the lower part of the legs. Wall length: 15 cm. Basin depth –1.6 cm. Height – 9.8. Wall thickness – 0.5 cm. Wall height – 3 cm. Legs foundation thickness – 3.8 x 1.9 cm. Kliment-Banyata. A destroyed cultural layer.*

white painted pottery from last site parallels the Proto-Starčevo horizon. These data, however, are insufficient for a search of the Karanovo I cultural genesis in northern Bulgaria, bearing in mind the new data from Strouma valley (Nevestino), as well as of the monochromic stage in European Turkey (see below). At the same time, the material from the Devetaki cave poses the problem of the possibility of direct contacts between the Karlovo Lowland population and that of the Osum basin in northern Bulgaria as early as the Early Neolithic. At present, the Kurnare-Troyan pass is a major communication route between southern and northern Bulgaria. The earliest archaeological data from the high parts of the Troyan pass in the Stara Planina Mountain originate from the First Millennium BC. High prehistoric set-

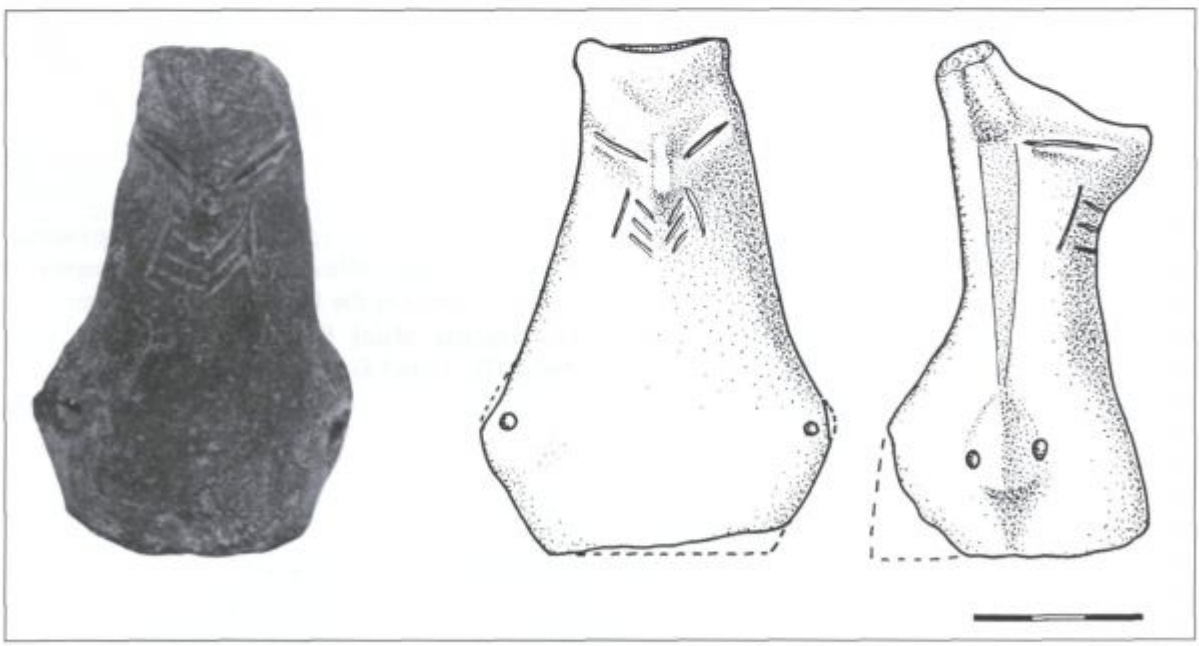


*Fig. 9. Banyata-Ploskata Mogila. Karanovo I Culture. A female idol. Clay with coarse and fine sand and gold mica admixtures. Well finished surface. Dark brown surface. A short cylindrical part of a hollow body is preserved. Broken parts at the lower and rear sides. Two opposed flattened extensions and two horizontal openings render the hands. High head, flattened at the back. Rounded face with a cone projection rendering the nose, on both sides of which two oblique cuts represent the eyes. Slight elongation of the face depicts the coiffure, with a concave upper edge and conical ends, one of which is broken. Under the nose, deep, M-shaped cuts render the mouth. Between the two longitudinal cuts there are two additional oblique cuts. Preserved height: 9.3 cm; neck thickness: 4.15 cm; maximum body width: 6.5 cm; wall thickness: 1 cm; opening diameter: 3.2 x 2 cm.*

tlements are generally missing in the Stara Planina Mountain. It is possible, however, that in the Early Neolithic there were communication routes through the more difficult passes, together with the Iskur Gorge and the lower eastern Balkan passes.

Evidence about the so-called monochromic stage of the Early Neolithic which precedes chronologically the horizon of the pottery painted in white is so far absent from Thrace. Data for this horizon came from south western Bulgaria: Krajnitsi, Polyanitsa, Platoto and Koprivets, and other sites in north eastern Bulgaria (*Vajsov 1998; Pavuk 1993. map 2;* see also the Appendix below). There are two possible explanations for this situation in Thrace: firstly, it can be accepted that the evidence about the earliest Neolithic in Thrace has not yet been discovered.

Secondly, we can suppose that the monochromic stage does not exist because of different reasons: a small number of the initial population which migrated into the Balkans with a tradition of the monochromic pottery and/or of native Mesolithic population adopted the baked pottery production; a lack of favourable conditions for settling down, etc.

The existence of a pre-Karanovo I stage was a principal point in the P. Detev periodisation, in which the pottery painted in white was assigned to the "Middle Neolithic" (*Detev 1963*). A number of Karanovo I characteristic morphological elements are genetically related to the monochromic stage, corded handles, spherical bowls and conical plates included (Fig. 1) (*Tscochadjiev and Bakamska 1990. Fig. 11. 1–4, Fig. 10. 1–2, 8*).

At the present state of our knowledge about the Karanovo I culture, several theoretical possibilities remain about the genesis of this culture in Thrace. An autochthonous development from the monochromic pottery along with synchronous cultural contacts is the first assumption. A second possibility is to assume an autochthonous development from the monochromic pottery along with synchronous cultural contacts and the appearance in the Balkans of migrating groups from western Anatolia. A third hypothesis is based on the presumption of a mass migration of Anatolian people into the Balkans and the occupation of areas that remained free after the initial monochromic stage migration (*see Lazarovici and Kalmar 1995.402–403; Garašanin 1998*).

In north-western Thrace we can identify a regional unit of Karanovo I culture, with the population who settled the area, for whom it is difficult to establish origins: whether from the Maritsa basin, the Kazanluk plain, or from the Zlatitsa-Pirdop lowlands. Multi-layered settlements existed along the Stryama River, while the settlements at the feet of mountains (the Stara Planina Mountain and the Sredna Gora Mountains) comprised only thin layers. The population had obviously chosen the left bank of the river, where the soils were more fertile (Dubene-Pishtikova Mogila) and the topography is more favourable for agriculture. The proximity of the Sredna Gora Mountains meant that hunting was also among the major economic activities. The land between the left bank of the Stryama and the southern slopes of the Stara Planina mountain is favourable both for agriculture and cattle breeding, although a great part of the present-day, flat arable area was probably forested. In the latter case there is no evidence of clearance of the surrounding area through burning. Only P. Detev mentions that at the base of the Plovdiv tell a thick ash layer was found which may be evidence of such activity. A thick layer of ash with fragmented pottery was found on the northern periphery of the Dubene–Pishtikova mogila, but the presence of archaeological artefacts indicates that it was the village dumping site.

The remains of Kliment-Banyata represent another type of settlement: an occupation at the immediate foot of the mountain, near a warm mineral spring. Stock breeding was probably the main economic activity of its population, as the settlement was small and did not last long, despite the massive house structures evidenced by large fragments of plaster. The upper Stryama valley is also characterised by the absence of flint resources. These were extracted in the Rhodopi Mountains region and shipped along the river. It is not clear whether the flint was an object of exchange, or whether there were groups specialised in mining it. An obsidian plate originates from Kliment-Banyata (*Nikolova and Madjev 1993, Fig. 4*), which is evidence of direct or indirect exchange, probably with the southern areas. As an exception, obsidian blades were found among the Early Neolithic flint materials from Thrace, which testify to long-distance contacts, if we do not accept that migrating groups brought them. Clay beds were also of prime importance for the first farmers settling in the upper Stryama valley. Present-day clay resources can be found in the vicinity of Dubene-Pishtikova mogila. It is worth noting that vessels of well-refined clay are numerous among the Dubene-Pishtikova mogila pottery. The large sand admixtures are local features of the Kliment-Banyata ceramics (Fig. 3; 6).

The late Karanovo I stage in western Thrace was synchronous with Karanovo II culture in north-eastern Thrace. The latter, from which no white painted pottery has been found, forms a local group. Channelled pottery is emblematic of this culture, while according to recent evidence, it appears among Karanovo I materials from western Thrace only as an exception. The channelled pottery from Kliment-Banyata have parallels as far west as in Sapareva Banya-Kremenik, where four Early Neolithic horizons have been documented (*Georgiev et al. 1986. Fig. 11*). Kliment-Banyata is probably synchronous with the late phase of Early Neolithic occupation of that site and marks the end of the Karanovo I culture in Thrace.

The second Karanovo I stage of western Thrace was contemperaneous with the Kremikovtsi Group and later Starčevo and the earlier polychrome stage in north-western Bulgaria (Gradeshnitsa), but concrete contact data have not yet been recorded from the upper Stryama valley. Vessels with polychrome decoration have been discovered in several Karanovo I settlements in Thrace: Rakitovo, Kazanluk, Stara Zagora/Azmashka Mogila and Karanovo (*after V. Nikolov, unpubl.*). These are individual vessels whose penetration to the east was facilitated by the communication route from Zlatitsa to Pirdop (Chavdar) – from the upper Stryama valley (the Dubene-Pishtikova mogila and Banyata-Ploskata mogila) – to the upper Tundzha region (Kazanluk). Another communication route was the Topolnitsa River connecting the Zlatitsa-Pirdop valley with the upper Maritsa valley. The idol from Banya-Ploskata Mogila is very similar to the one found in the Gradeshnitsa "B" level (*Nikolov 1975. Fig. 13c*) and has no close parallels in eastern Thrace.

According to the present data, it can be assumed that a variant of Karanovo I culture developed in western Thrace which could be named Kapitan Dimitrievo – Dubene – Pishtikova Mogila (for the regionalism during the Early Neolithic see *Pavuk 1993*).

### Late Neolithic I: Karanovo III Culture

The Karanovo III culture followed the Karanovo I culture in Thrace, which developed during the first stage of the Late Neolithic. The Karanovo I layers are overlaid by the Karanovo III layers on the tells Banya-Ploskata Mogila and Chernichevo. Unfortunately, the data are limited and it is not clear whether the stage of pottery style transformation is testified in the Karlovo Lowland, which was defined as Karanovo II–III Middle Neolithic culture in north-eastern Thrace by V. Nikolov (*1998 with ref.*). He relied on the interpretation of the excavation data from Karanovo and on the G. Il. Georgiev information on the so-called Karanovo II–III stage, documented on the Kazanluk Tell. V. Nikolov finds the old definition of "Karanovo II–III" as invalid for Kazanluk, because as the author notes there is no Karanovo II stage. It should be remembered that no precise excavations of the Neolithic layers have been performed on larger areas in north-western Thrace. A thick Karanovo III layer was investigated near Chernichevo, which probably overlaid the Karanovo I layer of ceramics painted in white together with pottery painted in

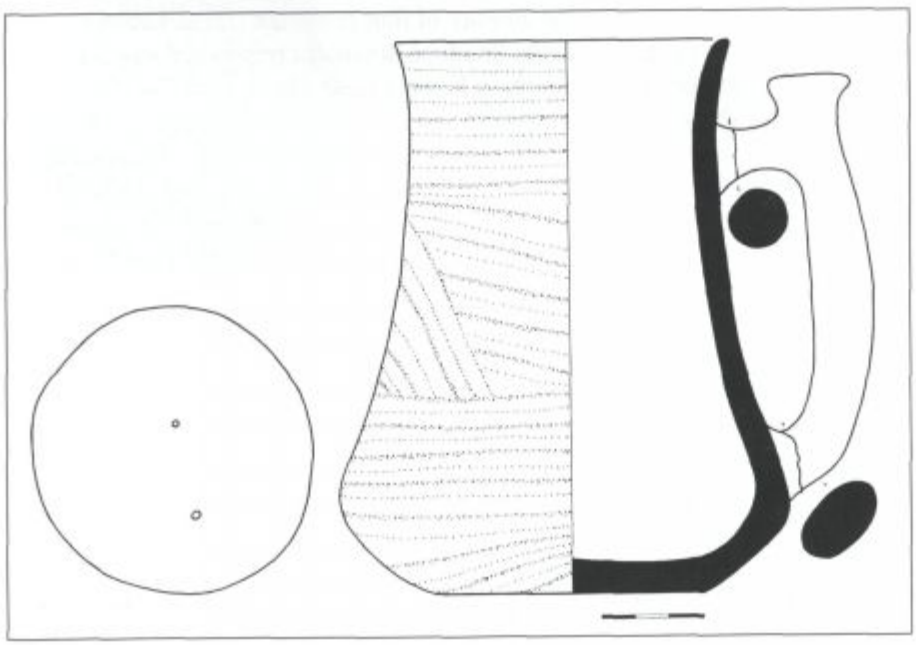


***Fig. 10. Banyata-Ploskata Mogila. Karanovo III Culture. A jug. A evenly cut rim and orifice, long neck and earthenware body. Two small holes on the flat bottom. Greyish-black, polished surface. Broken vertical handle attached to the upper part of the neck and to the earthenware body. Shallow, wave-like, horizontal and oblique channels over the whole outer wall surface. Height – 16 cm.***

***Fig. 11. Banyata-Ploskata Mogila. Karanovo III Culture. A bowl. Clay with a great amount of fine sand admixtures and small stones. Grey-brown smoothed surface. Cylindrical. Oblique short relief band. 9.7 cm long. The vessel actually is the lower part of a jug which was later used as a bowl after it had been broken and the upper rim had been rounded. Height – 10 cm. Wall thickness – 0.7 cm.***

dark colours, but stratigraphic data are lacking and its informative value is significantly reduced. At Banya-Ploskata Mogila, the Karanovo III layer was discovered at the periphery of later excavations, while P. Detev documented an Early Neolithic layer. These investigations were again limited and not precisely published. Thus, it cannot be ruled out that future investigations could differentiate or discover the Karanovo III formation stage in north-western Thrace, bearing in mind the observations in eastern Thrace, which confirmed its local character in the context of the active cultural interactions. The publication of the materials from Karanovo and Kazanluk would provide an opportunity for a better cultural definition of this stage as well.

Jugs having vertical handles and bud-like projections on them are diagnostic of Karanovo III culture. To this kind of vessel probably belongs a jug with a greyish-black, polished and channelled surface, which probably had the same kind of handle, which was found in a Karanovo III cultural layer at Banya – Ploskata Mogila (Banya II; Fig. 10), together with a jar secondarily used as a bowl (Fig. 11). Madjev registered two building horizons at the periphery of that tell. Also discovered with the ceramics was a loom weight (Fig. 12), a bone spoon (Fig. 13), a fish-hook (*Nikolova, Madjev 1993. Abb. 4*), a fragment of a cult table (Fig. 14), the lower part of a clay idol (Fig. 15), stone tools, numerous flint artefacts (*Tsonev 1995*), animal bones, etc.

A handle of a Late Neolithic jug with bud-like projection is a surface was found north of the Dubene-Sarovka, in the locality of Leshtaka (unpubl.). It is possible that the small tell located there to belongs to a Karanovo III Culture village which was a satellite of the large Banya–Ploskata mogila site some 3–5 km. distant.

The closest Banya II synchronous settlements investigated are to be found on the tell near Chernichevo (Chernichevo II) (unpublished) and at a settlement near Hissar (*Detev 1962*) in the Hissar valley. The bowl discovered at the last settlement is similar to that from Banya-Ploskata mogila. The materials from Banya find numerous parallels in Plovdiv-Yasa tepe (*Detev 1960*), including a jug (*Detev 1959. Fig. 12a, Fig. 21*), loom weight (*Detev 1959. Fig. 56.4*), spoon (*Detev 1960. Fig. 9*), cult table (*Detev 1959. Fig. 45; Detev 1960. Fig. 26*) and an idol whose high cylindrical head is missing (*Detev 1960. Fig. 34*). Detev published a marble fish-hook from Plovdiv-Yasa tepe, which was, however, discovered together with materials of Maritsa culture (the Early Copper Age, see *Detev 1960. Fig. 18*). The short relief band of the secondarily used vessel finds parallels in eastern Thrace (Karanovo III, see *Nikolov 1992. Fig. 1. 8*). Small cult tables with chess-board encrustation are characteristic of the Karanovo III culture in the region of Assenovgrad (Ruen I), in the Upper Maritsa valley (Kapitan Dimitrievo), the Middle Tundja basin (Vesseli-

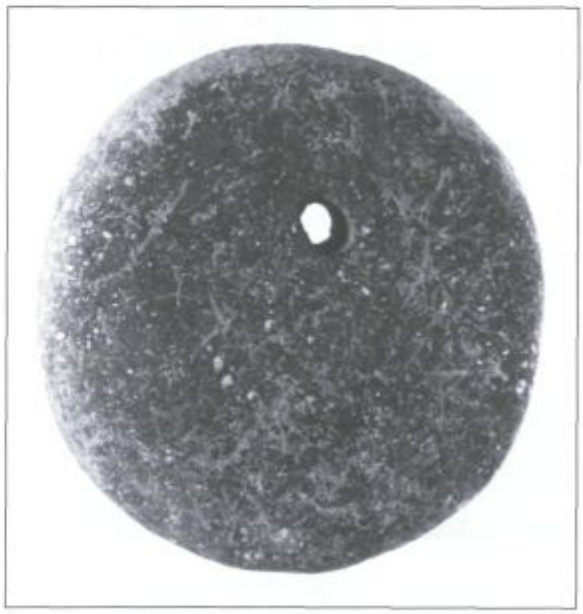


***Fig. 12. Banyata-Ploskata Mogila. Karanovo III Culture. A loom weight. Clay, sand admixtures. Brown, smoothed surface. Disc-like shape. A small, round opening. Diameter–7.2 cm; thickness–2 cm; opening diameter – 0.5 cm.***

***Fig. 13. Banyata-Ploskata Mogila. Karanovo III Culture. A bone spoon. Rectangular, with a long handle. Height – 8.9 cm.***

novo), etc. (*Kaludova 1966. Fig. 6a, g*). Banya II could possibly be synchronised with Drama-Gerena II.

The Late Neolithic finds of the Karanovo III culture from the upper Stryama valley relate north-western Thrace to the Zlatitsa-Pirdop Lowland where they find close analogies in the Chelopech II materials, vessels with vertical handles and bud-like projections on them (*Petkov 1948. Fig. 11*) and small cult tables (*Petkov 1948. Fig. 16*). According to N. Petkov, the Chelopech II cultural layer was 2.60 m thick and overlapped a dark, painted pottery layer (Chelopech I). The small cult tables with encrusted chess-board patterns are characteristic of the Late Neolithic in south-western Bulgaria: Sapareva Banya-Kremenik (*Georgiev et al. 1986. Fig. 28.1–2*). In the Early Neolithic layer of the same site a horn spoon was discovered (*Georgiev et al. 1986. Fig. 6*). A bone spoon from Gradeshnitsa also belongs to the Early Neolithic (*Nikolov B. 1975. Fig. 3*). The lower part of the flat idol finds parallels in Kurilo (*Vajsov 1984. Fig. 4.6*), probably belonging to the Late Neolithic as well. The head of that idol was probably similar to the heads discovered at Hissar (*Detev 1962. Fig. 3*). The settlement pattern in the upper Stryama valley included tells, but in contrast to eastern Thrace and upper Maritsa River, a peculiarity in the settlement structure exists there: there are no high, layered tells, and they do not exceed 2–3 m height, independently of the cultural succession on the micro-regional level. Interregional migration could not be better explained, unless a systematic investigation of the prehistoric sites of the micro-region is accomplished. According to the present data, some Neolithic tells (Banya, Chernichevo) were re-occupied in the Early Bronze Age.

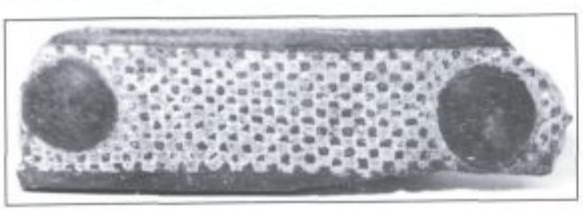


***Fig. 14. Banyata-Ploskata Mogila. Karanovo III Culture. A fragment of a cult table. Well refined clay. Grey-black surface. One table side is preserved, on which a chess-board pattern is encrusted with white paste, and bud-like projections are attached to its ends. Preserved length: 13.9 cm. Wall thickness: 1.3 cm. Wall height – 4.3 cm. Basin depth – 2.6 cm.***

## The Late Neolithic II: Karanovo IV Culture

During the second half of the Late Neolithic the Karanovo IV (Kaloyanovets) culture developed in Bulgarian Thrace and in European Turkey (Kîrklareli). A change in the settlement pattern characterises this phase: the pattern of the tell decreased (Karanovo IV, Kazanluk, etc.) and open settlements characterise that culture – Kaloyanovets, Nova Zagora – Khobeza-voda, etc. The Karanovo IV culture has been best studied in the region of Nova Zagora (*Kančev and Kančeva 1988 with ref.*), although its expansion was significantly greater, reaching Turkish Thrace – Kîrklareli (excavations under the direction of H. Parzinger and M. Özdoğan).

The absence of convincing evidence of the Karanovo IV Culture in western Thrace has recently provoked the launching of the hypothesis that Karanovo III culture continued its development in western Thrace during the period of the Kaloyanovets culture in eastern Thrace (*Nikolov 1998*). According to V. Nikolov, the encrusted ceramics from Kalugerovo (unpublished) in the upper Maritsa valley do not contradict this assumption.

But in 1992 a vessel with the encrusted ornamentation typical of Karanovo IV Culture was found for the first time in north-western Thrace (Fig. 16), which demonstrates that Kalugerovo was not an exception in western Thrace. It is a conical bowl found on the surface to the south of Dubene-Pishtikova Mogila, in the immediate vicinity of the left bank of the Stryama (Dubene-Popovka II). The bowl has a massive, broken foot. It is of clay, with fine and coarser sand admixtures. Its surface is smoothed, but not polished. The inner side of the plate is decorated with successive bands of horizontal incised lines and parallel zigzag lines. The rim bears oblique cuts. Bands of parallel, incised lines and an S-attached pattern decorate its outer side. The ornamentation was encrusted.

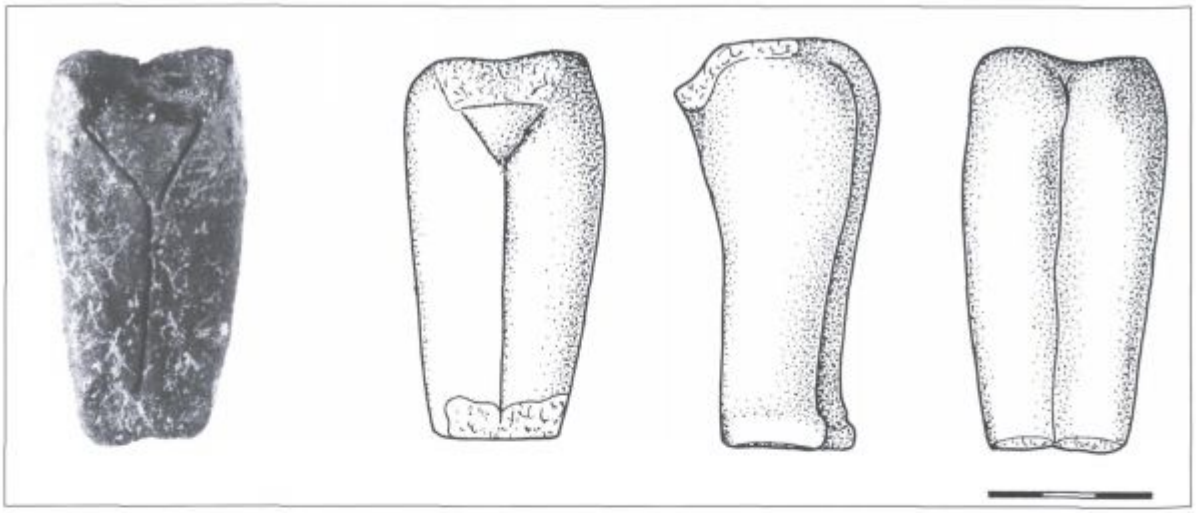


***Fig. 15. Banyata-Ploskata Mogila. Karanovo III Culture. The lower part of a clay idol. Clay with sandy admixtures. Black smoothed surface. The legs are preserved, which represent an undifferentiated volume, marked by a vertically incised line which reaches the point of an inverted triangle at the upper end. The seat is moulded rendered.***

This vessel is evidence of the fate of most of the thin-layered settlements in the region, which were completely destroyed by farming.

The close parallels in the ceramics from eastern Thrace also support this conclusion. A plate with an S-shaped pattern from Nova Zagora-Hlebozavoda has been discovered (*Kančeva 1992. pl. VI*). Three building horizons of the Kaloyanovets culture were filed at this site, as well as another bowl with a zigzag, incised pattern (*Kančev, Kančeva 1988. pl. II: 7*). The different decorative patterns on the inner and outer surfaces of the vessels could be followed in the published cone-shaped bowls from Nova Zagora-Hlebozavoda as well, although they have no feet (*Kančev, Kančeva 1988. plates I–II; Kančeva 1992. pl. 6*). According to the published stratigraphic data, the bowl from Dubene-Popovka originated from a settlement that was synchronous with building horizons 1–2 at Nova Zagora-Hlebozavoda.

The cone-shaped, solid foot, the zigzag and S-shaped patterns relate the vessel from Dubene-Popovka II to the bowls from Brenitsa (Northwestern Bulgaria), which, however, have smoother profiles (*Nikolov 1986. Fig. 5, 6*). According B. Nikolov, the lower two horizons at Brenitsa belonged to the end of the Late Neolithic.

In light of the evidence from Dubene-Popovka II (and Kalugerovo), the Karanovo IV Culture encompasses the whole of Thrace (Turkish Thrace includ-

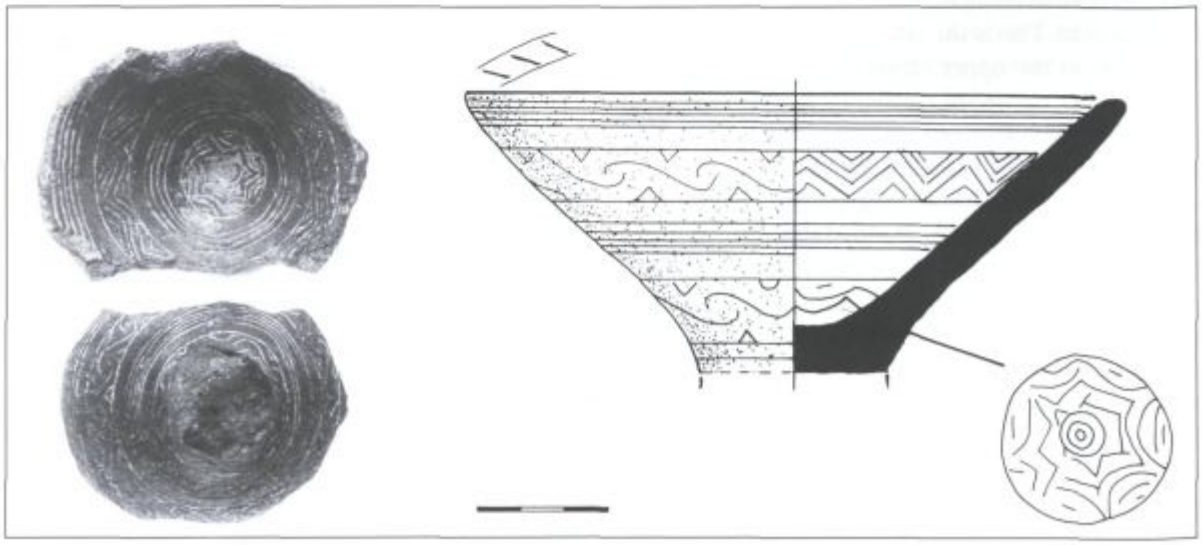


***Fig. 16. Dubene-Popovka II. Kaloyanovets Culture.***

ed). North-western Thrace was not isolated from common trends in the development of pottery styles (*Nikolov 1998*). It could be theoretically assumed that the Dubene-Popovka II find did not originate from the Karanovo IV Culture settlement in this locality, because the context is missing. But in my opinion, the presence of a Late Neolithic II settlement is more probable, given that the villagers have reported numerous pottery finds in the locality.

At the same time, the find, originating probably from a thin level, open settlement, also confirms my thesis that changes in the settlement pattern characterise the later Late Neolithic in Thrace, because there are no cultural levels of the Karanovo IV culture at the Banyata and Chernichevo tells. The situation is similar to that at the Kapitan Dimitrievo, Plovdiv – Yasa tepe, Kazanluk and other tells in Thrace.

The vessel from Dubene-Popovka II is so far the latest Neolithic find from north-western Thrace. No settlement of the Early Copper Age Maritsa culture has been discovered there, but a female anthropomorphic figurine from Dubene (an accidental find) suggests that the Karlovo Lowland was also occupied during this period (*Nikolova and Madjev 1993. Fig. 8*). A settlement of the late stage of Karanovo VI was discovered at the base of the tell near Dubene-Sarovka, located to the south-east of the village of Dubene (*Nikolova 1994*). A period followed which has not been documented: the final stage of the Copper Age when the Chernavoda I culture developed along the eastern lower Danube; while the end of the Krivodol-Salcuta-Bubanj and Salcuta-Telish cultures were characteristic of the western lower Danube. A big multi-layer settlement of Early Bronze Yunatsite culture has been investigated on the upper levels of Dubene-Sarovka. This is the latest prehistoric site so far registered in the upper Stryama valley.

## DISCUSSION AND CONCLUSIONS

In the context of the case study of this contribution, the recent evidence of the Balkan Early Neolithic raises several points for discussion and/or conclusions:

❶ The archaeological data on prehistoric sites in the Karlovo Lowland provide an opportunity to create a cultural-chronological system of the micro-region (Tab. 1). The last includes the following cultures: Karanovo I (Early Neolithic), Karanovo I/III, Karanovo II/III Karanovo III and Karanovo III/IV after V. Nikolov (Late Neolithic I), Karanovo IV (Late Neolithic II), Maritsa (Early Copper Age), Karanovo VI (Late Copper Age), Yunatsite (Early Bronze Age). For the time being, the Late Bronze Age is documented only by an accidental find of an axe mould (unpublished).

The data are so far insufficient for the periodisation of the Neolithic cultures of the micro-region. Apart from the Early Bronze Yunatsite Culture, the rest have scarcely been excavated. The new data on the Neolithic, the Karanovo I, Karanovo III and Karanovo IV cultures, however few, allow a more precise definition of the cultural attributes of the micro-region, to make a preliminary sketch of its settlement structure and to reconsider some previous scholarly views.

❷ At the various sites one, two or more prehistoric periods were represented (Tab. 2).

| Sites | Periods of occupations |
|---|---|
| Dubene-Pishtikova Mogila | EN II-III |
| Banya – Ploskata Mogila | EN II-III, LN I, EB II |
| Chernichevo | EN II-III, LN I, LC, EB III |
| Kliment – Banyata | EN III |
| Dubene- Leshtaka | LN I |
| Dubene-Popovka II | LN II |

***Tab. 2. The prehistoric periods of occupations on the documented prehistoric sites in the Karlovo Lowland.***

❸ The prehistoric settlement structure in the Karlovo lowland was established during Early Neolithic II. In the earlier stage it included multi-level settlements at distances of 10–15 km apart along the Stryama River: Chernichevo, Banya-Ploskata mogila and Dubene-Pishtikova mogila. The increase in population probably resulted in an extension of the settlement structure and settlement at the foot of the Sredna Gora, near the village of Kliment–Banyata. But no conditions for successful agriculture existed there. Probably this is a main reason for the short-term occupation of the village. In terms of archaeological typology, there are two types of settlements: tells (multi-level settlements) and open villages (short-term occupations). There are no investigated houses of the Karanovo I culture in the Karlovo lowland. According to the plasters recovered, wattle-and-daub buildings typify the Early Neolithic architecture there, as in other regions of the Balkans.

❹ Typological variety characterised the hand-made pottery of households in the Karlovo lowland dur-

| Models | Description |
|---|---|
| 1 | Adoption of the ceramic style of the white painted pottery by undiscovered culture of the monochrome stage (Early Neolithic I) |
| 2 | Migration / demic diffusion from the Strouma valley |
| 3 | Migration / demic diffusion from European Turkey |
| 4 | Migrations / demic diffusions from the Strouma valley and European Turkey |
| 5 | Migration from Anatolia through the Strouma valley and/or European Turkey |

***Tab. 3. Models of a genesis of the Karanovo I Culture in Bulgarian Thrace.***

ing the Early Neolithic, but pithoi, jars, pots, bowls and conical plates predominated. The evolution from the white towards white and red/brown painted ware can be assumed based mainly on the data from Dubene – Pishtikova Mogila. In the Karanovo III culture, plain pottery predominated, but channel and plastic ornamented vessels specify this ceramic style. Encrusted pottery, represented in the Karlovo valley by the conical bowl with a foot, is emblematic of the Late Neolithic II, Kaloyanovets culture.

❺ The arable/stock breeding economy characterises the Neolithic Stryama valley. Stone tool assemblages were comprised of mainly flat axes. Bone implements were also widely used in household activities. Special evidence of fishing was found at Banya-Ploskata tell, where a fish hook was discovered in a Karanovo III level.

❻ Idols and small tables were used in fertility cult rituals, and of special interest is a female idol of the goddess of fertility, which has no parallel in the Karanovo I culture, although there is a close one from north-western Bulgaria. This record documents active cultural interaction through the Sredna Gora Mountains and the Iskur River or through the Stara Planina Mountains, probably connected with common rituals of the fertility.

❼ The upper Stryama valley belongs to the third Euro-Asian geographical region distinguished by M. Zvelebil (the so-called southern Balkans and the Pontic Steppe) with an environment, which would suggest "a reliance on cereals, roots, and tubers" during the Mesolithic. He considers this area "as an extension of grassland habitats of the Near East (Irano-Turenian steppe), which share in common the abundance of wild seed grasses, including wild barley and eincorn" (*Zvelebil 1994.64*). G. Georgiev also stressed the presence of wild forerunners of some cultivated plans in the Bulgarian region. Nevertheless, there are no secure arguments for the autochthonous genesis of the Neolithic in Bulgarian Thrace, including the Karlovo lowland.

Several migration hypotheses can be defined (Tab. 3), but all they are based mainly on a lack of archaeological evidence of the earliest Neolithic in Bulgarian Thrace.

In the first model, the stage of the painted pottery in the second level of the graduate Neolithization of the Balkans and the bearers of the Karanovo I culture appear to be the inheritors of the first agricultural communities in the Balkans. The second to fourth models require a demographic crisis in the neighbour regions, the outcome of which was the colonisation of Bulgarian Thrace. In this case the presence of strong micro-regional and long-distance contacts are one of the main factors of Neolithisation in terms of demic interactions. The fifth model assumes a new population in the southern Balkans which immigrated from Anatolia and was integrated with the local agricultural and stock breeding structures. In all cases, Neolithisation can be defined as a long-term process of gradual culture integration.

The absence of Mesolithic evidence from the southern Balkans contrasts with the increased data on the Vlasac-Lepenski Vir culture in the western lower Danube basin, but recently in the south-eastern parts, important so-called Epi-Paleolithic sites have been documented (*Gatsov and Özdoğan 1994*). The Vlasac-Lepenski Vir culture is an advanced Mesolithic model, including temporary housing, a complex flint industry, possible storage facilities and a developed ideological system, the centre of which was an ancestor cult. It cannot be ruled out that the Mesolithic population participated in the Neolithisation of the Balkans (*Séfériadès 1993*). The anthropological characteristics of the Maluk Preslavets settlement cemetery in the eastern lower Danube basin are an example of a proto-European anthropological type (*Panayotov et al. 1992.52–53*), which is comparable to the Vlasac–Lepenski Vir Culture. A similar conclusion arises from the Devetaki Cave anthropological material, while Mediterranian characteristics are reported from Late Neolithic Plovdiv-Yasa Tepe (*Boev 1959*). At the same time, M. Hopf (*1988*), following the model of

J. Renfrew, assumes an influence from the south among the earliest (EN I) agriculturalists in North-eastern Bulgaria. Therefore, culture integration also characterises the Neolithisation of the Balkans in the light of the evidence from north-eastern Bulgaria.

❽ The process of Neolithisation originates from the Karanovo I settlement pattern, which characterises that process as a stabilisation and structuring of social relationships towards interrelated complex communities, in which households were the main social basis (see Hodder's (*1990*) concept of *Domus*).

The pottery, stone and bone industries of the Karanovo I culture also represent the Neolithisation of the Balkans as a standardisation of the cultural components connected probably not only with domestic activities, but to some extent with the specialisation of production.

The idols of the monochromic stage and from Karanovo I culture also define the Neolithisation of the Balkans as a process of reutilising social life, developing an innovative fertility cult. The existence of settlement burials suggests that in that process an ancestor cult was of great importance. But the absence of separate burial backgrounds characterises the Balkan Early Neolithic. This fact can be explained by the absence of a cult of the dead or of burial traditions. But in my opinion, it is more probable that a tradition of isolated burials existed. In this case the cult of the dead was not communal, but connected with the different households. At the same time, the Maluk Preslavets settlement cemetery as an exception in the Balkans is connected not only anthropologically and also ritually with the Mesolithic Vlasac-Lepenski Vir culture, where burials in settlements were popular, but its mode of inhumation - crouched position – is a element of Neolithisation.

❾ A cultural change can be recognised in the development of the Karlovo Lowland at the beginning of the Late Neolithic. Banya tell, and Chernichevo tell in the Hissar valley, represents continuity in settlement life, while in the Dubene region a new settlement probably was based at Leshtaka, approximately 5 km from the Early Neolithic Pishtikova Mogila. It can be assumed that a change in ceramics was the result of eastern influence in a period when the Balkan style of painted pottery began to be replaced by encrusted ornamentation. The last, as an exception, appeared during the early Neolithic, but began to predominate in the period of the Kaloyanovets culture. The absence of settlement(s) of this culture in the Karlovo lowland can be explained by a crisis in the arable/stock breeding economy, and a change towards a semi-nomadic economy in the later late Neolithic in western Bulgarian Thrace. Some changes in the landscape cannot be completely excluded (for the western Balkans see *Budja 1995*). Despite the possibility that one or more settlements existed from the Early Copper Age in the upper Stryama valley, a new flourishing of the prehistoric culture can be argued for the Late Copper Age, as well as during the Early Bronze Age.

❿ The Neolithisation of the Balkans was also a stage in the initial development of the earliest proto-Indo-Europeans as a stage towards the development of the initial technological terminology of the agriculture. In this case of special importance there is evidence of culture integration in the Balkans in terms of the similarity between the Karanovo I and Starčevo cultures, as well as the examples when one culture with painted pottery adopted other style (later Gulubnik and Sofia-Slatina). This example defines the culture system as dynamic. In the course of interactions, terminology was probably unified and reunifited, like the technologically unified system: stone and bone implements. For this problem it is important to define continuity in my case study in western Thrace: after the Neolithic, the Maritsa culture is well-documented in the Plovdiv region, as well as the Late Copper Karanovo VI culture, in all micro-regions. The latest Karanovo VI site in the light of recent evidence dates to the earlier Final Copper Age. At the same time, the Central Rhodopi Mountains cave were occupied by the successors of the Karanovo VI culture during the Final Copper I–II, the pottery of which parallels that of the Cernavoda I culture. Because the cultural continuity between the Cernavoda I and Cernavoda III cultures is well argued, of special importance is evidence of parallels in the material culture (mainly diachronic) between the Early Bronze I Ezero and Yunatsite cultures, on the one hand, and the Cernavoda III, on the other hand.

At the same time, there is no evidence for steppe migration in western Thrace at all, which is a very strong counter-argument against any theory connected with Indo-Europeanisation through steppe migration.

From this point – the Early Bronze Age – a long, well-documented continuity characterises the southern Balkans, including western Thrace, with its critical point, the Middle Bronze Age. But knowledge on the earlier Balkan prehistory suggests that in Bulgarian

Thrace there were cyclic economic changes, followed by the decreasing or temporary disappearance of settlement structures. This feature of the southern Balkan prehistoric development fits well with the social model of periodic crises in agricultural structures, and social and economic change towards nomadic structures. This fact explains the evidence for some similarity in the ornamentation of Late Bronze Age pottery to that of the Early Bronze Age, following at the same time the style of the former period. This pottery appears in the Rhodopi Mountains in a period when part of the population was already settled on the plain. But the Early Bronze Age was the last period of long-term settlements (tells); the Middle Bronze Age can be defined as a period of gradual development of nomadic structures in the southern Balkans, like those structures which are known for the earliest Indo-Europeans, the Thracians.

In this evolution and integrated model of Indo-Europeanisation as a gradual process of change, an increase and decrease in arable/stock breeding and nomadic structures, the advances over the migration theory is that there is no homeland identified by material culture, because in my opinion, one and the same culture cannot be equated to one and the same language, just as different cultures are not the same if they have different languages. A language can be unified through active contacts between distant cultures, and at the same time peculiarities can increase in micro-regional interactions. In this case a question appears: to what extent does an archaeological culture equate with a tribe? From an ethnic point of view, the ethnographic peculiarities appear as regional characteristics. At this point, the material culture of the distinct archaeological structures has the same feature – the archaeological culture is a regional definition of a peculiar material culture. This theoretical similarity makes possible the different archaeological cultures to be defined as different tribes (or clans). Therefore, the Early Neolithic is also a process of initial ethnic structuring and development of the Balkan population and the earliest stage of the proto-Indo-European tribes.

## SUMMARY

The study represents the Neolithic sequence in a newly investigated micro-region in the Balkans – the Karlovo Lowland in the upper Stryama valley (northwestern Thrace). The excavations of the author in 1992 uncovered Early Neolithic sites (Dubene-Pishtikova Mogila tell and the Kliment–Banyata open settlement), as well as a find from the Late Neolithic II period (Dubene – Popovka II). Based on ceramic parallels, they are attributed to the Karanovo I culture and to the Karanovo IV culture. Recent evidence confirms that during the Early Neolithic III (the period of Karanovo II) in western Thrace the development of the Karanovo I culture continued. The village of Kliment–Banyata, with some similarity in the pottery to that of Karanovo II, probably represents the end of that stage in the Stryama valley. At the same time, it is clear that the advanced culture developed there was in active contact with neighbouring regions, lying on one of the communicated lines connecting Thrace and the Strouma valley and, conceivably, northern Bulgaria. The unpublished excavations of P. Detev at the Chernichevo tell argue that the Early Neolithic II–III period was represented in the Hissar valley (to the south of the Karlovo Lowland), as well.

As far as the Late Neolithic I period is concerned, materials from the Karanovo III culture originate from excavations by P. Detev at Banya-Ploskata Mogila tell, Chernichevo (II) tell and the Hissar open settlement, as well as from the excavations of N. Madzhev at Banya-Ploskata Mogila. Some finds from the most recent investigations are included in this study to represent the Late Neolithic in the Karlovo Lowland, which parallel that from Hissar. The latest Neolithic sequence is represented by an accidental find from Dubene-Popovka II: a plate with Karanovo IV culture encrusted ornamentation. According to the author, the find confirms that the latter culture was distributed in north-western Thrace, and also economic changes are assumed for LN II in Thrace.

The absence of $^{14}C$ dates from the upper Stryama valley has required an indirect dating, so the Neolithic chronology and calibrated individual $^{14}C$ dates, as well as R-combine and Sum-probability for levels and phases from the Neolithic Balkans are given as an appendix. The chronological definition of the different Neolithic periods and of some key sites are based on available $^{14}C$ dates calibrated with Oxcal program, version 3.0. It is concluded that the Neolithic cultures developed from the later 7$^{th}$ Millennium BC until the end of the 6$^{th}$ Millennium/beginning of the 5$^{th}$ Millennium BC (c. 6200–5000/4900 BC). EN I is dated to c. 6200 BC– 6000 BC/5900 BC (monochromic and earliest painted phases), which is not documented in Bulgarian Thrace. The EN II span was between 6000 BC/5900 BC and c. 5750 BC (Karanovo I, earlier Starčevo and synchro-

nous cultures). The beginning of EN III (c. 5750) is well dated by the end of the Karanovo I and the beginning of the Karanovo II in eastern Thrace, continuing until 5000–5450 BC (the beginning of the Karanovo III culture). The span of the Karanovo III culture defines LN I (5500/5450 BC – 5250/5000/4900 BC) and that of Karanovo IV culture – LN II (c. 5250 BC–5000 BC/4900 BC). This periodisation is based on the culture sequence in Thrace.

## APPENDIX

### Neolithic Radiocarbon Dating in the Balkans

The absence of Neolithic radiocarbon dates from the upper Stryama valley requires indirect absolute dating. Recently armed with calibrated curves, the relative chronology based on cross-cultural contact data (*Lazarovici 1979. figs. 17–18; Özdoğan 1993; Lazarovici and Kalmar 1995; Özdoğan 1997; Brukner 1997; Garašanin 1998; Nikolov 1998;*) is easily comparable with the absolute chronology (*Breuning 1987; Vajsov 1998. Tab. 1; Görsdorf and Bojadžiev 1996. Fig. 1; Gläser 1996; Schier 1996*, and above (Tab. 1). Therefore, at the end of this approach towards the Neolithic in the Central Balkans I will briefly construct a model of the Neolithic Balkan radiocarbon dating, for the purposes of the indirect absolute dating of the Neolithic cultures of the upper Stryama valley. The fundamental monograph of Breuning (*1987*) and the recent comprehensive summaries of Bulgarian (*Görsdorf and Bojadžiev 1996*) and that of Rumanian dates (*Mantu 1995*) include the basic individual $^{14}C$ dates, and termoluminescence dates (*Bogdanović 1996*). The Oxcal program (3.0 version by B. C. Ramsay) provides for different interpretations of the available radiocarbon (and termoluminescence) dates.

In this study, of primary importance is the possibility of a Sum probability definition of different $^{14}C$ date series. In the cases of more than one date from one and the same horizon the Oxcal program requires R-combine dating, which is used here to date several key sites (Tab. 4). The Sum probabilities of dates from key phases (Tab. 5) give an approximate span of duration. There is are special technique for reduction of the values from wood charcoal, but bearing in mind that the $^{14}C$ dates give the end of the phase, for the purposes of this study this calculation was eliminated below. I should stress that most of the Neolithic samples are from wood, in contrast to the later prehistoric Balkans, but the method of using blocks of dates for conclusions give dates close to the historical chronology. It should be especially stressed that none of my conclusions is based on uncalibrated date comparisons because of the nature of the $^{14}C$ dates the validity of which depends on the calibrated values. Recently, only in exceptional research are uncalibrated dates still used, but this archaism of Balkan historiography is almost past.

In light of recent evidence, two periods can be distinguished in the Balkan Neolithic: Early and Late. Until the 80's, the thesis of the Middle Neolithic was popular, to which period recently V. Nikolov attributes so-called Karanovo II/III culture. In my periodisation system this phase, well-argued for by Nikolov, is attributed to the earliest stage of the Late Neolithic, based on the jugs with vertical handles and plastic application in the upper part as one of the remarkable innovations in the Balkans, characterising all later Neolithic periods in the southern Balkans. I. Vajsov (*1998*) still uses Middle Neolithic terminology, attributing the Karanovo III Culture even to the Early Neolithic; the former term is also popular for the stage of classical Starčevo in Yugoslavian historiography. V. Nikolov gave cogent arguments for the evolution from the Karanovo III towards the Karanovo IV cultures, which is my reason for attributing the Karanovo III culture to the earlier Late Neolithic (*Nikolova and Madjev 1993*).

The Early Neolithic is divided into three stages. The earlier phase of the first stage (EN IA) is characterised by the emergence of monochrome pottery (Donja Branjevina III-Gura Bacuilui Ia, Krajnitsi I, Koprivets I, etc.). It is partially investigated, e. g. there are areas in the Balkans, such as Thrace, in which this stage is missing, but there are no serious reasons to ignore the phase of monochrome pottery in the development of the Neolithic in the Balkans. To this phase belongs the Hoca Çesme IV type from the south-eastern Balkans (*Özdoğan 1993.185–86*). But according to M. Özdoğan (*1993.185*), at the same type of villages in north-western Turkey a few painted sherds were discovered. The radiocarbon dates place the EN IA at the latest in the 7th Millennium BC (Chart 1, Tab. 1). The radiocarbon chronology of the Vlasac (Lepenski Vir) culture – from the point of view of recent interpretations – belongs to the preceding Mesolithic period and there is no overlap between the Earliest Neolithic and the Mesolithic of the Central Balkans (*Tasić 1992*). This dating is important for excluding 6400 BC as possibly the earliest chronological border of the monochromic horizon in the Balkans if it was not a graduate stage from

| Site /Horizon | R_combine BP | 68.2% confidence BC | 95.4% confidence BC | Relative Chronollogy |
|---|---|---|---|---|
| Hoca Çeşme I | 7468±27 | 6360-6220 | 6380-6210 | EN IA |
| Polyanitsa-Platoto | 7271±34 | 6160-6010 | 6170-6000 | EN IA |
| Gulubnik 8 | 6787±33 | 5665-5600 | 5690-5590 | EN III |
| Gulubnik 7 | 6965±53 | 5860-5720 | 5950-5690 | EN II |
| Slatina 4 | 6875±17 | 5714-5687 | 5730-5670 | EN II |
| Eleshnitsa 2 | 6879±21 | 5720-5688 | 5745-5670 | EN II |
| Chavdar 5 | 6922±42 | 5790-5695 | 5860-5670 | EN III |
| Dobrinishte1 | 6626±38 | 5580-5450 | 5580-5440 | EN III |

***Tab. 4. R-combine dating of key levels of the Neolithic Balkans.***

| Sum | 68.2% confidence | 95.4% confidence | Period |
|---|---|---|---|
| Hoca Çeşme IV-II | 6500-5600 | 6600-5200 | EN I - EN II |
| Hoca Çeşme III | 5950-5660 | 6350-5500 | EN IB |
| Hoca Çeşme II | 5820-5330 | 6150-5200 | EN II |
| Stara Zagora - Okruzhna Bolnitsa IV-V | 5800-5520 | 6050-5400 | EN II-EN III |
| Stara Zagora - Azmak I | 5770-5320 | 6300- 5000 | EN II, EN III |
| Stara Zagora - Azmak I2-3 | 5720-5440 | 5950-5200 | EN II |
| Stara Zagora - Azmak I4-6 | 5490-5140BC | 5600-4950BC | EN III |
| Stara Zagora - Okruzhna Bolnitsa IV | 5780-5520 | 5940-5440 | EN III |
| Karanovo III | 5440-5290 | 5530-5220 | LN I |
| Sitargoi I-II | 5450-4600 | 5700-4400 | LNI-II |

***Tab. 5. Sum probability distribution for site sites and phases from the Neolithic Balkans.***

the south towards the north with possible example in southeastern Thrace before 6200 BC (Hoca Çeşme IV) (*Vajsov 1998*).

There are $^{14}$C series for the EN IA from Polyanitsa - Platoto I and Hoca Çesme IV (Charts 1, 2). According to the excavator (*Özdoğan 1993; 1997*), the third layer seems to precede Karanovo I culture. Despite that most of the dates from the third phase are dated after the beginning of the sixth Millennium BC (Chart 2), the computing programme of the possibility of calculates of any given year that preceded Hoca Çesme III, gives a dating before the end of the sixth Millennium BC (Chart 3).

To the later phase of EN I belongs the earliest white painted pottery horizon of Donja Branjevina II type (Proto-Starčevo II). According to V. Nikolov (*1998*), pottery with parallels in this horizon was documented at a multilevel site in north-eastern Bulgaria, where it followed a monochromic level. Therefore, in light of that evidence EN IB also includes that micro-region. The fact that at Krajnitsi the white level succeeded the monochromic level also suggests a diachronic relation between the earliest white painted pottery and that of the earliest Karanovo I complex. There are some parallels in Donja Branjevina II and Nevestino I (see above), probably document this Pre-Karanovo I phase in the central Strouma valley. It is difficult to conclude if this phase belongs to EN I (B-C?) or to EN IIA.

There are limited $^{14}$C dates from the key sites in the northern Balkans from EN IB with published correlation between the radiocarbon samples and the ceramic evidence. Tasić (*1993; Table A*) published dates and some stratigraphic correlation from Donja Branjevina and Magareči mlin. Assuming for the time being that EN IB is dated ca. 6100-6000/5900 BC.

The second stage of the EN is characterised by the wide distribution of white painted pottery in the Karanovo I complex, the earlier Gradeshnitsa-Cirça and earlier Starčevo-Cris cultures, as well as in the Maluk Preslavets type from the eastern lower Danube basin with the numerous regional peculiarities (for the middle and upper Strouma see *Pavuk 1993, Brukner 1997*). The $^{14}$C dates from earlier Karanovo I and Starčevo cultural contexts date the stage to earlier Sixth Millennium. The earlier Charvar, Slati-

na and Gulubnik belong to this stage too. For the case study of the upper Stryama valley, the beginning of the Karanovo II culture in turn gives the border between the EN IIA and EN IIB or between the earlier and later Karanovo I culture in western Thrace. There is a possibility of dating the latest white painted horizon in the upper Stryama valley, as well, and for the results to be compared. The radiocarbon dating of the Karanovo II culture based on the dates from the eponymous site correspond well to the EN III in the Balkans, giving dates between 5750 BC and 5520 BC, with 68.2% confidence (Chart 5). The fact that the charcoal samples date that group is not a big problem because those samples date the end of occupation of the levels and we are interested in the beginning of the Karanovo II group. Those dates coincide with the dating of the end of the Slatina 4 (Chart 6) to c. 5750 BC based on the earlier values of 68.2% confidence in the context of cross-cultural comparisons.

Therefore, the lowest chronological border of the EN II is c. 6000/5900 BC, and the upper chronological border is c. 5750 BC. This is the period to which can be attributed the earliest levels from the Dubene-Pishtikova Mogila, and probably from Banya-Ploskata Mogila and Chernichevo. It is possible the earliest Gradeshnitsa-Circa culture followed the beginning of the Karanovo I culture because of the indirect evidence for the white painted horizon from Devetaki cave (*Nikolov 1992*).

For the time being, the relative chronology is well defined for the Dobrinishte 1 (middle Stryama basin), at the end of the EN II (Chart 7). The calibrated values of R-combine 6626±38 BP date the end of the village between 5580 BC and 5450 BC (68.2% confidence) which in short corresponds to later Starčevo and the end of the Karanovo II complex in the eastern Balkans, including the Karanovo II and Ovcharovo groups.

There are 212 $^{14}$C dates reliable for Sum probability dating of the Early Neolithic Balkans, from pre- and Karanovo I culture and Starčevo complexes to Karanovo II culture. They infer that the span between 6010 BC and 5520 BC (with 68.2% confidence) gives the probable dating of the that period (Chart 4), which fact in my opinion corresponds well to the regional chronology of the different culture formations.

In the earlier Late Neolithic (LN I) two tendencies characterise Balkan Neolithic development: on the one hand, the innovatory, bi-conical ceramic style was distributed in the Karanovo III (including Karanovo II/ III and III/IV after V. Nikolov) and the earliest Vinča, as well as that of the Hamangia cultures (for the chronological sequence of the latter see *Vajsov 1998. Fig. 1*). On the other hand, the decreased evolution of the EN ceramic style of painted pottery was still distributed in the north-western Balkans. This stage is dated by the Karanovo III Culture $^{14}$C dates to the third quarter of sixth Millennium BC (Chart 8); 5440BC–5290 BC is the radiocarbon dating based on the sum probability of 12 dates from Karanovo tell, which coincides with the sum probability based on the dates from the tells of Karanovo III, Kazanluk 6 and 3 and Ezero 24 (Chart 9) to 5440 BC–5280 BC. To this stage belong the LN levels from Banya-Ploskata Mogila and Chernichevo tells.

The late Neolithic II horizon includes Karanovo IV culture in Thrace, an earlier Vinča culture, the earliest Boian, Hotnitsa, Gradeshnitsa and Hamangia cultures in the Balkans between the Drina and the Black Sea, as well as between the Carpathians and the Aegean. The absolute dating of Karanovo IV culture, based on a comparison with the EN II dating of sites from neighbouring regions (Chart 10), is to the fourth quarter of the sixth Millennium BC. This is the stage to which belongs the Dubene-Popovka II encrusted plate.

In light of the recent evidence, the end of the Neolithic in the Balkans occurred between c. 5000 and 4900 BC. The Sum probability of the 283 dates of the Balkan Neolithic confirms mainly the dating of the earlier stages (Chart 11), which can be explained by the fact that more dates belong to the earlier Neolithic.

## ACKNOWLEDGMENTS

I am grateful to Dr. M. Budja who invited me in 1995 to participate in the Neolithic Seminar at the University of Ljubljana. I extend my thanks to Prof. R. Tringham, who was my host at Berkeley during my research there in 1997–1998. I am also grateful to the Conference of the German Academy of Sciences, which supported my research and teaching at the University of Heidelberg in Winter 1998 – Spring 1999, and to my host professor there, Prof. J. Maran, who gave me the best conditions of work there and consulted with me on many primary research points. B. C. Ramsay was my initial indirect consultant at the beginning of my research on the radiocarbon chronology, whom I thank for his kind replies to my questions.

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## CHARTS

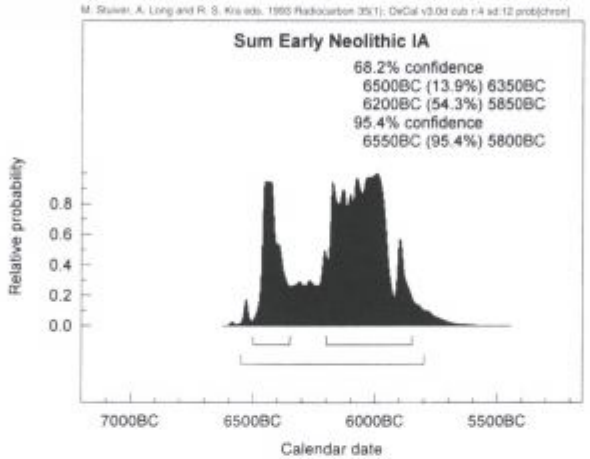


***Chart 1. Sum-probability for $^{14}C$ dating of EN IA in the Eastern Balkans (Hoca Çeşme IV and Polyanitsa-Platoto) n = 7.***

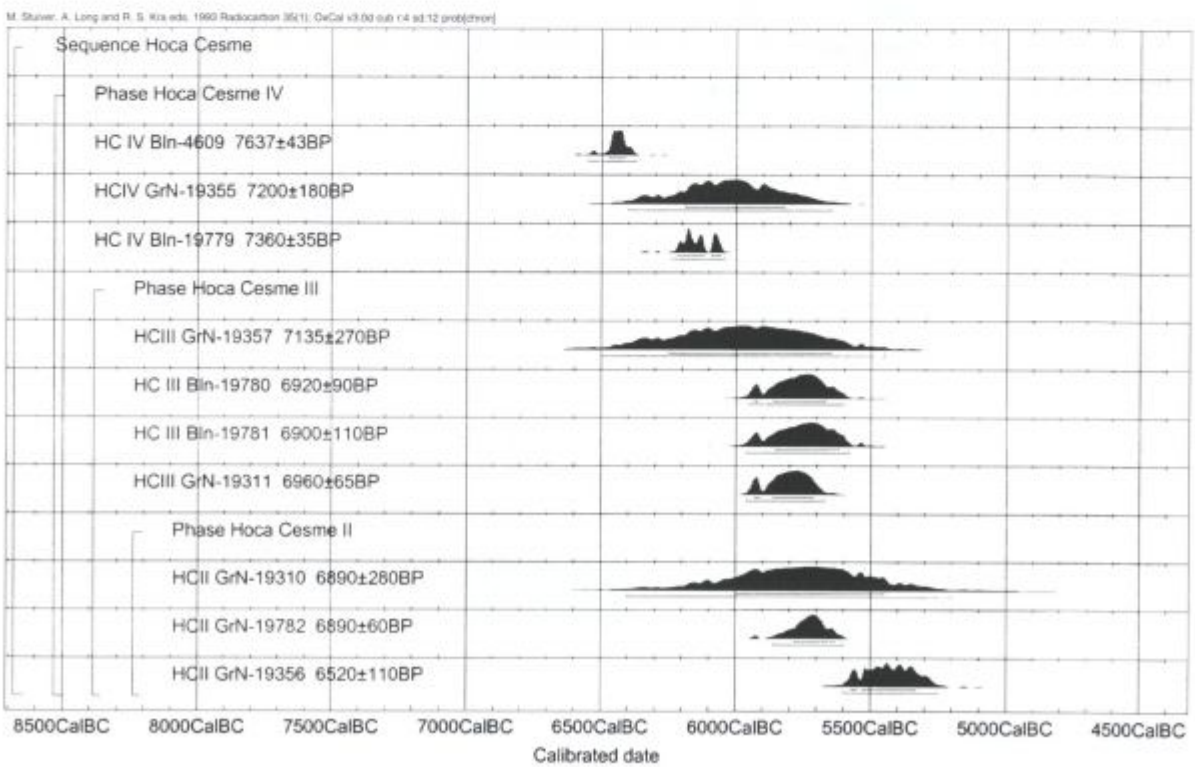


***Chart 2. $^{14}C$ dated sequence of the Hoca Çeşme IV, III and II phases.***

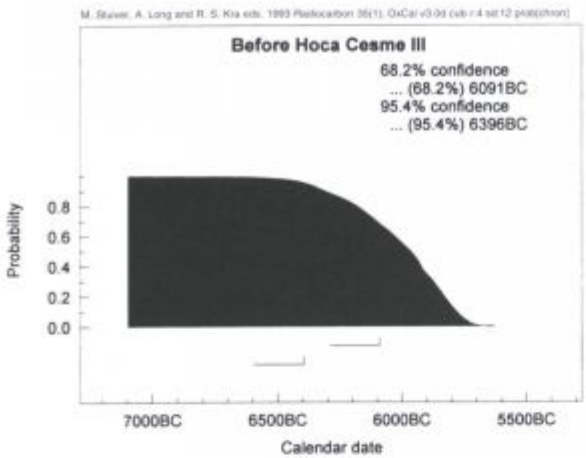


*Chart 3. The computing of the possibility of the calculates the probability of any given year preceding Hoca Çesme III.*

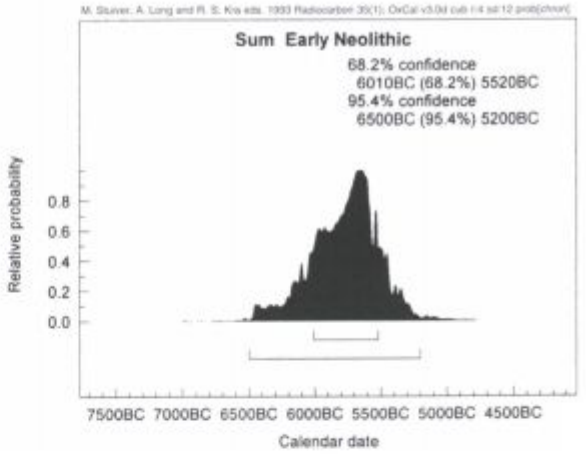


*Chart 4. Sum probability for dating of the EN in the Balkans based on 212 dates.*

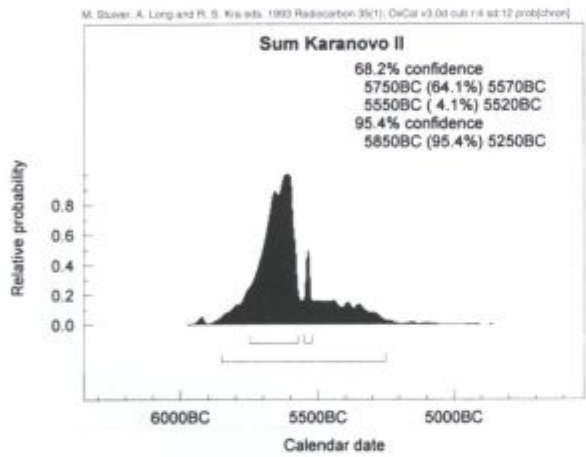


*Chart 5. Sum probability of radiocarbon dating of the Karanovo II culture.*

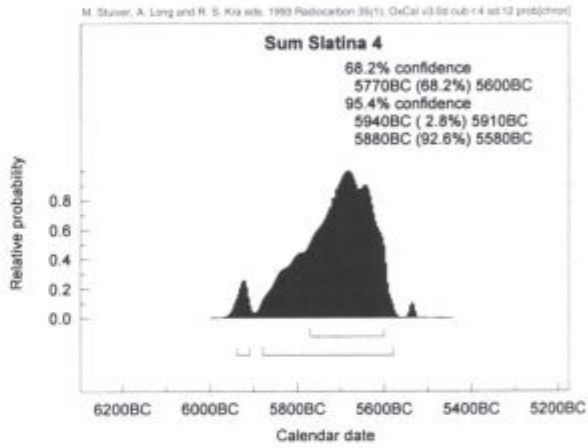


*Chart 6. Sum probability of dating of the end of the Burnt House from Slatina 4 (end of EN IIA).*

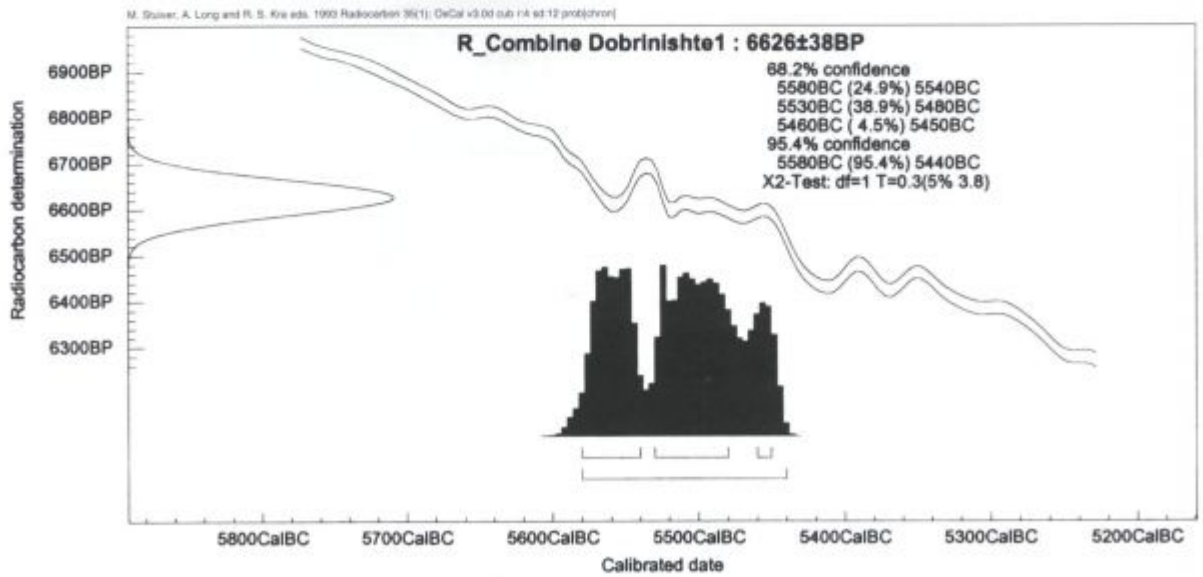


*Chart 7. R-combine probability of dating of the Dobrinitshte (the end of EN IIB in the Balkans).*

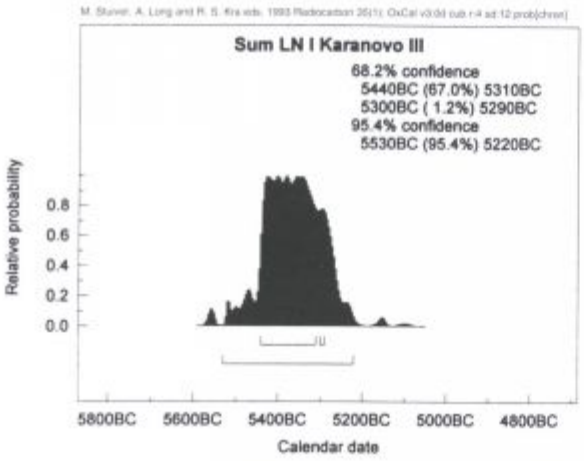


*Chart 8. Karanovo III levels absolute dating based on the sum probability of 12 dates.*

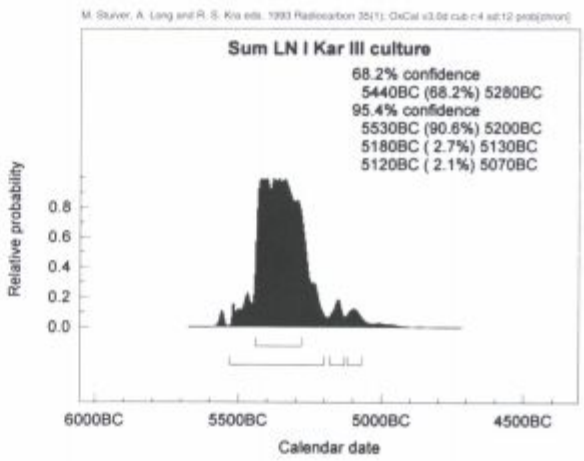


*Chart 9. Karanovo III culture absolute dating based on the dates from Karanovo, Kazanluk and Ezero tells.*

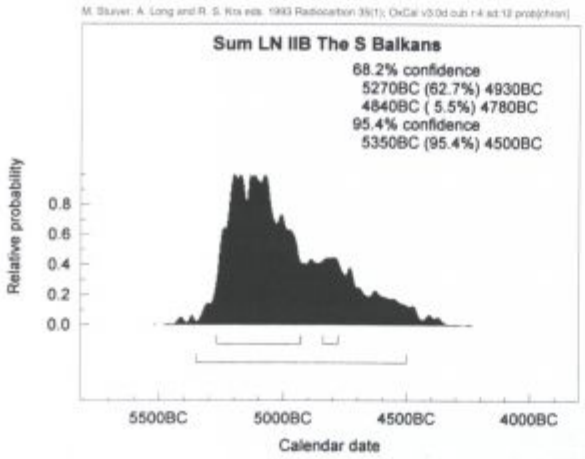


*Chart 10. Late Neolithic II in the Bulgaria and the northern Aegean dated by the $^{14}C$ dates from Kachica 3, Topolnitsa and Sitgaroi II.*

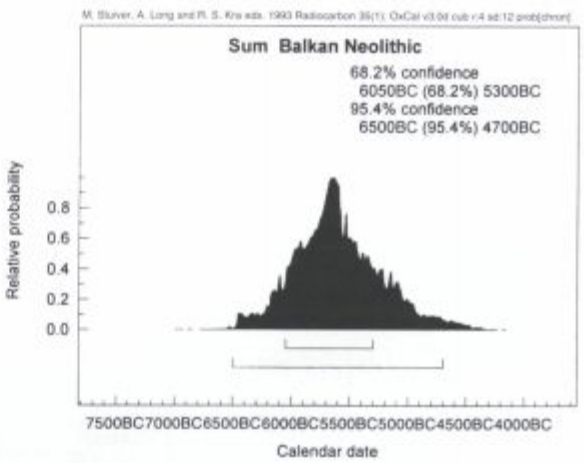


*Chart 11. Sum probability of the Neolithic absolute dating the Balkans based on 283 $^{14}C$ dates.*

***Table A. Individual calibrated dates from Neolithic sites in the Balkans (later Seventh– earlier Fifth Millennia BC), R-combine for individual levels and Sum-probability for phases. References for the dates: Breuning 1987; Tasić 1988; Mantu 1995 and Görsdorf and Bojadžiev 1996 (with ref.); Tasić 1993; Özdoğan 1993.186; Pyke G. and Yiouni P. 1996.195; Schier 1996; Gläser 1996; Özdoğan 1997.28; Özdoğan and Dede 1998.150. Calibrated by Oxcal 3.0.***

***EN – Early Neolithic***
***LN – Late Neolithic***
***EC – Early Copper***

***Comment: The kind of the most of the samples and their stratigraphic context are given in the original publications.***

| Site | Labaratory and Sample No. | BP | 68.2% confidence BC | 95.4% confidence BC | Complex (Culture, Group, Type) Period |
|---|---|---|---|---|---|
| Anzabegovo | LJ-2519 | 7560±70 | 6460-6250 | 6470-6190 | Anzabegovo-Vršnik |
| Anzabegovo Ia | LJ-2181 | 7340±250 | 6450-5850 | 6700-5600 | |
| | LJ-3032 | 7210±50 | 6120-5970 | 6170-5950 | |
| | LJ-2330/2331 | 7180±60 | 6110-5950 | 6170-5870 | |
| | LJ-3187 | 7150±70 | 6050-5880 | 6170-5820 | |
| | LJ-3183 | 7150±50 | 6030-5890 | 6120-5860 | |
| | LJ-3185 | 6830±70 | 5720-5600 | 5810-5520 | |
| | LJ-2347 | 6700±150 | 5690-5440 | 5950-5250 | |
| Sum-probability Anzabegovo Ia | | | 6150-5550<br>6050 (56.2%)<br>5940 | 6400-5400 | EN I |
| Anzabegovo Ib | LJ-2341 | 7230±170 | 6220-5860 | 6400-5700 | Anzabegovo-Vršnik |
| | LJ-2342 | 7120±200 | 6170-5730 | 6400-5550 | |
| | LJ-2332 | 7110±120 | 6050-5800 | 6170-5710 | |
| | LJ-2339 | 7110±70 | 6010-5850 | 6120-5770 | |
| Sum-probability Anzabegovo Ib | | | 6120-5790<br>6060 (63.8%)<br>5790 | 6400-5650 | |
| Sum-probability Anzabegovo Ia-b | | | 6200-5600<br>6200 (62.0%)<br>5800 | 6400-5400 | EN I-beginning EN II? |
| Anzabegovo Ib/II | LJ-2337 | 7080±60 | 5980-5850 | 6020-5760 | Anzabegovo-Vršnik |
| Anzabegovo II | LJ-2157 | 7030±330 | 6200-5550 | 6500-5200 | |
| | LJ-2405 | 6940±80 | 5930-5690 | 5960-5630 | |
| | LJ-2333 | 6840±120 | 5810-5580 | 5950-5480 | |
| | LJ-2409 | 6850±50 | 5720-5630 | 5770-5590 | |
| | LJ-2338 | 6800±140 | 5790-5520 | 5950-5400 | |
| | LJ-2156 | 6630±300 | 5850-5200 | 6200-4800 | |
| Sum-probability Anzabegovo II | | | 5940-5530<br>5870 (65.4%)<br>5570 | 6300-5000 | EN II |
| Anzabegovo II/III | LJ-2343 | 7000±280 | 6150-5550 | 6400-5300 | Anzabegovo-Vršnik |
| | LJ-2351 | 7050±80 | 5970-5800 | 6020-5700 | |
| Anzabegovo III | LJ-2344 | 7000±270 | 6150-5550 | 6400-5300 | Anzabegovo-Vršnik |
| | LJ-2345 | 6540±120 | 5580-5330 | 5630-5250 | |
| | LJ-2185 | 6510±110 | 5560-5320 | 5600-5250 | |
| Sum-probability Anzabegovo III | | | 5630-5260 | 6200-5200 | ENIII-LN I |
| Anzabegovo IV | LJ-2329 | 6230±60 | 5250-5070 | 5280-4990 | Anzabegovo-Vršnik |
| | | | | | IV |
| | LJ-2411 | 6070±190 | 5220-4780 | 5450-4500 | |
| Sum-probability Anzabegovo IV | | | 5270-4980 | 5350-4600 | LN |
| Sum Anzabegovo | | | 6150-5550 | 6500-4900 | EN-LN |
| Banja | Bln-873 | 7048±100 | 5970-5770 | 6050-5680 | Proto-Starčevo EN I |
| Beran Krš 7 | Z-491 | 6030±160 | 5210-4720 | 5300-4500 | Vinča / LN-EC |
| Beran Krš 13 | Z-492 | 5870±150 | 4910-4540 | 5200-4350 | |

***Continued...***

| Site | Labaratory and Sample No. | BP | 68.2% confidence BC | 95.4% confidence BC | Complex (Culture, Group, Type) Period |
|---|---|---|---|---|---|
| Bulgarchevo 4 | Bln-2614 | 6100±50 | 5070-4930 | 5210-4850 | Topolnitsa |
| Chavdar 6 | Bln-1583 | 7208±52 | 6120-5970 | 6170-5950 | Karanovo I |
| | Bln-1580 | 7202±55 | 6120-5970 | 6170-5890 | |
| | Bln-2108 | 7195±65 | 6120-5960 | 6170-5880 | |
| | Bln-1663 | 7070±50 | 5970-5850 | 5990-5780 | |
| | Bln-1582 | 7020±45 | 5950-5800 | 5960-5750 | |
| | Bln-1581 | 7000±60 | 5940-5760 | 5960-5710 | |
| | Bln-1579 | 7003±45 | 5940-5770 | 5960- 5730 | |
| | Bln-1578 | 6994±55 | 5940-5760 | 5960-5710 | |
| | Bln-2662 | 6820±50 | 5695-5615 | 5740-5580 | |
| R-combine Chavdar 6 | | 7049±17 | 5950-5855 | 5960-5840 | EN II |
| Chavdar 5 | Bln-4261 | 7120±80 | 6040- 5850 | 6130-5760 | Karanovo I / EN II |
| | Bln-4106 | 6840±50 | 5710-5625 | 5760- 5590 | |
| R-combine Chavdar 5 | | | 5790-5695 | 5860- 5670 | EN II |
| Chavdar 4 | Bln-1160A | 7040±100 | 5970-5770 | 6050-5670 | Karanovo I |
| | Bln-1251 | 6997±100 | 5950-5730 | 6000-5630 | |
| | Bln-1162A | 6985±100 | 5950-5720 | 5990-5630 | |
| | Bln-1241A | 6930±100 | 5940-5670 | 5960-5600 | |
| | Bln-1241 | 6852±100 | 5780-5590 | 5950-5520 | |
| | Bln-1160 | 6680±100 | 5620-5440 | 5720-5380 | |
| R_Combine Chavdar 4 | | 6917±41 | 5780-5695 | 5850-5670 | EN II |
| Chavdar 3 | Bln-998 | 7045±120 | 5980-5750 | 6120-5630 | Kremikovtsi |
| | Bln-908 | 6990±150 | 5970-5690 | 6150-5500 | |
| | Bln-911 | 6870±120 | 5820-5590 | 5960-5520 | |
| | Bln-909 | 6815±100 | 5750-5580 | 5940-5480 | |
| | Bln-1030 | 6760±100 | 5710-5520 | 5790B-5440 | |
| | Bln-910 | 6665±100 | 5600-5440 | 5710-5340 | |
| R_Combine Chavdar 3 | | 6833±45 | 5705-5625 | 5740-5590 | EN III |
| Chavdar 2 | Bln-906 | 6720±100 | 5680-5490 | 5750-5430 | Kremikovtsi / EN III |
| Circea-Viaduct III | Bln-1981 | 6540±60 | 5570-5380 | 5580-5330 | Later Gradeshnitsa - Circea |
| | Bln-1982 | 6430±60 | 5440-5310 | 5440-5260 | |
| | Bln-1983 | 6395±60 | 5430-5270 | 5440-5240 | |
| Sum-probability Circea-Viaduct III | | | 5550-4700<br>5550(65.2%)<br>5250 | 5600-4550 | LN I |
| Circea-Viaduct | Bln-1978 | 6585±65 | 5570-5440 | 5600-5340 | Dudesti - Vinča B |
| | Bln-2292 | 6325±60 | 5330-5140 | 5430-5070 | |
| | Bln-2008 | 6250±40 | 5260-5080 | 5270-5070 | |
| | Bln-1980 | 6100±60 | 5200-4930 | 5220-4840 | |
| Sum-probability Circea-Viaduct | | | 5600-4950<br>5350(49.7%)<br>4950 | 5600 (95.4%)<br>4900 | LN II |
| Čuka | Z-495 | 7010±190 | 6010-5660 | 6250-5500 | Starčevo |
| Dikili Tash I | Gif-1740 | 6450±160 | 5570-5240 | 5650-5000 | |
| | Gif-1737 | 6400±160 | 5480- 5080 | 5600-4950 | |
| | Gif-1735 | 6170±160 | 5270- 4920 | 5450-4700 | |
| Sum Dikili Tash I | | | 5480-5060 | 5600- 4800 | LN I |
| Dikili Tash II | Gif-1736 | 5990±160 | 5200-4700 | 5300-4500 | Sitagroi - Dikili Tash |
| | Gif-1424 | 5750±150 | 4780-4450 | 4950-4250 | |
| | Gif-1425 | 5750±140 | 4770-4460 | 4950-4300 | |
| Dikili Tash II | | | 4910-4450 | 5250-4300 | LN II |
| Divostin | Bln-899 | 7200±100 | 6170-5890 | 6220-5810 | Proto-Starčevo |
| | Bln-826 | 7120±100 | 6050-5830 | 6170-5730 | |

*Continued...*

| Site | Labaratory and Sample No. | BP | 68.2% confidence BC | 95.4% confidence BC | Complex (Culture, Group, Type) Period |
|---|---|---|---|---|---|
| | Bln-823 | 7080±180 | 6110-5720 | 6350-5550 | |
| | Bln-866/899 | 7050±100 | 5970-5770 | 6050-5680 | |
| | Bln-824 | 6970±100 | 5940-5710 | 5980-5620 | |
| | Bln-896 | 6950±100 | 5940-5690 | 5970-5610 | |
| | BM-573 | 6935±98 | 5940-5680 | 5960-5600 | |
| | Bln-827 | 6910±100 | 5850-5630 | 5960-5590 | |
| Sum-probability Divostin | | | 5960-5690 | 6200-5500 | EN I |
| Dobrinishte 1 | Bln-3785 | 6650±60 | 5590-5480 | 5610-5430 | Kremenik |
| | Bln-3786 | 6610±50 | 5570-5440 | 5580-5430 | |
| R-combine Dobrinishte1 | | 6626±38 | 5580-5450<br>5530BC (38.9%)<br>5480BC | 5580- 5440 | EN III |
| Donja Branevinja | Grn-15974 | 7155±50 | 6040- 5890 | 6120-5860 | |
| | | | 6040 (64.6%) | 6060 (77.4%) | |
| | | | 5950 | 5930 | |
| | GrN-15976 | 7140±90 | 6110-5850 | 6170-5770 | |
| | | | 6050 (46.5%) | | |
| | | | 5930 | | |
| | GrN-15975 | 6955±50 | 5850-5720 | 5950-5690 | |
| Sum Donja Branevinja | | | 6050- 5740 | 6120- 5700 | Proto-Starčevo and early Starčevo EN I-II |
| Eleshnitsa 2 | Bln-3238 | 7010±60 | 5950-5770 | 5960-5720 | Karanovo I |
| | Bln-3241 | 6960±60 | 5930-5710 | 5950-5680 | |
| | Bln-3242 | 6940±50 | 5830-5700 | 5940-5670 | |
| | Bln-3239 | 6920±60 | 5820-5680 | 5940-5630 | |
| | Bln-3240 | 6850±50 | 5720-5630 | 5770-5590 | |
| | Bln-3237 | 6790±50 | 5675-5595 | 5720-5530 | |
| | Bln-3245 | 6730±90 | 5690-5520 | 5730-5440 | |
| | Bln-3244 | 6720±70 | 5670-5520 | 5690-5440 | |
| R-combine Eleshnitsa 2 | | 6879±21 | 5720- 5688 | 5745-5670 | EN II |
| Ezero 24 | Bln-1833 | 6415±70 | 5430-5280 | 5450-5230 | Karanovo III |
| | Bln-530 | 6270±80 | 5280-5070 | 5430-4990 | |
| R-combine Ezero 24 | | 6353±53 | 5380-5240<br>5340(64.8%)<br>5240 | 5430-5210 | LN I |
| Gornja Tuzla | GrN-2059 | 6640±75 | 5580-5440 | 5640-5430 | Later Starčevo/EN III |
| Grivac | Bln-869 | 7250±100 | 6170-5980 | 6360-5860 | Proto-Starčevo/EN I |
| Gulubnik 1 | Bln-3579H | 7220±80 | 6160-5960<br>6070 (47.2%)<br>5960 | 6190-5870<br>6190 (91.4%)<br>5930 | Gulubnik |
| | Bln-3580 | 7120±70 | 6020-5850<br>6020 (41.7%)<br>5930 | 6120-5770<br>6060 (92.8%)<br>5770 | |
| | Bln-3579 | 7030±70 | 5960- 5790 | 5980-5710 | |
| | Bln-3582 | 6950±70 | 5930-5700 | 5960-5660 | |
| R-combine Gulubnik 1 | | 7073±36 | 5965-5865 | 5980-5820 | EN II |
| Gulubnik 7 | Bln-4096 | 7140±80 | 6050-5860 | 6170-5780 | Later Starčevo |
| | Bln-4095 | 7020±150 | 5980-5700 | 6200-5550 | |
| | Bln-4094 | 6760±80 | 5690-5520 | 5750-5440 | |
| R-combine Gulubnik 7 | | 6965±53 | 5860- 5720 | 5950-5690<br>5890 (84.7%)<br>5690 | EN II |
| Gulubnik 8 | Bln-4091 | 6760±60 | 5675-5580 | 5720-5520 | Later Starčevo |
| | Bln-4092 | 6710±60 | 5640-5520 | 5680-5440 | |
| | Bln-3576 | 6670±70 | 5600-5480 | 5640-5430 | |

*Continued...*

| Site | Labaratory and Sample No. | BP | 68.2% confidence BC | 95.4% confidence BC | Complex (Culture, Group, Type) Period |
|---|---|---|---|---|---|
| R-combine Gulubnik 8 | | 6718±36 | 5605-5525 5605 (45.8%) 5570 | 5670-5520 | EN III |
| Hoca Çeşme IV | Bln-4609 | 7637±43 | 6470-6410 | 6550-6370 | Hoca Çeşme |
| | GrN-19779 | 7360±35 | 6220-6060 | 6240-6040 | |
| | GrN-19355 | 7200±180 | 6190-5820 | 6400-5650 | |
| R-combine Hoca Çeşme IV | | 7468±27 | 6360-6220 | 6380-6210 | EN IA |
| Hoca Çeşme III | GrN-19357 | 7135±270 | 6250-5650 | 6500-5450 | Hoca Çeşme |
| | GrN-19311 | 6960±65 | 5930-5710 | 5960-5670 | |
| | GrN-19780 | 6920±90 | 5930-5670 | 5950-5600 | |
| | GrN-19781 | 6900±110 | 5850-5620 | 5960-5580 | |
| Sum Hoca Çeşme III | | | 5950-5660 | 6350-5500 | EN IB-II |
| Hoca Çeşme II | GrN-19782 | 6890±60 | 5780-5630 | 5860-5600 | |
| | GrN-19310 (or GrN-19356) | 6890±280 | 6000-5450 | 6400-5200 | |
| | GrN-19356 (or GrN-19310) | 6520±110 | 5570-5330 | 5600-5250 | |
| Sum Hoca Çeşme II | | | 5820-5330 | 6150-5200 | EN II |
| Sum Hoca Çeşme | | | 6500-5600 | 6600-5200 | EN I-II |
| Karanovo I | Bln-4179 | 7130±70 | 6040-5860 | 6120-5780 | Karanovo I |
| | Bln-4336 | 7110±50 | 5990-5870 | 6050-5830 | |
| | Bln-4177 | 7110±50 | 5990-5870 | 6050-5830 | |
| | Bln-4339 | 7090±90 | 6000-5810 | 6120-5720 | |
| | Bln-4338 | 6955±45 | 5840- 5720 | 5940-5690 | |
| | Bln-3942 | 6820±50 | 5695-5615 | 5740- 5580 | |
| | Bln-4337 | 6810±65 | 5695-5595 | 5770-5520 | |
| | Bln-4335 | 6710±55 | 5630-5520 | 5680-5450 | |
| Sum-probability Karanovo I | | | 6000-5530 6000BC (39.5%) 5840BC | 6050-5500 | EN II |
| Karanovo II | Bln-3716 | 6910±60 | 5810-5670 | 5940-5620 | Karanovo II |
| | Bln-3716H | 6850±60 | 5730-5620 | 5810-5590 | |
| | Bln-152 | 6807±100 | 5740-5530 | 5860-5480 | |
| | Bln-3944 | 6785±60 | 5680-5590 | 5730-5520 | |
| | Bln-3586 | 6780±60 | 5680-5590 | 5730-5520 | |
| | Bln-3943 | 6760±50 | 5665-5585 | 5700-5520 | |
| | Bln-3941 | 6750±50 | 5670-5530 | 5700-5520 | |
| | Bln-201 | 6540±100 | 5570-5330 | 5600-5270 | |
| | Bln-234 | 6490±150 | 5570-5270 | 5700-5050 | |
| Sum probability Karanovo II | | | 5750- 5520 | 5850- 5250 | EN III |
| Kazanluk 6 | Bln-730 | 6335±160 | 5440-5070 | 5600-4900 | Karanovo III/LN I |
| Kazanluk 3 | Bln-729 | 6330±100 | 5430-5080 | 5450-5040 | Karanovo III/LN I |
| Kremenik 2 | Bln-2554 | 6620±100 | 5590-5440 | 5670-5330 | Kremenik |
| | Bln-2552 | 6460±60 | 5440-5330 | 5480-5260 | |
| Kremenik 3 | Bln-2555 | 6840±60 | 5720-5615 | 5790-5580 | Kremenik |
| | Bln-2553 | 6660±60 | 5600-5480 | 5620-5440 | |
| | Bln-2105 | 6530±50 | 5530-5340 | 5570-5330 | |
| | Bln-2556 | 6480±60 | 5450-5330 | 5530-5270 | |
| | Bln-2106 | 6475±40 | 5440-5335 | 5450-5310 | |
| Kremenik 4 | Bln-2550 | 6550±60 | 5570-5380 | 5580-5330 | Kremenik |
| | Bln-2551 | 6450±100 | 5450-5280 | 5580-5210 | |
| | Bln-2549 | 6350±60 | 5380-5220 | 5440-5140 | |
| Sum-probability Kremenik 2-4 | | | 5570-5310 5530 (64..5%) 5310 | 5720-5240 | EN II |

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| Site | Labaratory and Sample No. | BP | 68.2% confidence BC | 95.4% confidence BC | Complex (Culture, Group, Type) Period |
|---|---|---|---|---|---|
| Magareci Mlin | Grn-15973 | 7130±60 | 6020-5870<br>6020 (48.3%)<br>5930 | 6120-5820<br>6060 (92.8%)<br>5820 | |
| | GrN-15972 | 7015±90 | 5960-5760 | 6000-5670 | |
| | GrN-15971 | 6910±45 | 5780-5685 | 5860-5630 | |
| Sum Magareci Mlin | | | 6000-5690<br>6000 (17.3%)<br>5930 | 6050-5670 | Proto-Starčevo and early Starčevo<br>EN I-II |
| Nea Nekomedea | P-1202 | 7557±91 | 6460-6230 | 6550-6170 | Nea Nekomedea |
| | OxA-1606 | 7400±100 | 6370-6060 | 6410-6010 | |
| | OxA-4282 | 7400±90 | 6370-6060 | 6400-6010 | |
| | OxA-1605 | 7400±90 | 6370-6060 | 6400-6010 | |
| | OxA-3876 | 7370±90 | 6360-6050 | 6380-6000 | |
| | OxA-3874 | 7370±80 | 6350-6050 | 6370-6010 | |
| | OxA-1604 | 7340±90 | 6230-6030 | 6370-5990 | |
| | OxA-3873 | 7300±80 | 6180-6020 | 6360-5960 | |
| | OxA-3875 | 7280±90 | 6180-6010 | 6360-5950 | |
| | P-1203A | 7281±74 | 6170-6020 | 6230-5960 | |
| | OxA-4283 | 7260±90 | 6170-5990 | 6240-5880 | |
| | OxA-4281 | 7100±90 | 6010-5820 | 6120-5720 | |
| | OxA-1603 | 7050±80 | 5970-5800 | 6020-5700 | |
| | OxA-4280 | 6920±120 | 5940-5630 | 5980-5570 | |
| Sum Nea Nekomedea | | | 6360-5990 | 6450-5700 | EN I-II |
| Ogradena-Icoana | Bln-1056 | 7445±80 | 6370-6180 | 6420-6050 | Starčevo-Cris / EN I |
| Ovcharovo-Gorata 1 | Bln-1544 | 6688±60 | 5610-5480 | 5670-5440 | Karanovo II - Ovcharovo aspect A |
| | Bln-1620 | 6463±50 | 5435-5335 | 5450-5280 | |
| R-combine Ovcharovo-Gorata 1 | | 6558±38 | 5525-5435<br>5505 (61.0%)<br>5435 | 5570-5380<br>5530 (82.3%)<br>5420 | |
| Ovcharovo-Gorata 3 | Bln-2032 | 6555±70 | 5450-5330 | 5530-5270 | Ovcharovo |
| Sum-probability Ovcharovo-Gorata 1/3 | | | 5590-5330 | 5630-5290 | EN III |
| Ovcharovo-Platoto I | Bln-1356 | 6480±60 | 5450-5330 | 5530-5270 | Ovcharovo EN III |
| Padina B1 | | 7100±80 | 6010-5840 | 6120-5740 | Proto-Starčevo EN I |
| Polyanitsa-Platoto I | Bln-1571 | 7535±80 | 6430-6230 | 6470-6180 | Koprivets I |
| | Bln-1613 | 7380±60 | 6110-5950 | 6170-5870 | |
| | Bln-1613A | 7275±60 | 6170-6010 | 6190-5980 | |
| | Bln-1512 | 7140±80 | 6050-5860 | 6170-5780 | |
| R-combine Polyanitsa-Platoto | | 7334±34 | 6180-6060<br>6180-6120 | 6220-6040 | EN IA |
| Porodin | KN-I.596 | 7240±55 | 6130-5990 | 6180-5970 | Starčevo |
| | H-1486/987 | 7120±140 | 6120-5780 | 6250-5650 | |
| R-combine Porodin | | 7224±51 | 6120- 5980 | 6170-5960 | EN II |
| Priština-Predionica | Bln-435 | 6280±80 | 5290-5070 | 5430-4990 | Vinča A |
| Selevac | Z-233 | 6366±100 | 5430-5220 | 5450-5060 | Vinča B/C |
| | Z-233B | 6152±90 | 5220-4960 | 5270-4840 | B/C |
| | Z-233A | 6113±80 | 5210-4930 | 5230-4830 | B/C |
| | LJ-2523 | 6100±100 | 5210-4860 | 5250-4790 | |
| | LJ-2521 | 6080±70 | 5070-4850 | 5220-4810 | B/C |
| Sum-probability Selevac | | | 5220-4900 | 5450- 4800 | LN II |
| Servia | BM-1103 | 6880±49 | 5760-5665 | 5820-5610 | |
| | BM-1104 | 6747±51 | 5670-5530 | 5700-5520 | |
| | BM-1106 | 6690±83 | 5630=5480 | 5690-5430 | |
| | BM-1107 | 6606±55 | 5570=5440 | 5590-5430 | |
| Sum Servia | | | 5670- 5450 | 5770-5430 | EN-LN |

*Continued...*

| Site | Labaratory and Sample No. | BP | 68.2% confidence BC | 95.4% confidence BC | Complex (Culture, Group, Type) Period |
|---|---|---|---|---|---|
| Sitagroi I | Bln-779 | 6625±170 | 5670-5330 | 5850-5200 | |
| | Bln-778 | 6425±100 | 5440-5270 | 5570-5140 | |
| | BM-648 | 6265±75 | 5280-5070 | 5340-4990 | |
| Sum-probability Sitagroi I | | | 5490-5080<br>5490 (57.3%)<br>5200 | 5750-5000 | Sitagroi LN I |
| Sitagroi II | Bln-884 | 6240±100 | 5280-5050 | 5430-4930 | Sitagroi II |
| | Bln-777 | 5920±120 | 4950-4610 | 5100-4450 | |
| | Bln-649 | 5904±66 | 4900-4710 | 4940-4600 | |
| | Bln-776 | 5720±100 | 4700-4460 | 4780-4350 | |
| Sum-probability Sitagroi II | | | 5250-4500<br>4950 (62.1%)<br>4500 | 5300(95.4%)<br>4350 | LN II |
| Slatina 4 | Bln-3504 | 6970±60 | 5930-5730 | 5960-5690 | Karanovo I |
| | Bln-3441 | 6960±60 | 5930-5710 | 5950-5680 | |
| | Bln-3438 | 6960±60 | 5930-5710 | 5950-5680 | |
| | Bln-3439 | 6940±60 | 5840-5700 | 5950-5660 | |
| | Bln-3434 | 6890±60 | 5780-5630 | 5860-5600 | |
| | Bln-3435 | 6860±50 | 5730-5635 | 5790-5590 | |
| | Bln-3440 | 6840±60 | 5720-5615 | 5790-5580 | |
| | Bln-3443 | 6840±60 | 5720-5615 | 5790-5580 | |
| | Bln-3436 | 6840±60 | 5720-5615 | 5790-5580 | |
| | Bln-3555 | 6830±60 | 5710-5610 | 5780-5580 | |
| | Bln-3437 | 6810±50 | 5685-5605 | 5730-5580 | |
| | Bln-3442 | 6780±60 | 5680-5590 | 5730-5520 | |
| R-combine Slatina 4 | | 6875±17 | 5714- 5687 | 5730-5670 | EN II |
| Stara Zagora-Azmak I-1 | Bln-293<br>Bln-291 | 7303±150<br>7158±150 | 6350-5970<br>6170-5830 | 6450-5800<br>6400-5650 | Karanovo I |
| | Bln-292 | 6878±100 | 5810-5610 | 5950-5570 | |
| | Bln-294 | 6768±100 | 5710-5520 | 5800-5440 | |
| R-combine Stara Zagora-Azmak I-1 | | 6956±59 | 5850-5710 | 5950-5680 | EN II |
| Stara Zagora-Azmak I-2 | Bln-296 | 6779±100 | 5720-5520 | 5820-5440 | Karanovo I |
| | Bln-295 | 6720±100 | 5680-5490 | 5750-5430 | |
| R-combine Stara Zagora-Azmak I-2 | | 6750±71 | 5680- 5520 | 5720- 5480 | EN III |
| Stara Zagora-Azmak I-3 | Bln-203 | 6870±100 | 5800-5600 | 5950-5520 | Karanovo I |
| | Bln-299 | 6812±100 | 5750-5580 | 5860-5480 | |
| | Bln-267 | 6758±100 | 5710-5520 | 5790-5440 | |
| | Bln-297 | 6675±100 | 5610-5440 | 5720-5380 | |
| | Bln-224 | 6650±150 | 5670-5380 | 5800-5250 | |
| | Bln-298 | 6540±100 | 5570-5330 | 5600-5270 | |
| R-combine Stara Zagora-Azmak I-3 | | 6727±43 | 5625-5525 | 5680- 5520 | EN III |
| Stara Zagora-Azmak I-4 | Bln-301 | 6483±100 | 5480-5280 | 5580-5240 | Karanovo I |
| | Bln-300 | 6426±150 | 5530-5220 | 5600-5000 | |
| Stara Zagora-Azmak I-5 | Bln-430 | 6279±120 | 5330-5060 | 5440-4940 | Karanovo I |
| Sum probability Stara Zagora-Azmak I-4-5 | | | 5490-5140 | 5600- 4950 | EN III |
| Stara Zagora-Azmak II | Bln-140A | 6476±100 | 5480-5280<br>5450 (66.5%)<br>5280 | 5580-5230<br>5530 (90.6%)<br>5230 | LN I |
| Stara Zagora-Okruzhna Bolnitsa V | Bln-1586 | 6814±65 | 5700-5600 | 5770-5520 | Karanovo I |

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| Site | Labaratory and Sample No. | BP | 68.2% confidence BC | 95.4% confidence BC | Complex (Culture, Group, Type) Period |
|---|---|---|---|---|---|
| | Bln-1587 | 7139±65 | 6040-5880 | 6120-5810 | |
| Sum-probability Stara Zagora-Okruzhna Bolnitsa V | | | 6020- 5590 | 6150- 5500 | EN II |
| Stara Zagora-Okruzhna Bolnitsa IV | Bln-1590 | 6939±60 | 5840-5700 | 5950-5660 | Karanovo II |
| | Bln-1589 | 6918±45 | 5790-5690 | 5930-5660 | |
| | Bln-1250 | 6820±100 | 5750-5580 | 5940-5480 | |
| | Bln-1164A | 6744±100 | 5700-5520 | 5770-5430 | |
| | Bln-1164 | 6723±100 | 5680-5500 | 5760-5430 | |
| | Bln-1163 | 6688±150 | 5690-5440 | 5850-5250 | |
| Stara Zagora-Okruzhna Bolnitsa IV1 | Bln-1588 | 6750±60 | 5670-5530 | 5710-5500 | |
| Sum-probability Stara Zagora-Okruzhna Bolnitsa IV | | | 5780- 5520 | 5940- 5440 | EN III |
| Starčevo | GrN-9036 | 6920±45 | 5790-5695 | 5940-5660 | Later Starčevo |
| | GrN-7155 | 6835±70 | 5720-5600 | 5820-5570 | |
| | GrN-9035 | 6835±45 | 5705-5625 | 5740-5590 | |
| | GrN-8231 | 6700±70 | 5630-5480 | 5680-5440 | |
| | GrN-9037 | 6700±55 | 5625-5520 | 5670-5440 | |
| | GrN-9034 | 6640±45 | 5580-5450 | 5590-5440 | |
| | GrN-6629 | 6615±65 | 5580-5440 | 5600-5430 | |
| | GrN-6626 | 6610±65 | 5570-5440 | 5600-5380 | |
| | GrN-7154 | 6610±100 | 5590-5430 | 5670-5320 | |
| | GrN-6627 | 6545±105 | 5580-5330 | 5600-5270 | |
| Sum-probability Starčevo | | | 5630-5440 | 5810-5330 | EN III |
| Tîrpeşti | Bln-801 | 6245±100 | 5280-5050 | 5430-4930 | Linear Band Pottery |
| | Bln-800 | 6170±100 | 5220-4970 | 5290-4840 | |
| Sum-probability Tîrpeşti | | | 5270-5000<br>5270 (64.5%)<br>5040 | 5400-4850 | LN II |
| Topolnitsa 2c | Bln-3349 | 6240±90 | 5270-5060 | 5340-4940 | Topolnitsa |
| | Bln-3382 | 6100±60 | 5200-4930 | 5220-4840 | |
| Topolnitsa 2b | Bln-3381 | 6270±60 | 5270-5080 | 5330-5060 | |
| | Bln-3348 | 6000±80 | 4970-4780 | 5080-4710 | |
| Topolnitsa Sum-probability | | | 5270-4940 | 5350-4750 | LN II |
| Toptepe 5 | GrN-16476 | 6290±25 | 5260-5227 | 5280-5140 | Toptepe |
| | GrN-18741 | 6200±50 | 5220 (68.2%)<br>5060 | 5260 (95.4%)<br>4990 | |
| | GrN 18740 | 6160±70 | 5220-4990 | 5260-4930 | |
| | HD 13589-13321 | 6155±40 | 5210-4990 | 5220-4950 | |
| | HD 13590-13235 | 6095±40 | 5050-4945 | 5210-4900 | |
| Toptepe 4 | HD 13591-13339 | 6410±180 | 5530-5090 | 5650-4900 | |
| Toptepe 3 | GrN-18743 | 6220±70 | 5240-5060 | 5280-4960 | |
| | GrN-18742 | 6060±110 | 5200-4830<br>5080(63.8%)<br>4830 | 5250-4700 | |
| Sum Toptepe | | | 5270 (68.2%)<br>4990 | 5450BC (95.4%)<br>4800BC | LN II |
| Trestiana | GrN-1 7003 | 6665±45 | 5595-5500 | 5600-5440 | Starčevo-Criş |
| Valea Rău | KN-1 102 | 6480±75 | 5450-5310 | 5570-5270 | LN I Starčevo-Criş |

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| Site | Labaratory and Sample No. | BP | 68.2% confidence BC | 95.4% confidence BC | Complex (Culture, Group, Type) Period |
|---|---|---|---|---|---|
| Veluška Tumba | Tx-1785 | 6950±120 | 5950-5680 | 6000-5590 | Starčevo |
| | Tx-1786 | 6890±140 | 5930-5600 | 5990-5480 | |
| | Tx-1809 | 6900±90 | 5830-5630 | 5950-5590 | |
| Sum-probability Veluška Tumba | | | 5930-5630 | 5980-5570 | EN II |
| Vršnik-Tarinci | Bln-339 | 6950±100 | 5940-5690 | 5970-5610 | Starčevo |
| | Bln-339a | 6855±80 | 5760-5600 | 5860-5570 | |
| | H-559/485 | 6865±150 | 5930-5580 | 6000-5400 | |
| Sum-probability Vršnik-Tarinci | | | 5840-5610 | 5980-5520 | EN II |
| Vinča-Belo Brdo | GrN-1535 | 6170±85 | 5220-4990 | 5270-4900 | |
| | GrN-1546 | 6190±60 | 5220-5060 | 5260-4960 | Vinča |
| | Hd-14184 | 6249±31 | 5260-5090 | 5270-5070 | Vinča A |
| | Hd-14235 | 6264±22 | 5260-5140 | 5270-5090 | |
| | Hd-14110 | 6149±63 | 5210-4960 | 5230-4920 | Vinča B |
| | Hd-16661 | 6353±66 | 5420-5230 | 5440-5140 | |
| | Hd-17665 | 6273±49 | 5270-5090 | 5290-5060 | |
| | Hd-16636 | 6180±40 | 5220-5060 | 5230- 4990 | |
| | Hd-17674 | 6198±51 | 5220-5060 | 5260- 4990 | |
| | Hd-16864 | 6145±34 | 5210- 4990 | 5220-4950 | |
| | Hd-16733 | 6293±79 | 5320-5080 | 5430-5050 | |
| Sum Vinča | | | 5260-5060 | 5340-4940 | LN II |

UDK 903.2:7.045(234.421)"633/634"
Documenta Praehistorica XXV (Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji XXV)

# Fish, faces and fingers: presences and symbolic identities in the Mesolithic-Neolithic transition in the Carpathian basin

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ABSTRACT - *There are many neglected difficulties with a colonisation model for south-east Europe at the start of the Neolithic, though some kind of slow and fragmented process may hold good for the southern Balkans. This paper concentrates on the northern Balkans, and especially the Carpathian basin east of the Danube, where the character of the early Neolithic lifestyle raises the possibility of indigenous acculturation. Varied Mesolithic presences, mobilities and regional systems in south-east Europe are discussed, and compared with Carpathian basin early Neolithic distributions and lifestyles. In seeking possible indigenous continuities, particular attention is given to symbolism and identity, via material culture, including pottery and figurines, and burials. A comparison is made between the symbolic system of the Starčevo-Körös culture and contemporaneous developments in the Danube Gorges. The two ideologies may have overlapped in many ways, and the many-sided personal identities of the Starčevo-Körös population may themselves have had a long local history. New concepts focus on ancestral beginnings and marked time, the human form and a more conscious difference between people and animals, and participation by the living in broad patterns of social interaction; the potential complexity of their derivation must now be recognised.*

POVZETEK - *Težave z modelom kolonizacije jugovzhodne Evrope na začetku neolitika ostajajo, čeprav velja ocena, da lahko dogajanje na južnem Balkanu morda vendarle označimo kot del nekakšnega počasnega procesa. V razpravi se ukvarjamo s severnim Balkanom in s Karpatsko kotlino vzhodno od Donave, kjer je zgodnje neolitski način življenja mogoče navezati na staroselsko akulturacijo. Analizirali smo različne mezolitske zapise, mobilnost ter regionalne sisteme v jugovzhodni Evropi in jih primerjali z zgodnjeneolitsko distribucijo in načinom življenja v Karpatski kotlini. Pri iskanju domnevne staroselske kontinuitete je bila s pomočjo lončenine, figurin in pokopov, posebna pozornost namenjena identiteti in simbolizmu. Primerjali smo simbolna sistema kulture Starčevo-Körös in sočasnega razvoja v Džerdapu. Ideologiji sta se najbrž v mnogočem prekrivali, saj identiteta Starčevo-Körös populacije gotovo temelji na dolgi lokalni zgodovini. Potrebujemo nov konceptualni pogled na začetke naših prednikov in časa, ki so ga zaznamovali, na človekove navade in na zavestno ločevanje med ljudmi in živalmi, na participiranje živih v obširnih vzorcih socialne interakcije in na potencialno kompleksnost njihovega izvora.*

## COLONISATION MODELS

How did the Neolithic begin in south-east Europe, and what did this Neolithic consist of? Answers to the two questions have been closely intertwined in the long dominant model of colonisation. The Neolithic has often been seen as the arrival of a new population, from Anatolia and points east, with a new subsistence economy based on domestication of plants and animals and a concomitant sedentary lifestyle. Since Neolithic expansion from the Levant can be traced westwards (*e. g. Cauvin 1994*), and since the Mesolithic or Epipalaeolithic presence in south-east Europe has long seemed both patchy and thin (*e. g. Tringham 1971*), debate within the colonisation model has concentrated not on challenging basic assumptions or considering possible alternatives, but rather on investigating details of dates and routes (*e. g. Kaiser and Voytek 1983; Perlès 1990; Hansen 1991*). There has been some recognition of the possibility of filtered or fragmented colonisation by sea, for example in the 'boat people' model of Chapman and Müller (*1990*), but this has hardly been connected with a wider review of the supposed colonisation phenomenon as a whole.

That colonisation did take place, and by sea, under conditions presumably more difficult than on land,

is amply documented by what happened on Cyprus and Crete (*Cherry 1990; Broodbank and Strasser 1991*), and indeed on other islands in the central and west Mediterranean (*Patton 1996*). On the other hand, probably both Cyprus and Crete may have been empty of resident population at the start of the Neolithic, and their intake was not therefore necessarily typical of wider processes. While the strengths of the colonisation model have often been emphasised, its weaknesses are less often debated. I have set out these arguments elsewhere (*Whittle 1996, chapter 3; cf. Zvelebil 1995; Zvelebil and Lillie forthcoming; Chapman 1994a*), and need only briefly allude to them here to set the scene for specific discussion of the northern Balkans and the Carpathian basin in particular.

The distribution and density of the early Neolithic in western Anatolia remain to be established (*e. g. Cauvin 1994; Özdoğan 1989; Özdoğan 1995; Özdoğan 1997*). At the present time, it is far from clear that western Anatolia was sufficiently well populated to have generated significant budding-off on the scale required for full-scale colonisation, though of course that does not exclude more episodic or opportunistic fission. Expansion into western Anatolia might itself only date to the sixth millennium BC (*Yakar 1996.6*); recent finds in the Marmara area (*Özdoğan 1997*) have not so far been matched further south. Pottery was a recent innovation in Anatolia itself, and the possibility of an aceramic phase remains in Greece; one of the supposed principal material signatures of a new, intrusive population may in fact have been characteristic of neither alleged source population nor alleged first incomers. By contrast, the presence of obsidian in early Neolithic Thessaly (*Perlès 1992*) relates to the continued exploitation of a source known to indigenous population since the Palaeolithic and in regular use in the Mesolithic (*Perlès 1990*). Above all, the establishment of what we regard as the typical elements of the early Neolithic may have been a long and slow process (*Whittle 1996, ch. 3*). The important investigations at Platia Magoula Zarkou in northern Thessaly, for example, show that a tell began in an unstable and periodically inundated creek/floodplain environment (*van Andel et al. 1995*), making permanent settlement impossible. The character of early levels at Argissa, Sesklo and elsewhere in Thessaly (*Milojčić 1960; Gimbutas et al. 1989; Wijnen 1982*) shows that early occupations were not continuous (though that does not exclude the possibility at some of them of year-on-year residence) and did not include substantial built above-ground structures. Tells are anyway something that came into being through the later and continued histories of chosen places (*cf. Chapman 1997a*), and 'open' sites have begun to be recognised in north-east and northern Greece, in Macedonia and Thrace (*Andreou et al. 1996*). For all the past excavations of tells in central-southern Bulgaria (*e. g. Todorova 1995*), we lack detailed information on early levels, and a regional contrast is also apparent in the different character of early Neolithic settlement in north-east and north-west Bulgaria (*Todorova 1995*). And so on.

It is possible therefore to envisage that the beginnings of the Neolithic in the southern Balkans were at the least both slower and more regionally varied than commonly supposed in vulgar versions of the colonisation model. This raises also the possibility of transformation involving more centrally the indigenous population. To resolve this question will require much more research, including – apart from excavation and locally-oriented studies (*Miracle 1997*) – more radiocarbon dating, survey (including in western Anatolia) and if possible DNA analysis of ancient human bone, animal bone and plant material (*cf. Heun et al. 1997*). My first aim has been to show that even in the southern Balkans the model of fullscale colonisation rests on less secure grounds than commonly supposed. This does not exclude the possibility of episodic or filtered movement of new population.

In the northern Balkans the case for fullscale colonisation is weaker still. It has long been noted that the early Neolithic Starčevo-Körös lifestyle looks different from that of the supposedly typical areas of tell settlement to the south (*e. g. Tringham 1971; Trogmayer 1968.18-19; cf. Banner 1937*). There are scattered sites and occasional clusters; occupation levels are thin, generally without significant stratigraphic build-up, which strongly implies residential mobility, on a spatial and temporal scale still to be established (*cf. Whittle 1997*); material culture is in some ways (especially as seen in pottery) simpler; and a wide range of resources was exploited, including wild game, fish, birds and shellfish alongside domesticated animals and cereals. Within the subsistence economy the balance of resources is unclear. The scale of cereal cultivation may have been quite restricted in the 'island' pattern of Körös waterside occupations (*Kosse 1979; Sherratt 1982a; cf. Willis and Bennett 1994*), and the dominance of sheep and goats in such a setting (*Bökönyi 1974*) has always seemed more than a little odd. If these are reasonable doubts about the plausibility of continued incoming popu-

lation, can we envisage in more detail the processes by which a regional indigenous population could have changed, to become what we increasingly inadequately call Neolithic? To answer that question, rarely formulated in any specific fashion for south-east Europe (*but see Chapman 1994a*), we must further consider aspects of identity and lifestyle. But first, there is the issue of Mesolithic presences and distributions.

## INDIGENOUS PRESENCES

It was noted above that the apparent lack of Mesolithic distributions in south-east Europe has often been taken as a further support for the colonisation model. This now requires the closest examination (*cf. Zvelebil 1995*). First, there is the matter of research history and coverage (*Chapman 1989*). The Mesolithic or Epipalaeolithic has been a poor relation in the development of most parts of south-east Europe. After all, no one anticipated the discovery of the spectacular finds in the Danube Gorges before investigations began in 1965 (*Srejović 1972*). Finds there remain restricted to the bottom of the Gorges, and despite the existence of a wide range of terrestrial resources in Gorges-bottom sites including pig and deer which could hardly have shared the same narrow water-edge areas as people, no survey has yet been carried out of the varied hinterland terrain on either side of the Gorges; Băile Herculane on the Romanian side, though probably very early in the Holocene sequence (*Nicolăescu-Plopşor and Păunescu 1961; Dinan 1996*), indicates what might be expected in side valleys and plateaus. Repeated observations in the main part of the Great Hungarian plain have so far failed to locate signs of Mesolithic presence (*Makkay 1996.41*), but knowledge of local collections combined with careful survey and excavation have begun to produce evidence on the northern edge of the Plain for an early Holocene presence, just beyond the Körös culture distribution (*Kertész 1996*). Against this, there are some examples of areas where systematic survey has not produced or has not been able to recognise evidence for a Mesolithic or Epipalaeolithic presence, for example along the Peneios in northern Thessaly and in inland Epiros in north-west Greece (*Runnels 1988; G. Bailey 1998*).

These cases constitute only partial or anecdotal evidence until much wider and more systematic as well as detailed local surveys have been carried out. But even in the present state of evidence it is possible to consider the overall nature of Mesolithic distributions, to compare them with the evidence for the also non-continuous distributions of the early Neolithic, and to begin to model variation in Mesolithic regional systems. Recognising that there may not have been a single kind of Mesolithic presence, just as with the early Neolithic, may be an important first step to further progress.

Mesolithic populations can in fact be documented over a wide area of south-east Europe as a whole. The general situation has been well mapped by Zvelebil (*1995, fig. 5*), though with brief accompanying detail. There are sites and/or concentrations: in the north-eastern Peloponnese at the Franchthi Cave (*Hansen 1991; Perlès 1990*); at the Theopetra cave on the northern edge of the Thessalian plain (*Kyparissi-Apostolika 1995*); in the Dinaric chain from Montenegro to Slovenia (*Srejović 1989; Srejović 1996; Budja 1993*); on the northern side of the Great Hungarian Plain in the Jászság region north of Szolnok (*Kertész 1996*), and then further north in Slovakia and Moravia (*e. g. Kozłowski 1982; Mateiciucová forthcoming*); in the Danube Gorges (*Srejović 1972; Radovanović 1996*); in the Southern Bug and Dniestr valleys east of the Carpathians (*Markevitch 1994; Zvelebil 1995; Zvelebil and Dolukhanov 1991*); and in eastern Bulgaria (*Gatsov 1989*) and easternmost Thrace (*Gatsov and Özdoğan 1994*).

Absences have therefore probably been much exaggerated, just as differences to early Neolithic distributions may have been overdrawn. For the early Neolithic, it is normal and understandable practice to present maps with cross-hatched or otherwise generalised distributions (*e. g. Tringham 1971, fig. 10; Gimbutas 1991, fig. 2-14*). These can conceal the variations in early Neolithic settlement type and duration already noted, just as they can also mask areas with still surprisingly low Neolithic presence, for example the Vardar valley compared with the Struma, and Yugoslav Macedonia and southern Serbia in general (*Garašanin 1982; Tasić 1997*). Körös distributions in southern Hungary are in places strongly clustered, with micro-regional distributions evident in the area of the Double and Triple Körös rivers, for example around Szarvas, Devaványa and Gyomaendrőd (*MRT 1989; cf. Kalicz 1990.83-8*); it is also possible that there are less dense distributions, in the area of the Maros-Tisza confluence (*Trogmayer 1968; Horváth 1989*), on the Danube itself (*Kalicz 1990*) and on the north-west fringe of the overall distribution around Szolnok in the Tisza

valley (*Raczky 1976*). Likewise, there is a wide scatter of Starčevo sites in the Vojvodina, but it is not yet clear whether these form the dense riverine clusters characteristic of parts of the Körös distribution. Perhaps by way of contrast, the range of Starčevo locations in northern Serbia is rather broad (*e. g. Chapman 1990*).

Beyond the mere question of presence and absence there is the issue of the nature of regional systems. It seems both short-sighted and unhelpful to suppose that all Mesolithic regional settlement systems were uniform throughout south-east Europe. Variation is already apparent, even in the current state of research, and may be both a diachronic and spatial feature.

Evidence from Franchthi Cave shows two dominant, perhaps related features. The deposits themselves represent a long continuity of occupation from late Pleistocene into the Holocene. The intensity of occupation seems to have varied, though it was regularly more intense in the early Holocene than earlier; the period of Mesolithic-Neolithic transition is missing, however, due to erosional hiatus (*Perlès 1990; Hansen 1991*). The presence of graves reinforces the importance given to this chosen place. Secondly, there was a broad-spectrum subsistence economy, elements of which would have taken people far afield. It is not clear exactly how far to sea in the Aegean the catching of large tunny would have taken people, but it is possible that the distances covered were considerable (*van Andel and Runnels 1987*). The regular bringing of obsidian from Melos back to the cave reinforces this possibility. It can be stressed that in the Mesolithic the cave itself was close to rather than on the coast itself (*Curtis and Runnels 1987*), and thus safe (for archaeological purposes) from subsequent sealevel rises. To the west, in Sicily, the Grotta dell' Uzzo provides a rather similar sort of situation, again in a location a little above the sea (*Costantini 1989*). Given the range of the Franchthi exploitation system, it would require only a couple more such sites to have existed in the Aegean, physically closer to early Holocene water levels, say in Euboia or southern Thessaly and in south-west Turkey (*compare the Öküzini cave inland: Otte et al. 1995*), for the Mesolithic of the Aegean as a whole immediately to look more busy.

The Danube Gorges are the obvious next example, and in discussing them I follow the chronology of Radovanović (*1996*), according to which some sites are pre-Neolithic but others, including most of the Lepenski Vir sequence, run parallel to Starčevo-Körös elsewhere in the region. In the Gorges people exploited fish from the river. Isotopic evidence from Vlasac and Schela Cladovei indicates that some parts of the population may have been heavily dependent on fish (*Bonsall et al. 1997*), although the largest anadromous fish, *Acipenser huso* or beluga, appears not to have been exploited in later periods (*Radovanović 1997*). Use of fish may have bound some people closely to the river, in differing parts of the Gorges. But there were also numerous finds of terrestrial animals, notably red deer, which also had symbolic significance in mortuary rituals. Hunting or otherwise exploiting such animals must have taken people further afield, away from the Gorges. The movement of raw material also shows wider movement, to bring flint, obsidian, basalt and igneous rock from the north and west and 'pre-Balkan platform' flint and graphite from north Bulgaria (*Chapman 1989; Kozlowski 1982*). It remains a moot point (and see further below) whether the sites are to be regarded as merely settlements or whether some or several can be characterised as special places or shrines, especially those in the upper Gorges including Lepenski Vir itself (*Radovanović 1996; Whittle 1996; for detailed maps see Radojčić and Vasić 1997*); this may have been a feature especially of the period of Neolithic contact. The important implication here is that sites and/or shrines in the upper Gorges may have served a much wider population, at least partially mobile by land or by river over varying but sometimes considerable distances.

In other cases, Mesolithic systems may have been more limited. Hypothetically, sites up and down the Dinaric chain (*Srejović 1996; Müller 1994; Budja 1993; Chapman et al. 1997*) could have been part of a system of seasonal movement, which involved summer occupations in the high hills and winter stays in the narrow coastal lowlands. Likewise the Southern Bug-Dniestr sites may have been based on a combination of local river fishing and forest-steppe hunting.

Different kinds of radius and mobility are evident. In at least two cases, though each was different, the combination of local activity with long-range mobility may be the key to understanding the distribution of people and sites. Were areas like Thessaly, therefore, which was so important in the Neolithic from the early Neolithic onwards, literally empty in the Mesolithic? Despite the general continuing non-recognition of Mesolithic sites, there is a documented presence now in the Theopetra cave (*Kyparissi-*

*Apostolika 1995*), and this could indicate – albeit unclearly at this stage – something of the same kind of regional system. There is also the matter of where some early Neolithic sites were placed. Early sites include many examples away from the most fertile locations suitable for easy permanent occupation, including Achilleion close up to the southern hills fringing the Thessalian plain, and Sesklo set in its striking natural amphitheatre of hills (*Kostas Kotzakis, pers. comm.; Mills 1997*). It is as though there was already knowledge of where to go.

The Neolithic pattern of settlement could therefore have been based on what went before, but equally it does not represent a direct continuation of this. At a regional scale there was infill and perhaps a shift in the range of mobilities (though note the continued importance of Melian obsidian, brought to Thessaly, and of pre-Balkan platform flint, taken to Starčevo sites). Importantly, however, in the perspective suggested here, such infill and shifts were relative. A 'clean slate' or 'empty niche' model of colonisation of the Balkans can hardly any longer be supported. In the past such expansion, whatever precise form it took, has been seen chiefly as the outcome of the operation of new ways of getting fed. The rest of this paper is concerned with the significance for this question of matters of identity.

## EARLY NEOLITHIC LIFESTYLE IN THE NORTHERN BALKANS

If the Neolithic phenomenon in the northern if not also the southern Balkans was not simply a matter of changing resource procurement and diets, what other changes were fundamental?

We have already noted above that there were subsistence changes, notably the appearance of domesticated animals including sheep and goats and the beginnings of cultivation of non-indigenous cereals. These new elements became very widely distributed, including within the Danube Gorges, where isotopic evidence indicates a less aquatic diet in the contact phase (*Bonsall et al. 1997*). What, however, was their importance? To answer this, much basic research remains to be done, especially now at local scales (*cf. Miracle 1997*). It has long been clear (*cf. Banner's brilliant initial 'ethnology' of the Körös culture: Banner 1937*) that a very varied range of resources was exploited in the Körös context. Game, fish, birds and shellfish are documented, and the succession of deposits in pits in Maros-Tisza confluence sites could show patterns of resource exploitation changing by the season (*Tringham 1971.92; Trogmayer 1968*). Fine sieving, cementum increment studies (*cf. Lieberman et al. 1990; Burke 1993; Burke and Castanet 1995*) and detailed micromorphology of feature fills are among approaches that need to be applied, to refine our understanding of seasonality and seasonal variation in resource use. From Starčevo itself comes a long list of game, fish and birds which were exploited (*Clason 1980*), a range which seems to be matched on Körös sites (*Bökönyi 1974; Bökönyi 1992; Takács 1992*). Starčevo itself is on the edge of the Danube floodplain (*Barker 1975*); the extent and duration of annual flooding there remain to be established. Further north in the Körös river system, the extent and duration of backswamp flooding both seem likely to have been greater (*Kosse 1979; Sherratt 1982a; Sherratt 1982b*), though again this remains to be established in much more detail. People of the Körös culture may have lived much of their lives in a fragmented pattern of islands. If so, it seems unlikely that either limited cereal cultivation or the husbandry of sheep and goats could have constituted the critical key resources which enabled the intake or infill (if such it really was) of this environment from the early Neolithic onwards. It is possible that future research into river history could indicate changes in natural conditions which allowed easier exploitation of this zone than in the very early Holocene (*there might be an issue of malaria in wet lowlands: Andrew Sherratt, pers. comm.; and Sherratt 1997.21*). When occupation came, levée cultivation of cereals is plausible enough (*cf. Sherratt 1980; van Andel et al. 1995*), but the scale and regularity may have varied. Flotation at the short-lived, perhaps seasonal Criş occupation site of Foeni-Sălaş in western Romania produced no cereal remains (*Greenfield and Draşovean 1994*). The keeping of sheep and goats might even appear somewhat perverse in this kind of setting. The motive for possession of these animals could rather have been novelty or their connection with new beliefs and identities.

As already noted, Starčevo-Körös sites characteristically have thin levels, and in the current state of research built structures are relatively rare. That built structures did exist is well enough shown by examples like Divostin and Tiszajenő (*McPherron and Srejović 1988; Selmeczi 1969; Raczky 1976; cf. Trogmayer 1966*), and suggested elsewhere by surface finds of burnt daub (*e. g. Sherratt 1983*), and the only slightly later example of new discoveries of longhouses in the northern Linear Pottery cultu-

re of the Hungarian Plain at Füzesabony (*Domboróczki 1997*) shows how dependent such observations can be on the scale of excavation possible; before the motorway rescue excavations, AVK longhouses could only be documented episodically from the Szakálhát phase onwards. There is also an enormous amount to be done to understand the possible rhythms of occupation of Körös waterside sites (*cf. Sherratt 1982b*). But even in the current state of research, it seems likely that there was coming and going in the Körös lifestyle, and given that Starčevo sites include also waterside ones and caves in the hills, it is plausible that the generalisation holds good over a wider area, and not just in the Körös river system itself.

Mobility in the Starčevo-Körös lifestyle could be considered at seasonal, annual and lifetime scales (*cf. Whittle 1997; Chapman 1997b; Zvelebil 1993*). We do not know whether or to what extent there was year-on-year occupation of single locations; seasonal mobility looks a likely and recurrent feature, and the wider scale of lifetime mobility may also be important. Given this possible, if still largely hypothetical diversity, and compared to the varied pre-Neolithic situations or systems sketched above, there is plenty of scope for adjustment of existing practices. To have moved from pre-Neolithic systems of mobility to Starčevo-Körös systems of mobility may not have required major adaptation.

If the Neolithic was not a matter only of nutrition, and if its patterns of settlement could have been descended from pre-existing regional practice, what can we say about the beliefs and senses of identity which could have served both to change and define a new world?

## SYMBOLIC IDENTITIES

This dimension can be approached in two ways: through material culture, especially pottery and figurines, and mortuary rites. Each can be taken in turn. This will then lead to comparison with indigenous traditions including that seen in the Danube Gorges sequence.

### Material culture: pottery and figurines

Starčevo and Körös sites are rich in pottery, poor in stone. The quantities of lithic waste and tools are limited. There are stone axes, but these are recurrently quite small and never abundant. In the Körös phase, one has the impression that flint and similar materials were scarce; their availability varied regionally (*Kertész 1996*). At Endrőd 39, one cache of 101 flints had been put in a pot which was deliberately placed in a pit cut through a soil over a pre-existing house. The flints, consisting of various preparation flakes, including for platform preparation, probably came from three nodules of flint from the western Banat (so to the south-east), suggesting both long-range procurement and careful hoarding (*Kaczanowska et al. 1981*). Some other lithic remains were recovered from the site. The abundant material on Starčevo-Körös sites is pottery. Numbers of sherds can run into the thousands from single features; up to 30 000 were recorded from Pit 1 at Röszke-Ludvár (*Trogmayer 1968; John Chapman, pers. comm.*). Contexts are known in which pottery has been found in houses or structures (*e.g. Tiszajenő: Raczky 1976*), but it is also clear that much greater quantities are to be found in the spaces in between, including in pits and other features (*Trogmayer 1968.12; Makkay 1992*). While there is much to do in the future in terms of residue analysis as a guide to function and breakage/erosion analysis as a guide to deposition, three aspects of pottery can be considered here: the significance of style boundaries, decorative motifs and deposition as sherds rather than whole pots.

The traditional culture history approach, with its understandable concern for chronology, has given us a familiar vocabulary of separation into cultures or groups within cultural complexes: Starčevo, Körös, Criş, and so on. This has rarely been challenged, except by Nandris (*1970*) and more recently by Makkay (*1996.36-8*). That there are stylistic differences between the pottery of, say, the Kőrös rivers area of the Hungarian Plain and the southern part of the Vojvodina is not really in doubt. Techniques of roughening and decorating the surface of coarse pottery varied and the quantities of the rarer fine wares, including those with painted decoration, seem normally to be greater in Starčevo than in Körös contexts. What this may have meant in terms of human recognition and social interaction is quite another matter. Most maps of the phenomenon present borders and boundaries, within the normal style of the culture history approach, with little or no overlap (*e. g. Dimitrijević 1974, fig. 1; Garašanin 1979, map 2; Tringham 1971, fig. 10; Kalicz 1990, Taf. 1.2*). Really only Brukner (*1966, fig. 1; cf. Garašanin 1982.111*) has mapped a more subtle picture of overlap in the northern Vojvodina, with areas of 'Starčevo-Körös' distribution between 'Körös' and

'Starčevo'. Individual sites within this area like Donja Branjevina may show varying styles from stage to stage in their sequence (*cf. Ružić and Pavlović 1988*).

This may indicate a picture of continuum rather than sharp boundaries in ceramic style. Pottery may have been a medium through which convergence and cohesion rather than ethnic difference were expressed, as the culture model has so often, if implicitly, implied. Pottery then becomes a symbol of participation rather than badge of separation. It is hard to envisage a closed ethnic unit over the total range of the Starčevo-Körös phenomenon, any more than over the total area of the distribution of early Neolithic white-painted wares, but both could indicate areas of shared practice. Pottery was a new material medium in this area, and if the population using it were indigenous, some of the abundance of pottery might be explained by the novelty of a new medium being used to express versions of existing material practice (*cf. Stevanović 1997*). The general similarities between, say, indigenous lithic projectile distributions (*e. g. Kozłowski 1982*) and early Neolithic ceramic distributions might be considerable. The next step will be to examine more closely the manufacture and use of such pottery. It appears to have been easily made, including fine wares. There are some very large vessels in Körös contexts, which may have been used for storage (*cf. Banner 1937. 37*), but it is possible that many pots were made with a very short use-life in mind. That is certainly one way to explain the abundance of pottery, which could represent as disposable a material in its way as flint in other circumstances.

Pottery was a new medium for visual display. Surfaces of fine wares were smoothed and/or burnished, and some painted, with generally simple motifs. Surfaces of 'coarse' wares were also treated, either by roughening or applications of clay and frequently by finger-tip and fingernail impressions. In Körös contexts there are relief representations of both animals and human or human-like figures (*e. g. Banner 1937; Kalicz 1970*). The human figures are characteristically very stylised, with virtually no sign of individualism in terms of face or expression (*Pollock 1995*), and recurrent gestures such as bent arms, which might represent particular meanings, actions or contexts (*Kalicz 1970; Banner 1937.41 suggested stylised representation of dancing*). The animals are in part more recognisable, such as the stag from Csépa or the probable goats (with strongly curved horns) from Hódnezővásárhely-Kotacpart (*Kalicz 1970, pls. 6-8*); others, though said to be species-specific, such as the claimed deer on the vessel from Hódnezővásárhely-Hámszáritó are more ambiguous (*Kalicz 1970, pl. 9*). Human-like figures and animals occur together on the same large Körös vessels, and the combination must surely be significant; it is not yet clear whether they can also occur separately. This kind of representation seems in general much rarer in Starčevo contexts, though there are interesting examples from Donja Branjevina (*Garašanin 1979, fig. XXXIX*). These are made by incision, and represent animals whose identity is quite unclear; some have projections from their heads which could be either antlers or horns.

The tactility and immediacy of 'coarse ware' decoration have been neglected. This decoration is very common, but it seems shortsighted to relegate it to unconscious practice simply because it occurs on so-called coarse pottery. Roughening and finger-tipping bring the human hand into direct contact with the clay. This is a kind of signing of the pots, just as in other contexts and times rock art can be thought of as signing the land (*Bradley 1997*). It is possible that particular individual potters or decorators can be distinguished by variations on nail size and shape (*Eszter Bánffy, pers. comm.*), but the fact that these 'signatures' are superficially so similar may be the real point, expressing both participation and a merging of individualism in collective practice. This would be all the more significant if the manufacture and use of pots were episodic, based on either seasonal movement or a rhythm of cyclical gatherings and feasts. These humble sherds, on which so much dust accumulates in the museums of the region, may still loudly be proclaiming a central and important ethic of participation and communality.

Until very recently, the fact that so much of the pottery is represented by broken sherds has gone largely unremarked (*Makkay 1992.149; Chapman 1996; Chapman forthcoming*). It is likely that the significance of pots was carried over into the practices surrounding their deposition. Pots may have been deliberately broken after use in particular events, gatherings or feasts: another way of explaining the great quantities involved. It can be argued that sherds stood metonymically, as part for whole, for past social interaction, and carried something of their past history into the ground in chosen places, as people consciously selected and deposited them. There is enormous scope in future fieldwork for more detailed study of variation in such depositional practice (*cf. Last 1996*).

Figurines may present both overlaps with and contrasts to what may be represented in pottery. Starčevo-Körös figurines are overwhelmingly of human form. Two unique four-footed and double-horned pieces from Szolnok-Szanda may be a rare, if rather abstract, representation of bull imagery (*Kalicz and Raczky 1981*); some four-footed lamps may also have schematic animal heads (*Kalicz 1970, fig. 13*). Given the more frequent representation of animals on Körös pots and as figurines in subsequent phases of the sequence, for example from the AVK on the Hungarian Plain (*e. g. Domboróczki 1997*) or from the Vinča culture further south (*Gimbutas 1991*), this absence may be significant. It may suggest claims for the centrality of the human form and human identity, although in other contexts these were treated in combination with those of animals.

Traditionally, figurines have been seen as some kind of representation of spirits or ancestral figures (*e. g. Gimbutas 1991, and a vast literature*). It has also been suggested that figurines in some contexts may represent individuals or 'acting human beings' (*e. g. Bailey 1994; Biehl 1996*). For the purposes of this discussion (and without wishing to reduce a highly complex issue), it is neither possible nor desirable to settle upon a single meaning. The apparent anonymity of Starčevo-Körös figurines may speak against their representing specific individuals as such. They do not seem to occur in Starčevo-Körös burials, where pots are perhaps the most recurrent (but still infrequent) grave good (*e. g. Galović 1964; Trogmayer 1969*). A more typical sort of context is represented by one context at Endrőd 39, in which parts of four figurines, already broken, were deposited close together at the base of a substantial pit, with animal bones, sherds and bone tools above and nearby (*Makkay 1980.210*). A possible inference is that figurines were something held in common, akin to the signings on pots suggested above, and circulated widely among the living until (deliberately) broken and deposited. Nor were figurines necessarily the only token of concepts of ancestry, if this was indeed part of their field of reference. So-called sacrificial pits in Körös contexts held carefully deposited layers of material and finds including pottery, animal bones, fish bone and snails (*e. g. Makkay 1992*).

Superficially, the overwhelming representation in the figurines is of the mature female form, with varying emphasis on heads, breasts, genitalia and buttocks; limbs seem less important (a contrast which can again be heightened by comparison with pottery and with later figurines). Heads and necks are elongated (and see below); there is some treatment of eyes as schematic slits, and the occasional suggestion or representation of nose and mouth. There are some suggestions of hair. Generally faces appear to our eyes abstract, expressionless and anonymous. This may be the combination again of individual and collective. Breasts and genitalia are separately modelled or indicated on the bodies of most figurines. They are not normally further emphasised, though occasionally there is a kind of startling realism, as in the Szajol figurine (*Raczky 1980*). Buttocks and thighs are normally disproportionately large.

As well as the superficial emphasis on the female form, and the apparent anonymity of faces, there is another neglected feature of these figurines: their ambiguity in terms of gender or sexual representation. Is it fanciful to suppose that elongated heads and necks are in fact also a representation or a suggestion of erect *male* genitalia? The same suggestion has been made, independently, for Greek material (*Kokkinidou and Nikolaidou 1997*). Many of the Starčevo-Körös figurines in fact offer quite striking images of the head of the erect penis. One of the most suggestive examples is from a Starčevo context at Gladnice (*Garašanin 1979, fig. XXIV*), well to the south, and others also occur further south, including in Greece (*Kokkinidou and Nikolaidou 1997*), but these objects are widespread including within the Körös distribution (*see for example Gyomaendrőd 119: Makkay 1992; and Szajol: Raczky 1980*). The whole figurine may also be regarded as in part a representation of erect male genitalia, in which buttocks become transformed into testicles. There is no need to insist on either interpretation to the exclusion of the other. What seems most interesting is the potential ambiguity created, in a medium – fired clay – which itself presents the theme of transformation (*Talalay 1993*). There is thus in these apparently simple figurines a possibly complex set of beliefs. The human form is emphasised separately from animals. Female form is emphasised, with overt attention to reproductive or sexual parts. Heads and necks are important, but faces are more anonymous. At the same time there is some kind of concern for the combination of female and male gender and/or sexuality. It is a striking presentation of a particular kind of self-consciousness, once again a merging of perhaps several different identities. I will consider below possible differences and continuities with the indigenous system of representation of identity as seen in the Danube Gorges; the concern for reproduction and fertility may be old, while the heightened awareness of several dimensions of a separate human identity may be new.

## Mortuary rites

Starčevo-Körös mortuary rites were simple but varied. The principal visible element of such rites seems to have been in settlements or occupations. Not all occupations contain burials or human remains, and it is hard in the present state of evidence to distinguish whether burials occur only on particular kinds of site. Gyomaendrőd 119, for example, apparently a quite small occupation, has a number of burials, while the larger area opened at Divostin had only one shallow burial of an adult woman, uncertainly attributed to the Starčevo phase (*McPherron and Srejović 1988*). From the indications of sequence at Gyomaendrőd 119 (*Makkay 1992*), it seems likely that the rate of deposition was slow: perhaps only one burial every few years at the most. There do not appear so far, in the current state of excavation, to have been cemeteries or burial grounds, so much as episodic accumulations or small concentrations in places chosen and re-chosen for occupation. It has been suggested that a sense of pollution in the Körös culture could have caused site abandonments and short-distance relocations (*Chapman 1994b*), but this may be too extreme an explanation for specific instances like Gyomaendrőd 119. The further obvious implication is that much of the population is not represented in the evidence excavated so far, which could reinforce the sense of fluidity and mobility that characterises other aspects of the settlement record and the lifestyle as a whole. The dead may have been used to reinforce the attachment of the living to particular places, but that attachment itself was a broad one.

The diversity of rites is striking. These have been described often enough before (*e. g. Garašanin 1982; Borić 1996; Trogmayer 1969; Chapman 1983; Chapman 1994b*), but will bear brief rehearsal in order to contribute to the discussion of lifestyle, relations between individual and collective, and comparison with pre-Neolithic rites; analysis of context-related variation has so far not been systematic enough. Women, men and children are represented in the mortuary record; so far, women might be in the majority (*Chapman 1983.8; Zoffmann 1986, for Hungary; Borić 1996, table 1 for the Srem region in northern Yugoslavia*). The dominant mode was inhumation of fleshed corpses, either contracted or sometimes extended with some flexing of the legs. Single burials are recurrent, though double burials also occur, and small collective deposits are found in both Starčevo contexts, as at Vinča (*Garašanin 1982; Letica 1968; the context could be very early Vinča culture*), and Körös contexts, as at Hódnezővásárhely-Kotacpart-Vata tanya (*Trogmayer 1969; Zoffmann 1986*). There are also in Körös contexts partial inhumed remains, skull deposits and even rare cremation deposits (*Chapman 1994b*).

Single burials normally occur either in their own grave pits or in larger, presumably abandoned features normally interpreted as pits or pit-dwellings. It is not yet clear whether there is any structured difference between the remains and their treatment in such differing contexts. Burials have been found inside structures, as at Szajol and Szanda near Szolnok, and it is possible that these were deliberately fired following deaths of occupants or 'household' members (*Raczky 1982-3; Chapman 1994b; cf. Stevanović and Tringham 1997; Stevanović 1997*). A related example could be the collective deposit at Vinča in a supposed former pit-dwelling (*Garašanin 1982*). The orientation of the body seems to have varied in Starčevo contexts as a whole (*Garašanin 1982*); a recent discussion of the Srem region evidence suggests greater variation for left-side inhumations (*Borić 1996, fig. 3a*). Less variation is claimed in Körös contexts (*Trogmayer 1969.13*). There has been no context-related examination of orientation, to consider body position in relation, for example, to natural features. It has been suggested that details of the position of heads and upper limbs, as at Zlatara A, could be related to personal identity or position (*Borić 1996.74*).

Many burials were not accompanied by grave goods. There are early reports of Körös burials with red ochre around the skull (*Trogmayer 1969*), echoing practices in the Danube Gorges (*Radovanović 1996; Bradley 1998*), but ochre does not seem to be an element of Starčevo rites. In various cases whole pots and sherds were deposited with the dead. At Golokut in Srem an adult woman was interred below the skull of an aurochs (*Borić 1996, and pers. comm.*), while there were red deer antlers with a woman at Zlatara B (*Borić 1996*).

It was formerly suggested that complete inhumations in these contexts might represent more socially prominent persons than the partial remains incorporated into refuse deposits (*Chapman 1983.10*). It has also been suggested that Starčevo communities emphasised 'certain communal rights' through their burials (*Borić 1996.75*). I would prefer to emphasise diversity and fluidity. Diversity and mobility do not seem easily compatible with rigidly fixed social positions. Some of the dead may have been buried

or exposed elsewhere before eventual deposition, or even moved around the landscape before final interment. The contrast then would be between those buried after death and those selected for ancestral veneration. The apparent numerical dominance of women is significant. It was formerly linked to the hypothetically central role of women in hoe agriculture (*Chapman 1983.10*), but this is to assume that hoe agriculture had a central role in Starčevo-Körös subsistence. It may have more to do with other gender-based division of labour or gender-based variation in lifetime mobility. It is tempting to see a link with the superficial dominance of the female form in figurines. Identities and social roles were perhaps much more open than we are accustomed to think of or experience. Burials may have reinforced a sense of place, but there were many places so reinforced. People were perhaps more attached to regions or landscapes than to particular places alone, and the fluidity of social relations may have allowed the individual or groups to move and to merge freely with others. Burials recurrently present the individual, but the individual is also subsumed in the collective. Once again there is ambiguity (*I have discussed the concept of the individual more widely elsewhere: Whittle forthcoming*).

## DESCENTS: COLONISATION, ACCULTURATION AND INDIGENOUS CHANGE

So far, I have cast doubt on the applicability of the colonisation hypothesis for the northern Balkans, while leaving the matter open for the southern Balkans. I have indicated that at a broad regional scale there were widely distributed Mesolithic populations in south-east Europe as a whole, which had varying patterns of lifestyle, mobility and subsistence. I have suggested that the early Neolithic northern Balkan lifestyle was based on mobility of varying kinds and a very broad subsistence spectrum; some elements represented, such as sheep and goats in wet Körös contexts, may have had more to do with novelty than practical reason. Identities may also have been open, fluid and ambiguous. Material culture patterning, for example as seen in pottery, looks weak, and we need to break away from the traditional assumptions of differentiation implicit in the culture model approach. Decoration of pots and their frequent deposition as broken sherds may have served to submerge the individual in a wider collective. Burials also celebrate the individual, but without clear emphasis on particular persons or their social position. The dead populated the whole landscape in varying guises, again merging individual and collective. If the colonisation hypothesis is unreliable, how can we plausibly derive this situation from the indigenous setting? It is my aim here to suggest refinements to existing acculturation models (*see also Zvelebil 1998a; Zvelebil 1998b*).

A straightforward acculturation model would accept the existence of more or less widely distributed Mesolithic populations, and suggest that under the influence of innovations to the south there followed a series of changes in the northern Balkans, including the adoption of cereal cultivation and animal husbandry, including the use of sheep and goats, the adoption of pottery and figurines, built structures and so on. Such changes might be seen as extensive, driven above all by change from the outside. While not denying the importance of changes in the situation from the outside, what I wish to explore is the possibility of something more complex.

### Indigenous traditions: generalities

Taken again at a broad scale, it is possible to use the south-east European Mesolithic evidence to suggest many elements of continuity of lifestyle. Mesolithic people were regularly mobile, though to varying degrees, and the possibility of restricted mobility, for example in the Danube Gorges or in the Southern Bug and Dniestr valleys cannot be excluded. Particular places were emphasised by repetition of occupation, from obvious examples like Franchthi Cave and locations in the Danube Gorges to spectacular inland Montenegran caves like Crvena Stijena (*Srejović 1989*). A broad spectrum subsistence economy was practised, and there was long-distance movement of raw materials. Burials reinforced the importance of place, with examples at Franchthi, Theopetra, and in the Danube Gorges (*Jacobsen and Cullen 1981; Kyparissi-Apostolika 1995; Radovanović 1996*). Individuals in this world too may have moved freely from group to group; the patterning in material culture is also broad and not sharply differentiated.

In this perspective, the scale of early Neolithic changes could actually appear relatively restricted, to the extension of zones of settlement, the limited take-up of some cultivation and husbandry, and the exuberant use of fired clay for pottery and figurines. It is not so much the material conditions of existence that may be at stake, important though those obviously are, as shifts in the sense of identity of individual and collective. Can that further be explored?

## Indigenous traditions: the case of the Danube Gorges

My discussion will principally concern the Danube Gorges. The major features of the phenomenon are well known and need no re-description here (*Srejović 1972; Radovanović 1996*). The chronology of developments in the Gorges is central. There is a large body of opinion which attributes the significance of the Gorges phenomenon principally to its *pre-dating* the Neolithic (*e. g. Srejović 1972; Srejović 1989; Boroneanț 1989; and many others*). The more likely sequence, however, is that while some sites in the Gorges can indeed be dated to before the Neolithic in the wider region as represented archaeologically by Starčevo-Körös material, the apogee of the Gorges developments was *contemporary* with early Neolithic culture elsewhere in the wider region (*Whittle 1985.115-8; Radovanović 1996; Whittle 1996.24-9*). From this it follows that the belief system or ideology seen in its most developed form at Lepenski Vir itself could in some sense have been a resistance to or variation on early Neolithic belief and ideology (*Whittle 1985.118; Chapman 1993; Radovanović 1996; Whittle 1996.44-6*). It is not therefore a precursor, but, even more interestingly, a foil to early Neolithic ideology. The Lepenski Vir system is not necessarily completely opposed to that of the early Neolithic, but its major features may serve further to highlight what is new about the early Neolithic sense of identity and belief.

Srejović himself insisted that there were mythic dimensions to the symbolism of Lepenski Vir I and II:

> *... the existence of a specific fish-like deity came into being relatively late in the Lepenski Vir culture. It probably descended from the belief that all men were children of the river, or the descendants of mermen, or perhaps from a myth in which water, stone, the boulders, fish, deer and human heads held the most important places* (*Srejović 1972.122*).

This kind of interpretation was curiously neglected for a long time, including by this writer. Renewed attention was given to the symbolism of Lepenski Vir by Hodder (*1990*), but that brief analysis concentrated on simple binary oppositions between hearth and burials, life and death, and so on. Handsman (*1991; cf. Chapman 1993*) took note of the carved boulders, but principally as representations of lineage ancestors, in a discussion of the development of social relations along presumed lineage divisions. More recently still, Bradley (*1998*) has drawn attention to the unifying features of the materials and practices drawn upon in Lepenski Vir, to suggest a worldview more in harmony with its natural surroundings.

It is possible to go still further, and the most successful detailed attempt to develop Srejović's view has been made by Radovanović (*1996; 1997*). This account accepts that Vlasac, only a little downstream in the Upper Gorges, is earlier than Lepenski Vir. The burials there may be of two phases. As elsewhere in the Gorges, ochre was scattered in an earlier phase on the bodies of the dead (on men, women and children). In its later phase, ochre is scattered only on women, in the pelvic area, becoming perhaps a symbol not just of life but also of birth. Ochre was not a feature of Lepenski Vir burials. There is continued interest in fertility, for example in the combination of female mandibles and hearths, and one might add in the form of red deer antlers near the hearths of phase II (*Srejović 1972.123*). An earlier burial in phase Ie had an aurochs skull by the deceased's shoulder, a red deer skull by one hand and antlers nearby (*Srejović 1972.120, pl. 61; grave 7, house 21*). Birth symbolism shifts into the houses or shrines in the form of sculptures with vulvae, for example in Lepenski Vir II house XLIV, thus being transformed from something associated with individuals and becoming 'interwoven into a complex set of other symbols belonging to a collective heritage. The collective heritage acted as a myth, even as a dogma...' (*Radovanović 1997.88*). Other features are important. The heads of the dead at Lepenski Vir (children often under the house or shrine floors, with adults in the spaces in between) were oriented downstream. Sculptures from an early part of Lepenski Vir I onwards present fish-like faces, which become both larger and more accentuated in Lepenski Vir II. These can be seen to represent the massive anadromous beluga, *Acipenser huso*, though that was largely absent from fish remains themselves in later levels. In a rather different way to Hodder, Radovanović comes to a duality between life and death, with the river itself of critical and central importance as the conduit for the passage upstream of the ancestors (as beluga) and the departure downstream of the dead, and as a metaphor for death and endings on the one hand and life and return on the other (*Radovanović 1997.89*).

One could add two emphases, both to do with the dynamic development of the sequence. The early burials of Lepenski Vir appear to be very varied in nature, and include partial remains, heads only and

jaws only (*Srejović 1972.117-8*). The later burials seem therefore to represent a relatively greater formalisation of mortuary rites, and perhaps therefore a consolidation also of collective identity, especially if, as I have argued elsewhere (*Whittle 1996*) the houses were in fact shrines and the whole site a special sanctuary serving a wider area and population.

The other point to stress is once again the wider context. These spectacular developments at Lepenski Vir took place on the chronology advocated here at a time of Neolithic contact. They emphasised a special place and a special area with a long history. By the apogee of Lepenski Vir II, there were major ideas to do with belonging, the merging of the individual into a wider collective, origins, ancestral return and the destination of the dead, which *had developed, amplified or made explicit* earlier ideas to do with the centrality of fertility, reproduction and unity with nature.

It would be naive to suppose that the belief-system represented in the Danube Gorges should reveal that of the whole of Mesolithic south-east Europe. But its major elements may help also to define what was different about early Neolithic ideology, and therefore give further insight into what was involved in the conceptual shifts of an indigenous transition. Ideologies need not necessarily have been completely opposed. This is not the only likely case of delay and resistance. The Ertebølle case springs to mind (*Whittle 1996, chs 6 and 7, and references*), and in that case some of the long process of *stasis* may have been conditioned by convergence as much as by difference. The early Neolithic belief-system as sketched earlier was in varying ways to do with belonging, origins and ancestral figures, fertility and reproduction. There were therefore perhaps considerable elements in common at one sort of level. Belonging and identity may have been more ambiguous and fluid in the early Neolithic situation, as discussed above. Perhaps it was so also in the Mesolithic, and the apogee of Lepenski Vir could be seen as an attempt to fix behaviour into a particular mode. The interest in ancestors in the early Neolithic seems to have been bound up with a greater interest in the human form and human body, as expressed in the form of figurines and in their often ambiguous gender. There was an interest in animals as separate beings, perhaps a concern for human relationships with animals created by the new practices associated with domestication.

Both sets of people, if such a crude distinction can be made, thought about where they came from and to what they belonged. In the Gorges, this was focused on concepts of the natural world and ancestors who took natural form, on a cycle of life, reproduction and death. In a wider world, and undoubtedly affected by developments to the south, other people focused on concepts of a human world, the importance of belonging to a broad community, of tracing descent from ancestors in human form, and of a more conscious difference between people and animals. The human dead were hardly neglected, but their treatment suggests that they were not a central focus in the same way as in the Gorges. I have deliberately tried to avoid simplistic opposition between a Mesolithic and an early Neolithic belief system, nor do I suggest that these would have been uniform; the *domus* concept (*Hodder 1990*) runs both risks. But it is as though, as well as the overlaps, there were fundamental divergences: on the one hand, an emphasis on cyclicity, the merging of time, and the importance of death, and on the other, an emphasis on ancestral beginnings, marked time, and participation by the living in social life.

I am trying to avoid both simplistic or universalising models and excessive opposition between putative worldviews. The elements sketched here, however, do recall the contrasts made by several authors between one worldview, associated with at least some recent hunter-gatherers or foragers, in which nature is perceived as a partner, if it is actually conceptually distinguished at all, and another worldview, thought to be more characteristic of cultivators and others, in which 'nature' is both separated and appropriated (*Ingold 1986; Ingold 1992; Ingold 1993; Bird-David 1990; Bradley 1998*). The contrast here, if valid, might best be summed up in the differences in the representation of faces: in the Danube Gorges context a composite image which draws on both fish and humans, but in Starčevo-Körös contexts an image based on human features alone.

People in a process of transition could have drawn on both sets of ideas. There is no need to suppose instant or wholesale change. The Starčevo burials from Golokut and Zlatara B, with their animal remains, strongly echo certain of the deposits at Lepenski Vir, and the diversity of Starčevo-Körös mortuary rites also recalls Gorges practices before they became more formalised. On the other hand, new ideas filtering from the south may have spread the quicker or more easily because they were not wholly dissimilar to existing ones. The potentially complex set of interactions is thus poorly conveyed in the term 'acculturation'. Just as Srejović emphasised

the importance of myth in the Danube Gorges, so I suppose that mind-sets were changed by myths and stories, by new tellings of the beginnings of the world, of the nature of human social life and of human relationships with the natural world (*cf. Whittle 1996; I will discuss these ideas further elsewhere*). I presume that these would have spread more quickly than anything else, and could have encouraged people to dwell in parts of south-east Europe previously little used or swiftly passed through.

A final example is the neglected upper level III at Lepenski Vir. The place was still used, but much changed (*Srejović 1972*). Structures were of irregular shape and earth-sunk, and a small number of burials were set in deep graves next to these. Among other new material culture, extraordinarily abundant pottery replaces the old symbolisms. The motif on one large globular pot from level IIIa is particularly telling: an outstretched human hand (*Srejović 1972, pl. VIII*).

**ACKNOWLEDGEMENTS**

I am particularly grateful to: The British Academy and The Hungarian Academy of Sciences for making possible an exchange visit to Hungary in 1997, and to Dr Eszter Bánffy for help with my programme; Dušan Borić, Ivana Radovanović and others, including the Rotary Club, Belgrade, for making possible a visit to Yugoslavia in 1998; and Mihael Budja and the University of Ljubljana for their invitation and subsequent hospitality. I am very grateful also to Douglass Bailey, Richard Bradley, Mihael Budja, John Chapman, Vicky Cummings, Detlef Gronenborn, Andrew Sherratt and Marek Zvelebil for commenting on draft versions of the manuscript.

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UDK 903(398–11)"6343"
Documenta Praehistorica XXV (Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji XXV)

# The northern periphery of the Early Neolithic Starčevo culture in south-western Hungary: a case study of an excavation at Lake Balaton

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ABSTRACT – *Vörs-Máriaasszonysziget is one of the northernmost lying sites of the Starčevo culture discovered in Hungary recently, which allowed the authors to reconstruct important steps in the neolithisation of the Carpathian Basin. The Northern distribution limit of the Starčevo-Körös-Criş complex forms not only the periphery of the earliest Neolithic communities, but represents also a frontier zone between the earliest farmers and the local hunter-gatherers at the turn of the 7/6 millennium BC. The appearance of new features in pottery production that turned to be main characteristics of the Oldest Linearband Pottery culture and the raw materials distribution are discussed in context of farmer-forager interactions on the agricultural frontier zone.*

POVZETEK – *Vörs-Máriaasszonysziget je eno najsevernejših najdišč kulture Starčevo, ki so ga nedavno odkrili na Madžarskem. Avtorji članka so lahko na osnovi tega najdišča rekonstruirali pomembne korake neolitizacije Karpatske kotline. Severna meja razširjenosti kompleksa Starčevo-Körös-Criş predstavlja obrobje zgodnjeneolitskih skupnosti in hkrati tudi mejni pas med zgodnjimi kmetovalci in lokalnimi lovci-nabiralci na prehodu iz 7. v 6. tisočletje BC. V članku obravnavamo pojav novih značilnosti pri izdelovanju keramike, ki so postale glavna lastnost najstarejše kulture Linearnotrakaste keramike, ter razširjenost surovin in sicer v luči medsebojnih vplivov med kmetovalci in lovci-nabiralci na kmetovalski meji.*

The Starčevo culture constitute the westernmost unit of the large Early Neolithic archaeological complex, comprising, towards the east the Körös culture and further east, Criş, a culture representing the first food-producing communities in the region. It is connected with more loose ties to the Bug-Dniestr culture, lying further to the east, the formation of which, however, was also influenced by other factors (*Маркевич 1974; Larina 1994, Fig. 1*). As has been noted several times, the complex of Starčevo-Körös-Criş cultures form the northernmost territory, i.e., the periphery of the vast area where the Early Neolithic archaeological heritage is intensively influenced by Balkan-Aegean traditions. The lively discussion of recent years has only concentrated on unfolding the nature and extent of this southern, south-eastern influence, as seen from this peripheral "frontier" position[1].

The limits of the aforementioned periphery start at the foreland of the Alps and run across the southern parts of Transdanubia in a west-east direction along Lake Balaton, turning north in the Tisza region of the Alföld up to the great bend of the Tisza. From here, the limits terminate, across Transylvania and the Northern part of Rumanian Moldavia to the river Dniestr in the central part of the Moldavian Republic (Fig. 1) (*Larina 1994, Fig. 1*). The archaeological

1 It is most exciting that the last four volumes of "Poročilo" edited by M. Budja (*Vols. 21, 1993; 22, 1994 (1995); 23, 1996; 24, 1997*) were devoted to the question of European Neolithisation, giving a forum and space to sometimes conflicting views. Further works on this issue: *Barker 1975*; *van Andel, Runnels 1995*; *Bogucki, Grygel 1993*; *Velušček 1995*; *Budja 1996b*, etc.

heritage is bound by many indisputable threads to southerly regions. The great problems are how to interpret historically the attestable archaeological contacts with the Balkano-Aegean region, and how to explain the northern limit of distribution. The three cultural units (Starčevo, Körös, Criş) of this large northern Early Neolithic complex can be well considered as three independent cultures. Distinguishing features can be spotted within the great unit in several characteristics of settlement features, and in the quality and quantity of material and spiritual cultural heritage; taken together these features offer adequate grounds for separating the individual cultures (*Raczky 1976; Kalicz 1980; 1983; 1990; 1993*).

Among the three cultural units, the Körös culture occupies the smallest territory. Its density of sites and richness of the material culture, however, is exceptional in this period, and far surpasses that of the other two cultures. The explanation for this unexpected abundance can be found in differences in ecological relations. Only the territory of the Körös culture is fairly homogeneous, fertile flatland, where differences in altitude are negligible and soil quality is also fairly even. At the same time, this central part of the Alföld (Great Hungarian Plain) densely criss-crossed by living waters and periodically inundated land, the most extensive area of the Carpathian Basin, offered an especially favourable micro-climate for the first farming communities occupying the region. The forest groves and grass-lands, steppes, and "Pusztas" offered favourable conditions for both domestic animals and game, and the abundance of the latter provided conditions for easy hunting. It must be said, however, that hunting was less important in the life of Early Neolithic communities than, for example, in the Late Neolithic (*Bökönyi 1992. 197–201, 233–239*). At the earliest settlements, the people of the Körös culture basically consumed the meat of domestic animals and the ratio of hunted animals, apart from some local exceptions, was negligible in the food supply. The protein sources included, apart from meat, an almost inexhaustible stock of fish, freshwater mussels, and other resources, obtained from the rivers and the flood plains. The immediate surroundings of the settlements was also suitable for the cultivation of plants, i.e., corn. Favourable natural endowments are indirectly reflected in the density of settlements and the wealth of archaeological finds, animal bones, fish and shell remains. In our opinion, no other places in Europe offered, in the scale of the whole culture, comparably favourable conditions, with the exception of small ecological niches. The factors permitting and facilitating the existence and flourishing of Körös culture are so different from an average Early Neolithic footing that, in spite of its peripheral position, it can be considered a special, evolved case among south-east European cultures.

The Starčevo and Criş cultures, in a way, surrounded the Körös habitation area in a large semicircle (Fig. 1). The ecological relations of the Starčevo and Criş cultures were essentially different from that of the Körös culture. Smaller and larger flatlands, basins, river and stream valleys, as well as hills and Alpine-type mountain ranges can be found in the habitation area. With the exception of the wide, swampy valley of some great rivers (e.g. the confluence of the Danube and the Sava), the living water environment was as important here as on the Alföld. The strategy for acquiring food was more variable compared to Körös subsistence strategies, as a result of the more variable local natural endowments.

The population belonging to these cultures (Starčevo, Criş) also intruded into the high mountain ranges and adapted successfully to a variable local environment without essential modification to the material culture so far unearthed. This feature allows us to hypothese, among others, the existence of permanent communication networks.

As a special case we can mention the settlements in the Iron Gate region where the subsistence strategy was based on the Danube and girdled with high mountains (*Srejović 1969; 1972; 1981; Jovanović 1969; 1972; 1975; Comşa 1974 with all earlier references; Stalio 1986; Vasić 1986; Stanković 1986*). We can also mention Bosnia, the complete territory of which has yielded only four sites (*Leković 1995. 36*), two of which, however, Tuzla and Obre seem especially important with tell settlements proving the existence of long-term permanent occupation (*Čović 1960/61; Benac 1973*). In the case of Obre, communication routes running along the valleys of the Neretva and Bosna rivers and passing Obre are especially important (*Gimbutas 1974.11–13*). The range of the Dinarian Alps running along the western part of Bosnia probably forestalled the population of the Dalmatian coast by Starčevo people. It is well known that the narrow zone of the Adriatic coast was inhabited by different Early Neolithic cultures (Impresso ceramics) (*Müller 1994*) that were essentially different from the appearance of the Starčevo and Criş cultures, never reaching the coast all along their vast areas of distribution. The territory of the Starčevo culture is following the N–S direc-

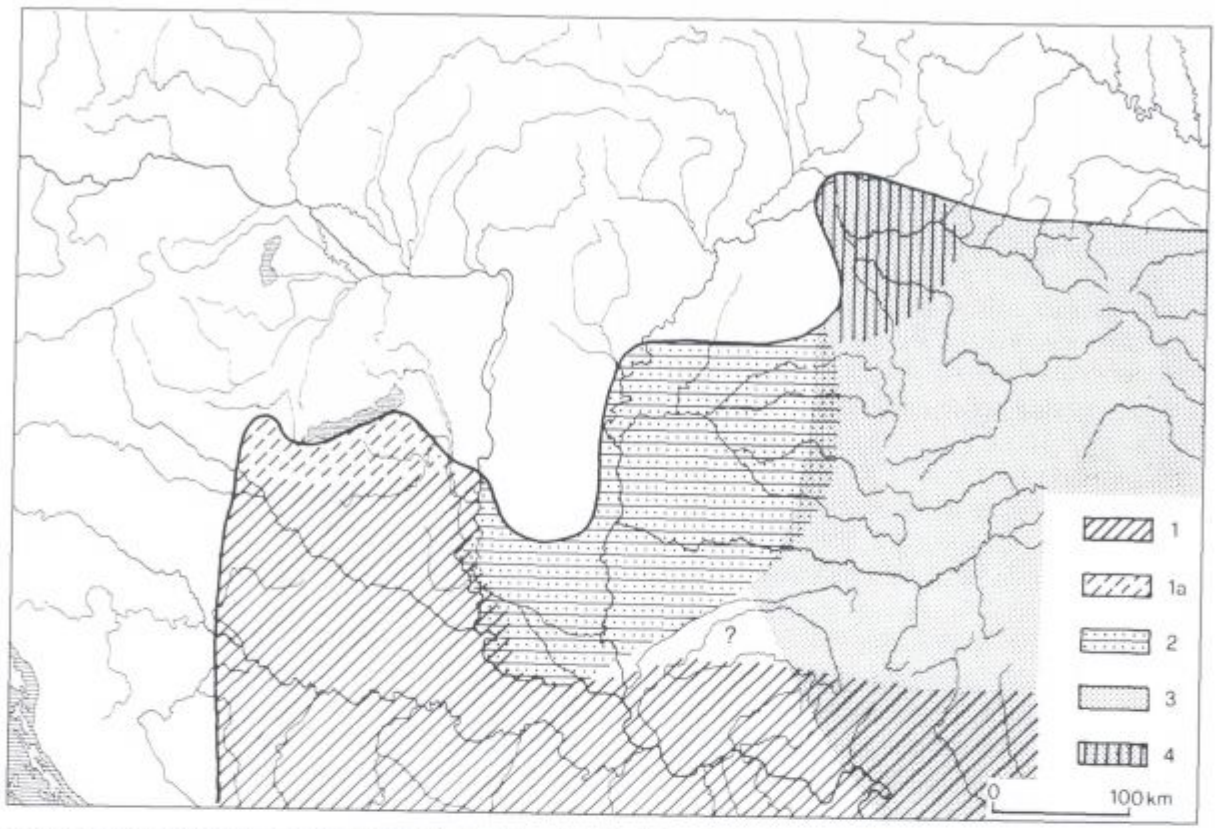


*Fig. 1. Early Neolithic cultures in the Carpathian Basin. Key: 1. Starčevo culture, 1a. Periphery of the Starčevo culture, 2. Körös culture, 3. Criş culture 4. Méhtelek facies of the Körös culture.*

*Fig. 2. Sites of the Starčevo culture in Southern Transdanubia (Hungary), Croatia and Syrmium. Key: Vörs-Máriaasszonysziget.*

tion axis of the Vardar and Morava rivers from Macedonia to the mouth of the River Sava, and following the valleys of the Danube-Sava and Drava, the main area of distribution widens in an E–W direction (*Arandelović-Garašanin D. 1954; Garašanin M. 1958; 1979; 1982; Dimitrijević 1966; 1969a; 1969b; 1974; 1979*). In my opinion, the wide strip of land starting from the central Balkans can be still considered as a possible route for neolithisation for large parts of the Carpathian Basin. The other communication route also reaching the Carpathian Basin and running similarly in a S–N direction is the Struma valley with northward running course connected to this towards the Danube. The lower reach of the Danube, currently lying between Bulgaria and Romania, transferred the early Neolithic achievements towards the North (Transylvania) and the North-west (Tisza Valley). The two routes of southern origin could possibly meet in the Sava and Drava Valleys. The Criş culture was formed along the Oltenian rivers and passes in Transylvania (*Lazarovici 1969; 1979; 1984*) and round the Eastern Carpathes, in Moldavia (*Ursulescu 1984*). The formation of the Körös culture took place along the river Tisza (*Kutzián 1944; 1947*), while the Southern parts of Transdanubia were taken over by the Starčevo culture following the rivers Danube-Sava-Drava, to the East, along the Sihievements towards the North (Transylvania) and the North-west (Tisza Valley). The two routes of southern or Zala flowing into the Balaton and, to the West, the Alpine forelands (Fig. 2) (*Kalicz 1978; 1990; 1993; H. Simon 1996*).

As pointed out earlier, at the beginning of the Early Neolithic period these three cultures were fairly uniform (which is probably why the complex was separate within Early Neolithic units: *Kalicz 1983; 1990; 1993*). The separation of the individual cultures started only later, not at the very beginning. Observing the phenomenon from Yugoslavia, almost the entire territory of which was occupied by the Starčevo culture, D. Srejović termed this earliest Neolithic unit "ProtoStarčevo" (*Srejović 1971.14–15; 1981.176–180*) which is, however, rather unfortunate, as the same phase of development can equally be seen in the territory of both the Körös and Criş cultures. Thus the same phenomenon could equally be termed "Donja Branjevina", "Gura Baciului", the "Szarvas 23" phase, "ProtoKörös", or "ProtoCriş", as did J. Paul (*1995*).

Our current level of understanding suggests that by the time the Early Neolithic communities reached Transdanubia, the separation of the three regional versions of the great complex was complete, as only the classical and late phases of the Starčevo culture are known throughout the territory (*Kalicz 1978; 1980; 1983; 1990; H. Simon 1996*). However, we must be very careful with such exclusive statements. For example, after the discovery of the first Neolithic communities established in Northern parts of Transdanubia, the Central European type Oldest Linear Band Pottery Culture, the evidence for distribution was concentrated for two decades at sites lying further west of the Danube. The classical phase of LBC was known far to the east of Budapest as well, with a site density great enough to indicate a seemingly reliable border region. Only the investigations of the most recent years have shown the distribution of the oldest phase of this culture to east of the Danube, in the same region where the classical phase of the LBC has long been known (*Kalicz, Kalicz-Schreiber 1999*). In other words, the Central European LBC took hold of the same territories from the beginning where the classical LBC with its numerous sites had spread. Similarly, we cannot finally exclude the possibility of finding the oldest phase of Starčevo ("ProtoStarčevo") culture within Transdanubia. Allowing for this, we can suppose that the distribution of Early Neolithic cultures in Western Hungary would be similar as in the classical and late phases of the Starčevo culture.

The settlement lying closest to the Danube with the oldest phase of habitation is Donja Branjevina, which is opposite the mouth of the Drava on the Eastern bank of the Danube, already on the Alföld side. This site had a strategic location at the crossroads of natural communication routes, as well as being an important point of contact between the Starčevo and Körös cultures, taking a different turn of regional development in times to come (*Karmanski 1968; 1975; 1979; Trbuhović-Karmanski 1993*). Farther away from the Transdanubian region, the Dobanovci site, opposite the mouth of the Sava, is a site of similar strategic importance, but unfortunately it was less intensively investigated (*Todorović 1968; Dimitrijević 1974.100, Pl. 1, 1–7*). The sites at the Iron Gate can be classified here, constituting surprisingly the most dense network of occupation of the early period (as above).

A similar importance can be attributed to sites of the Eastern parts of the Carpathian Basin along the rivers in Oltenia (most important among them, Cîrcea and Grădinile: *Nica 1976; 1977; 1981*)) and sites of similar age in the valley of rivers running through the Carpathians (e.g., Ocna Sibiului: *Paul*

*1995*). In the heart of Transylvania, the site Gura Baciului has attained general fame (*Vlassa 1972; Lazarovici-Maxim 1995*). In Eastern parts of Hungary, this period seems to be represented by some units of the Szarvas 23 site, finds from which have yet to be published in their entirety (*Makkay 1981; 1996*). We can neglect here more the southerly, exposed Central Balkan sites, mentioning only that the character of the early Neolithic sites in the Serbian parts of the area agree well with the most ancient finds of the Carpathian Basin. On all these sites so-called "monochrome pottery" is mentioned as the earliest phase of the first pottery periods, which is rather difficult to interpret due to the scarcity of data.[2] According to our current knowledge, the presence of the common type of the earliest Neolithic can be traced from Central Serbia to the West-Eastern midline of the Carpathian Basin. There are no significant differences in the finds, just as there are no essential chronological differences.

The study of the Transdanubian settlements of the Starčevo culture has raised several important questions, most of which cannot be answered yet. On the 18000 km$^2$ of territory, currently known as the Transdanubian distribution area, there are still only 18 known sites. It is highly probable that the number will grow, as has happened lately in Croatia. According to K. Minichreiter, the number of sites known between the Drava and the Sava rivers is about 60, increasing in density towards the east (*Minichreiter 1997*). According to V. Leković, in the much smaller Syrmium region, straddled by the Drava, Sava and Danube, the number of sites is already 56 (*Leković 1995*). The geographical conditions bordered by the rivers are basically similar to the natural endowments of southern parts of Transdanubia, therefore we are confident that the number of settlements will also grow considerably in Hungary. The settlements of Croatian and Syrmian territories are especially mentioned because, apart from the geographical conditions, the similarity of finds also connects them closely to Southern Transdanubia. The territories lying to the south and north of the river Drava can be considered as belonging to the same cultural entity, and this entity is also supported by environmental conditions.

The neolithisation of Southern Transdanubia probably started during the frequently quoted "monochrome" phase which is, however, not adequately defined for northern territories. It is beyond doubt that the process of neolithisation proceeded from the south towards the north (*Ammerman, Cavalli-Sforza 1971; 1973; Chapman, Müller 1990; Chapman 1994*). In respect of Transdanubia, the lines of communication which facilitated this were the valleys of the Danube and the Drava. The earliest settlers were attracted farther along the Danube by the waterways of the Sió-Sárvíz, while along the Drava, parallel stream valleys running north to south are typical of the whole Hungarian reach of the river as far as Lake Balaton and the large northern bend of the River Zala mentioned above (Fig. 1,2).

Several questions arise concerning the first Neolithic settlers. One of most important is the character of ecological conditions at the beginning of the Neolithic in the southern parts of Transdanubia. Palinological analyses would be a good tool for environmental reconstruction. These are, however, not very abundant, we can still build our knowledge mainly on the drilling probes of B. Zólyomi (*1980*).

In trying to collate the data of pollen chronology and calibrated $^{14}$C dates, we find that neolithisation of the southern part of the Carpathian Basin, and also in Transdanubian territory, had already begun at the beginning of the Atlantic climate zone. The beginning of the Atlantic period is generally dated to 5500 BC (although some favour 6000 BC: *Borsy 1985*), while the earliest Neolithic cultures are dated to the first half of the 6$^{th}$ millennium, and some data indicate the middle third of the 6$^{th}$ millennium BC Unfortunately, we have no relevant data from southern Transdanubia as yet. We have a seemingly young radiocarbon date from a Late Starčevo settlement, Becsehely (6425 bp, that is, 5550–5290 BC (*Kalicz 1990.92*)). Thus we can only consider the data of the nearest and neighbouring settlements which can be tentatively applied to the start of neolithisation in Transdanubia (*McPherron et al. 1988.379–381*: Divostin: 5945–5685 BC; Grivac: 5985 BC; Banja 5810 BC; *Gimbutas 1974.15–21*: Obre IA 6250–5750 BC; *Ehrich 1977*; *Gläser 1991*: Starčevo 5800–5290 BC). The Hungarian Körös dates are, according to Hertelendi et al. (*1995; 1998*) are 5950–5400 BC for the earliest period, and 5770–5230 BC for the later phase. In the first half of the Atlantic climate phase, that is, during the Early Neolithic period, the pollen of mixed deciduous vegetation (oak, lime, elm and beech) can be found. Conifers and hazelnut

2 *Srejović 1971; 1973; 1981; Jovanović 1969; 1972 1975; Dimitrijević 1974; Makkay 1982*; Remarks on the "monochrom" pottery: *Kalicz 1990.89*.

were still present in a significant ratio around Lake Balaton. These features indicate considerable woodlands which are, however, less dense than later. At the same time, non-arboreal plants are also represented, indicating grasslands probably in valley bottoms. It should be mentioned as a positive fact that occasionally the pollen of cerealia and weed plants can also be found in small quantities, which is not statistically relevant, but very important for our subject (*Zólyomi 1980; Járai-Komlódi 1987; Füzes 1989.142–145, 203; Willis et al. 1997; 1998; Szathmáry 1983; 1988; 1991*). The vegetation of the Alföld was essentially different, with much looser arboreal vegetation and the presence of more non-arboreal plants. Recently, P. Sümegi and R. Kertész examined the Early Neolithic environment in a fundamental paper (*Sümegi, Kertész 1998*) attesting, partly, to trends similar to that of our era, and observing a mosaic-like character in the Carpathian Basin due to the movement of flora and fauna caused by rhythmic changes in climate since the Late Pleistocene.

Closed forests are still characteristic of the southern Transdanubian region, and general in almost the entire Holocene period. This feature can explain the less dense habitation compared to the Alföld in the Early Neolithic, and the lower supporting capacity. Auroch, which had been one of the key elements of the economy in steppe-like regions since the beginning of the Neolithic, had a much smaller territory. It is also probable that a considerable degree of deforestation was needed for the establishment of settlements, and perhaps also for areas selected for cultivation. So far, we do not have enough direct evidence of cereal cultivation during the Early Neolithic in Southern Transdanubia, but the little direct and much more abundant indirect evidence certainly prove its existence. Among the rare direct evidence there is an altar fragment found at Kéthely, undoubtedly representing Starčevo culture, in which burnt cereal remains were found in the eye sockets of a sculpted human head (*Füzes 1989.161–162*). At the same time, pieces of burnt clay (daub) found at several localities contain abundant corn chaff prints, and the same can be said of pottery. These remains were found in large numbers at Lánycsók (Baranya County) at one of the settlements of Starčevo culture (*Kalicz 1990. Pl. 9*). On the fragments of vessels and (daub) of the Körös culture, the chaff prints can in most cases be observed with the naked eye; several pieces of corn fragments were obtained from these prints. The chaff fragments were generally used for tempering all types of Körös and Starčevo pottery, most of them being from cereals (*P. Hartyányi, Nováki 1971/2; Füzes 1989.155–157*). In the (Proto)-Starčevo cultural layers of Divostin and Grivac, palinological studies have confirmed the presence of cerealia, and burnt corn grains were also found at the settlement (*Grüger-Beug 1988*). The so far deficient, but potentially increasing evidence proves the wide distribution of agriculture and cereal cultivation during the Early Neolithic not only on the Balkans, but also in the Carpathian Basin.

The above incidental data indicate that during the Early Neolithic, favourable conditions were formed wihtin the Carpathian Basin, with some regional variations similar to the Balkans (*p.e. Kordos 1978a; 1978b*).

The known settlements of the Starčevo culture are usually distributed at considerable distances from each other. Communication between these settlements is shown by the presence of non-local objects such as stone artefacts made of raw materials coming from more distant territories. Radiolarite from the Bakony mountains and other raw materials are found on some sites as we shall see below. The obsidian of the Tokaj-Zemplén mountains are not known yet from the Early Neolithic Starčevo finds of Southern Transdanubia. This must be accidental, as obsidian has been found in the Eastern Slavonia and Sirmium Early Neolithic sites (Vinkovci: *Chapman 1981.302–304*; Golokut-Vizić: *Kaczanowska-Kozłowski 1984–85.27–31*) and even on the eponym site (*Fewkes et al. 1933.47*). On the Obre site, mentioned formerly as lying along important communication routes, obsidian has also been found (*Benac 1973.365; Sterud & Sterud 1974*). The exact provenance of the Obre obsidian is not known yet; it could equally be of both Carpathian and Melian origin (Lipari obsidian should be also considered), but undoubtedly it was brought to the site as a result of very distant relations (*Willms 1983.342–346*). Similarly, obsidian is known from the contemporary layers of Tuzla as well as more southerly, exposed sites in the Morava valley (Grivac, Drenovac, *Chapman 1981.302–304*). From the Early Neolithic of the Trieste Karst the presence of Carpathian obsidian is, specially mentioned (*Biagi et al. 1993.58*). Obsidian is also known from the earliest Neolithic sites of Transylvania and Oltenia. Their quantity is not great, but this is not surprising considering their great distance from the source region (*Vlassa 1972.178; Lazarovici, Maxim 1995.390; Nica 1977, fig. 6, 7–8*). It can also be concluded from their scarcity that they were not items of daily necessity. The site at Lepen-

ski Vir is especially interesting in this respect because, in the Early Neolithic layers, Tokaj obsidian from the north occurs with Aegean Spondylus shell (*Srejović 1969.173; 1972; 1981.173*). All these features show that at the beginning of the Neolithic, long-distance connections were already established, probably being based on Mesolithic antecedents.

The identity of the carriers of the neolithisation of Transdanubia, as well as questions of "when" and "how", are the focus of intensive discussion. Unfortunately, the scarcity of evidence precludes a reassuring answer. The subjective judgement of students of the period interfere considerably in deciding on migration, diffusion models or the formation of a local autochthonous Neolithic culture. Like archaeology, physical anthropology still does not provide enough evidence on this matter. Zs. K. Zoffmann and J. Nemeskéri emphasised the heterogeneity in the anthropological remains within the material of the two cultures (Starčevo and Körös). She attributed this to differences in origin, i.e., the variations in the anthropological evidence were traced back to the mixture of local population and southern immigrants (*K. Zoffmann 1977–78.157–162; 1988.447–454; Nemeskéri 1972.201–202; 1981.268*). A similar mixture of anthropological types was observed in the Iron Gates materials excavated later (*Radosavljević, Krunić 1986.51–56*).

The contributions of palaeozoological and palaeobotanical evidence are heavily debated, as some scientists postulate the existence of the wild forms of all domestic animals and cultivated plants in the Balkans, and even the Carpathian Basin during the late Mesolithic (*Whittle 1985.11–12, 65; Budja 1993; 1996*)[3]. It is not aimed here that authors should recite the known contradictory theories on migration, diffusion and local development with all their variants. Lacking decisive new evidence, the formerly expressed opinion is maintained: i.e., neolithisation in the Carpathian Basin took place as a result of the interaction of an autochthonous, so far hypothetical, local, Mesolithic population and an infiltrating(?), immigrating(?), smaller, southern groups conducting already a "Neolithic" way of life. Recently, in a micro-region in the northern parts of the Alföld, the Jászság area, several sites of the formerly hypothetical Mesolithic population have been found in several chronological phases (*Kertész 1991; 1996, with all earlier references*). According to R. Kertész, the youngest Mesolithic finds can be dated to the early phase of the Atlantic period. This period is partly contemporary with the existence of the Early Neolithic Körös and Starčevo cultures as well (*Kertész et al. 1994; Kertész 1996.23*). This Northern region of the Alföld was never populated by these two cultures, which means that the earliest food-producing groups in the Carpathian Basin did not occupy this region, i.e., the Early Neolithic Körös culture was not formed here. According to P. Sümegi and R. Kertész, the Late Mesolithic population was ready to adapt itself to Neolithic achievements (*Sümegi, Kertész 1998*) which had taken place probably by the end of the Körös and Starčevo cultures. It should be stressed that his investigations proved the existence of a Mesolithic population similar to that in neighbouring regions of Hungary. The high level of Mesolithic culture was best presented by the excavations at the Iron Gates. At the same time this population was not acquiring notions of a productive economy by itself, together with the technical and cultural achievements characteristic of the productive way of life. Certain ethnic impetus from the south transferring Neolithic ideas, characteristic material and spiritual culture, all domestic animals and cultivated plant species were needed for the neolithisation of the local population.

It should be stressed that we think of no large-scale direct migration from the far south, but of smaller immigrant groups from the northern Balkans where the Proto-Starčevo phase was formed earlier. Although we cannot fully agree with the theory of Ammerman-Cavalli-Sforza on the mechanical explanation of northern distribution, it is clear that the known absolute dates of the Early Neolithic tend to be younger proceeding from south to the north. This feature shows the direction of neolithisation clearly (*Ammerman, Cavalli-Sforza 1971; 1973; Chapman-Müller 1990*). The content of the process, however, always simultaneously influenced a larger area. This means that the model of distribution is more staged, than ramp-like. All this happened in the southern part of the Carpathian Basin, thus in southern Transdanubia, at the turn of the 7/6$^{th}$ millennium BC, or the beginning of the 6$^{th}$ millennium BC. The process of neolithisation stopped here for a time.

The borders of the northern periphery of the Starčevo culture, observed and drawn during the last two

3 The representation of wild goat in the Carpathian Basin and Bulgaria (*Makkay 1996; Budja 1996a*) is at least questionable, given that with the investigation of several ten of thousands of animal bones, no wild-goat remains were found.

decades, can be considered more or less stable. The question can be raised, why this frontier zone existed in the same time. Ecological condition do not necessarily imply a barrier here. Although only a few specialists have ventured to give an explanation, opinions vary considerably. One of the strongest points is that hypothetical northern Mesolithic populations did not immediately conform to neolithisation, and blocked the distribution of Starčevo and Körös cultures farther to the North (*Kalicz 1965.33–35; 1983.108–109; Kalicz, Makkay 1972.78; 1977.18; Makkay 1982.21–22; 1996.40–42*). According to another explanation, climatic factors prevented the further northern distribution of the first Neolithic farmers, because the natural endowments as a system were already not found there (*Pavúk 1980.171–173; 1996.30, 33*). The most tenable current view is the acceptance of a "Central-European-Balkan agro-ecological barrier" as proposed by P. Sümegi and R. Kertész in their excellent paper (*Sümegi, Kertész 1998*). Their convincing reasoning is quoted here, almost word for word. The environment formed as a function of different climatic, soil geographical, hydrological factors "...the communities with Mediterranean cultural and economic traditions, reaching the periphery of Balkan environmental and climatic endowments were, in a way trapped by the more northerly exposed ecological conditions. Their distribution slowed down, then completely stopped along the Central-European-Balkan agro-ecological barrier". According to the authors, the Mesolithic hunters living north of the barrier came close to the vicinity of Early Neolithic groups and were allowed time to adapt to Neolithic technical and economic novelties without integrating culturally and demographically with Neolithic communities of Balkan origin. Our earlier opinion agrees well with the conclusions of the author, according to which "...the Mesolithic communities living south of the barrier assimilated into the Mediterranean type neolithisation process, culturally and demographically, with the exception of certain places of isolation (e.g., Iron Gates). It seems that the "Central-European-Balkan agro-ecological barrier" played a decisive role in the formation of a different character of local Neolithic to the north of the barrier, adapting to local environmental conditions (*Sümegi, Kertész 1998.156–157*). On the basis of our present state of knowledge, we can fully agree with the statements of the cited authors. In our former studies, this barrier was understood as the meeting zone of the Balkan-Aegean region and the Central European region. Smaller scale migrations were postulated as reaching the northern periphery of the Balkan-Aegean region. Further migrations were, however, not postulated, but rather an exchange of ideas, a transfer of Neolithic achievements (*Kalicz 1980, 1983, 1993, 1995; Makkay 1982.23; 1987; 1996.42–43*). The same opinion is maintained today. Our conception can be brought into accordance with "agricultural frontier" model of R. W. Dennel and M. Zvelebil (*Dennel 1985; Zvelebil 1986; 1995*).

## CASE STUDY – VÖRS-MÁRIAASSZONY-SZIGET

Evidence concerning the settlement area of the Starčevo culture has undergone considerable change since the beginning of the 'seventies. The pioneering study of S. Dimitrijević proposed, at that time, the northern distribution limit of the culture at the line of the Drava river (*Dimitrijević 1966; 1969a; 1969b; 1974; 1979*). Sites of the Starčevo culture were discovered by Hungarian research in the southern parts of Transdanubia (*Kalicz 1978; 1980; 1983*). These sites clearly indicated that the northern distribution of the culture went beyond the River Drava. The investigations of the 'eighties and 'nineties has proved the existence of the Starčevo culture up to the line of Lake Balaton (*Kalicz 1990; 1993; Füzes 1989.142–145*). Even further north, west of Lake Balaton, in the northern bend of the River Zala, an independent Starčevo site was found (Gellénháza, in the vicinity of Zalaegerszeg: *H. Simon 1996*). According to our present knowledge, this is the northernmost distribution limit of the Starčevo culture. Probably, this northern distribution limit can be considered stable (Fig. 1. 1).

One of the northerly settlements was found in 1990 at Vörs, Máriaasszony-sziget, Somogy County, which proved for the first time that Starčevo people reached the line of Lake Balaton, proceeding along the north-south oriented tributaries of the Drava river (*M. Virág 1996; M. Virág, Kalicz 1999*). These communities proceeded further to the north along the River Zala.

The Máriaasszony-sziget (island) is located in wetlands connected to the SW corner of Lake Balaton. Before the regulation of the marshy area, rescue excavations were performed there (Fig. 3). The excavations were connected with the investigation of a small medieval church, during which four smaller sondage sections were opened to the south of the church. On the area investigated (some 500 $m^2$), traces of intensive occupation by Early Neolithic, Starčevo people were found. The units and details of

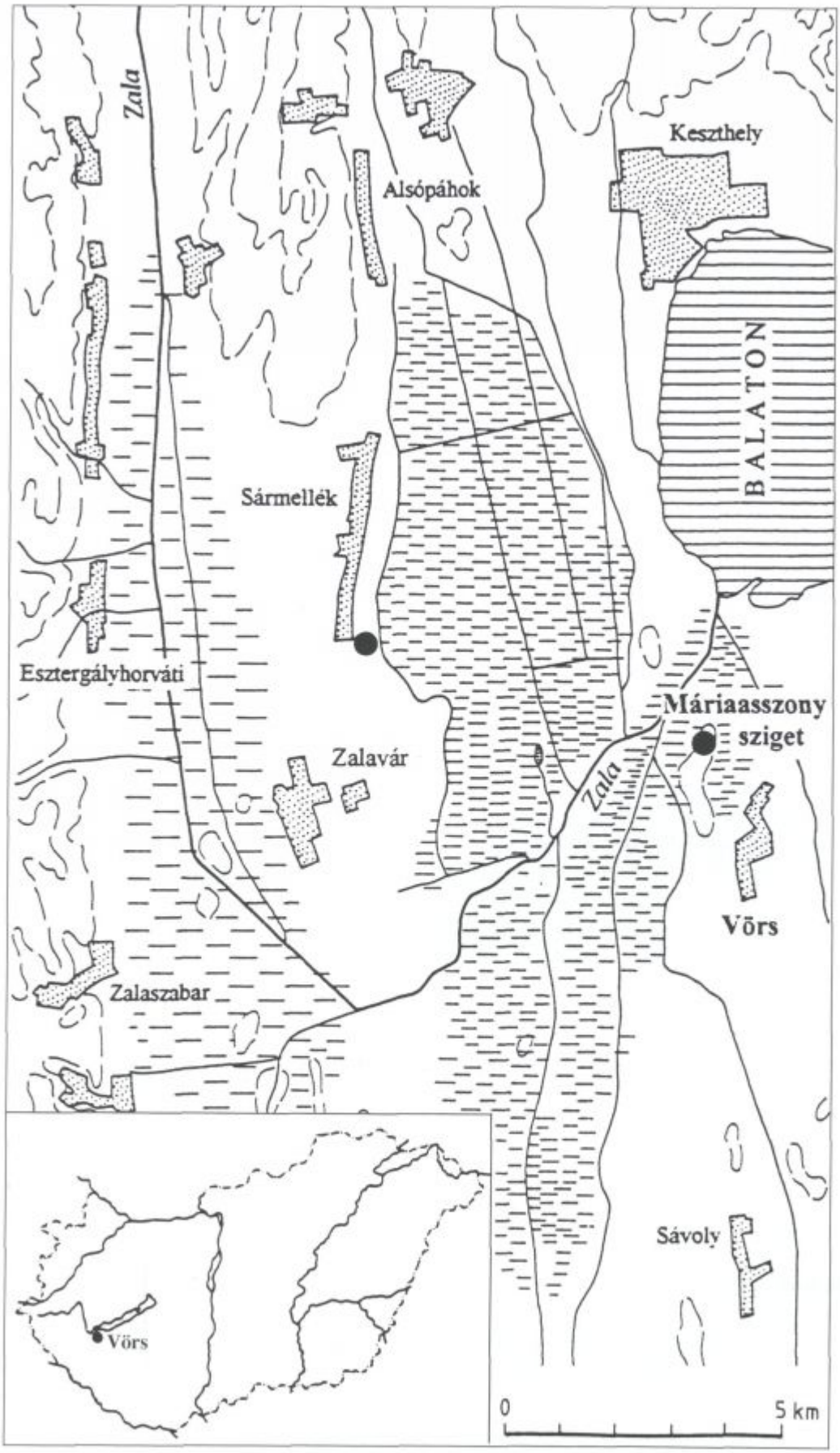


*Fig. 3. Natural environment of the Vörs-Máriaasszonysziget settlement.*

units (Fig. 4. hatched surface)[4] were irregular clay-pits and pit complexes more or less linked to each other. Probably belonging to a Neolithic settlement, an inhumation burial in the contracted position, without grave goods, and two ovens were found[5]. The extent of the settlement cannot be judged on the basis of the relatively small excavation area, but the range of sections lying 75 m in length from north to south indicate traces of very intensive occupation. Unfortunately, we have no data on the character of the settlement pattern, but we can be almost certain that there was once a small, Early Neolithic village there.

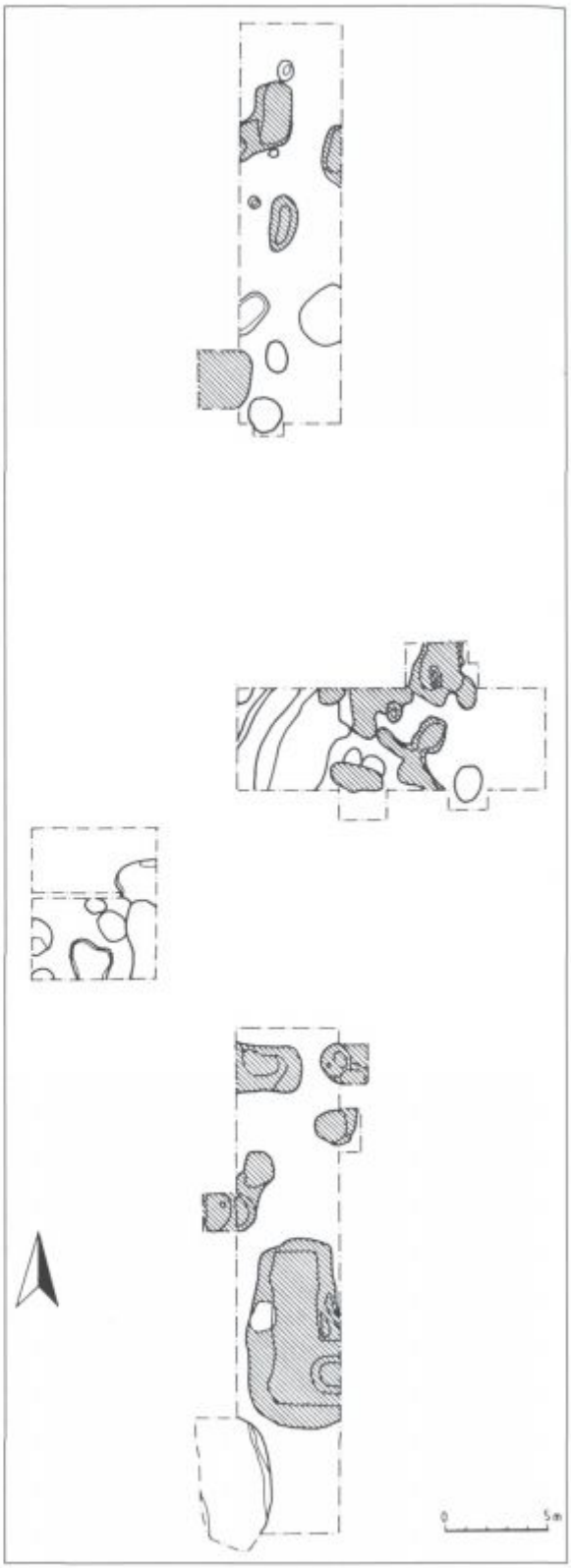


***Fig. 4. Vörs-Máriaasszonysziget, general map of the excavations. Hatched area: units of the Starčevo culture.***

## GENERAL CHARACTERISATION OF THE POTTERY

### Pottery technique

The pottery of the find assemblage can be uniformly characterised by the application of organic matter, probably chaff for tempering, sometimes with variable quantities of sand. This is characteristic of both smaller and larger vessels; "fine" and "coarse" pottery can only be differentiated on the basis of surface finish and size. The surface of larger vessels is typically made "rough" by the application of special techniques (Schlickwurf, barbotine), but specimens with smoothed surfaces are also common. "Fine" pottery is made up of smaller vessels which typically have a carefully smoothed or polished surface. In all types we can observe a careful smoothing of the interiors of the vessels, sometimes polishing. Occasionally we can observe the application of a thin, clay varnish (slip) on the surface of smaller vessels. The colour of the pottery is generally reddish or yellowish, light brown, often with greyish, dark brown patches. A characteristic feature connected to the firing of the vessels is the layered structure observable on the fractures of sherds: the colour of the exterior and interior wall surfaces is typically identical, while inside we can observe in most cases a dark, typically grey-brown stripe.

### Pottery forms

#### Fine pottery

***Pedestal goblets***

Rimmed side fragments of small vessels belong to this type. The diameter of the mouth of the vessel is

4 Units unmarked on Fig. 3. belong to more recent periods (Early Bronze Age, Medieval period).

5 The excavation of the Early Neolithic settlement remains were performed by Cs. Móga-Aradi in 1990 (RF 44(1992) 26–27. We should like to express our thanks for the possibility of publishing the material to her.

typically less than 10 cm., but some specimens have a larger mouth, around 15 cm. The surface is carefully smoothed, sometimes polished from both inside and out. Three variants could be separated in the Vörs material; all variants probably stood on a low, hollow foot. They are generally ornamented with small knobs along the fraction lines.

Variants:

(1) Biconical goblets, with a slightly (Fig. 5a. 1) or considerably (Fig. 5b. 3) inwardly curved upper part.

(2) The biconical type also occurs with slightly arched rim (Fig. 5a. 2,4).

(3) Less frequently we find specimens with a globular ventral part and a slightly outwardly curved rim.

***Bowls***

Typologically, the bowls can be considered as larger variants of the goblets. The diameter of the rim varies between 19–20 cm. The surface of the bowls found in the assemblage is typically carefully finished, smoothed, or polished. The polishing of the interior surface of the vessels is also typical here. Three variants seem to be present in the Vörs material, all of which could be occasionally completed with a low pedestal. The most frequent ornamentation consist of flat knobs placed on the belly of the vessel, sometimes dissected with vertical panels.

Variants:

(1) Most fragments represent double conical, deep bowls, with a slightly inwardly curved upper part (Fig. 5b. 8,10). Most of the biconical fragments found in the assemblage can be assigned to this type.

(2) Another characteristic type is a more robust biconical form (Fig. 5a. 6), occurring also with a slightly concave upper part (Fig. 5b. 11).

(3) A less frequently occurring variant is a deep bowl with an arched bottom with a slightly convex or slight S profile in the upper part.

***Pedestals***

Low, hollow pedestals belonging to goblets and bowls are quite frequent in the material. Their surfaces are smoothed and polished. Their form can be conical (Fig. 5b. 9) or slightly swelling (Fig. 5b. 7).

**Coarse pottery**

***Pots***

A very frequent type. Fragments of large vessels with different degrees of swelling and more coarse surfaces belong to this group. The diameter of the rim is 16–24 cm. The complete surface or the neck part is slubberly smoothed. In the latter case, the belly part can be covered by barbotine or hand-drawn Schlickwurf. The rim of the pots is often ornamented with finger impressions; the belly can be ornamented with vertically dissected flat knobs or flat discs ornamented with incisions. The interior part of this type is also carefully finished, often polished. We can separate on the basis of form two variants:

(1) Most typical is a biconical form with strongly inward bent upper part (Fig. 6a. 3; 6b. 4; 7. 1) or slightly inward bent upper part (Fig. 7. 4), which can also occur with a slight S profile (Fig. 6a. 2; 6b. 4). The rim can also be bent outwards due to finger and nail impressions (Fig. 7. 4).

(2) A less frequent type of vessel is the spherical pot with a narrow mouth, strong belly and arched side (Fig. 6a. 2,3). Spherical slice pots with a straight rim and slight sinus are less typical.

A few fragments can be attributed to flask-like types of varying degree of belly inflation, with a cylindrical neck (Fig. 6b. 5) or slightly convex rim (Fig. 6b. 6).

**Ornamentation**

***Carved, incised ornaments*** are frequently found in the Vörs material, both on fine and coarse pottery. The patterns comprise zigzag lines, spirals and concentric circles.

(1) On fine pottery, mostly *incised ornaments* are found both on the side (Fig. 8a. 2–5) and the bottom of the vessels. The system of motifs cannot be reconstructed due to the fragmentary character of the material. On lateral fragments, parallel bunches of zigzag lines are often found which could cover larger surfaces as well. The occurrence of meandroid and spiral patterns is less typical (Fig. 8a. 1). On the bottom of the vessels, incised net patterns can also be found.

(2) On the coarse pottery, *deeply carved* parallel line patterns can be found with deep and thick lines (Fig. 8a. 6,7,8,10). Parallel deep incisions were often found on horizontal handles (Fig.

8b. 12). Light incision is less frequent on coarse pottery, typically also consisting of straight lines (Fig. 8b. 15) and only occasionally forming arched patterns (Fig. 8a. 7). Disc form knobs appearing on the coarse pottery were also ornamented by indents. In these ornaments, a characteristic form is the pattern formed by parallel V forms (Fig. 9a. 3) apart from spiral motifs and concentric circles (Fig. 8a. 1,7; 8b. 14). Motifs formed by finger impressions are less frequent (Fig. 9a. 4,5). Occasionally on the coarse pottery there are rows of impressions (Fig. 8a. 9). Also rarely there are find nail imprints over the surface in a loose array (Fig. 6a. 3).

***Painting*** occurs only exceptionally and is not typical. We could observe black painting applied before firing. The pattern observed is constituted from narrow and wider vertical stripes and was found, probably, on a bowl fragment.

***Plastic ornaments***

(1) *Knobs* - the most frequently applied ornaments. Two variants can be separated.

1a) On fine pottery, the application of flat oval knobs, placed on the belly of the vessels is typical (Fig. 5a. 1,5; 5b. 10) which can be dissected by incisions (Fig. 9a. 8). This form of knob, in more robust form, and rough multiple cuts are also frequently found on the coarse pottery (Fig. 9a. 6,7). Elongated, upwardly extending knob variants are seldom found (Fig. 6a. 1).

1b) On the sides of larger and coarser pots and storage vessels, flat discoid plastic ornaments can be found, quite often in fairly large size (Fig. 8b. 14; 9a. 1,5). Their ornamentation has been presented before.

(2) *Ribs* appearing only on the belly part of large, rough surface pots and storage vessels (Fig. 8b. 11,14) and the shoulders of flasks (Fig. 8b. 13). Ribs and lath-like plastic ornaments can be applied with finger and nail impressions. It is also found combined with a discoid knob (Fig. 8b. 14).

(3) *Barbotine* - a characteristic ornament of large vessels, applied to the whole surface (Fig. 6a. 1, 2; 9b. 11,14). Among the densely patched, small clay nodules, knobs were also used (Fig. 9b. 11).

Another characteristic ornament over the complete surface of the vessel is channelled barbotine (*Schlickwurf*). On the surface of the Vörs vessels, the clay slip was pulled in a zigzag (Fig. 9b. 9,10) and wavy lines. The sometimes very thin slip was also pulled by the oblique (Fig. 9b. 13,15,16) or vertical (Fig. 8a. 4) or, rarely, arched (Fig. 8a. 6) motion of the fingers.

**Evaluation**

At the Vörs settlement, the pottery types were dominated by sharp or rounded biconical forms, but quite frequently the mild S-profile was also found. Both features are typical of the Spiraloid B phase of the Starčevo culture (*Dimitrijević 1974.104–106*). Similar features can be observed on other South-Transdanubian sites of the Starčevo culture (*Kalicz 1990. 73–77; H. Simon 1996.59–92*) as well as in Croatia (*Minichreiter 1992.72–73, 75*). Biconical vessels are also fairly typical of the oldest phase of Transdanubian LBC (*Kalicz 1993. Fig. 17; 19–20; fig. 18. 13, fig. 19. 2; 1995*).

One of the most apparent features of the ornamentation of pottery is the application of carved and incised ornaments, which occur both on coarse and fine pottery, and present in almost all of the excavation units.

The construction of the ***incised line ornaments*** and the wealth of motifs comprising zigzag line bunches, less frequently, meandroid incisions and spirals remind us of the characteristic features of the oldest LBC.

The Vörs site is the first and so far only locality of the Starčevo culture in Transdanubia where this ornamentation, as a possible antecedent of LBC main features is present (see LBC materials from: Becsehely, Barcs, Medina, Baja, Szentlőrinc, Budapest III, Aranyhegyi út, etc: *Kalicz 1978–79; 1993; 1995; Kalicz, Kalicz-Schreiber 1992*), as a very early and abundant feature. Perhaps it is not by chance that this deeply incised linear ornament is missing from the otherwise strongly related material of Gellénháza, which lies not very far from this site (*H. Simon 1996*). The differences between the two sites cannot be exactly specified yet, but it seems that the Vörs settlement could be a little younger. Opposed to this, the incised net pattern at the bottom of the vessels (*M. Virág, Kalicz 1999.5; Fig. 9*) can be found in considerable numbers on other sites of the Starčevo culture (*Kalicz 1990. Taf. 22, 9–10, Taf. 23, 6*).

The row of impressions under the rim of the vessels is not really typical of the Starčevo culture, and occurs occasionally in the Vörs material. This means of ornamentation, mainly characteristic of the coarse pottery, became a frequent feature of the oldest LBC pottery (*Kalicz 1993. fig. 18. 14, fig. 19. 8, fig. 22. 13–15, fig. 26. 9 etc.*).

***Painting*** is seldom met in the Vörs material, with only a few fragments yielding reliable traces (*M. Virág, Kalicz 1999, fig. 5*). This lack of painted pottery can probably be explained by unfavourable soil conditions, similar to those in the neighbouring Gellénháza material (*H. Simon 1996.61*).

Among plastical overlays, most frequently we find ***knobs***. Horizontal oval, less frequently round knobs appear in a flat form on the bowls and goblets among the fine pottery. On large vessels, especially pots, the same type of knobs appear dissected by 2–3 cuts. Knobs with cut ornamentation can be found in several find complexes of the Classical and Late phase of the Starčevo culture in Southern Transdanubia (*Kalicz 1990, 22. t. 1, 23. t. 9, 28. t. 10, 29. t. 3, 5, 30. t. 9, 45. t. 9–13; H. Simon 1996, 3. t. 7*), and this type of ornament became a characteristic feature of the Transdanubian LBC as well (*Kalicz 1978–79, 6. t. 5–7, 7. t. 10–11, 8. t. 1, 3, 9. t. 3, 8, 10, 10. t. 9, 11. t. 12–13, 12. t. 12–13; Kalicz 1993, fig. 32. 1, 4–5, 10; Kalicz 1995, Fig. 11. 3, 4, 10, Fig. 19, 14, Fig. 20, 3, 7, Fig. 21, 1, 4–5, 10*).

The large ***discoid plastical overlays*** are striking in the Vörs material, and were probably used mainly on storage vessels, which are special features of this site. Their surfaces are typically ornamented with deeply incised lines. Similar to Vörs, this type of plastical ornament is also known from the closelying Gellénháza material (*H. Simon 1996, Fig. 1, 3, Fig. 3, 1, 3, 5, Fig. 7, 5, Fig. 9, 10*), the same richness of which was also pointed to by recent Croatian research (*Minichreiter 1992, Pl. 2, 2, Pl. 5, 8–10, Pl. 7, 10–22*). The application of discoid overlays ornamented with different patterns seem to be a local feature which was specially frequent in Southern Transdanubia and Croatia. This specific feature of the pottery appeared sporadically at the beginning of the Spiraloid A phase and lasted till the end of Spiraloid B phase, even until the final phase of the culture described by Dimitrijević (*Dimitrijević 1974, Pl. 22, 7; Kalicz 1990, Pl. 38, 2*).

***Plastical ribs*** dissected by finger and nail imprints appear only on coarse pottery (pots, storage vessels). Such vessels appear already in the Linear A- and B-phase of the culture (*Kalicz 1990, Pl. 22, 4–5, Pl. 25, 15, Pl. 24, 6, 14, Pl. 30, 5; Minichreiter 1992, Pl. 1, 1–3*). In Hungary, it was more frequent in the Spiraloid B-phase, observable mainly in Gellénháza (*H. Simon 1996, Fig. 6, 1, Fig. 7, 4, 6–7, Fig. 11, 4*). This type of ornamentation was hereditary to the Oldest LBC pottery (*Kalicz 1993, Fig. 18, 3, 13, Fig. 21, 15; Kalicz 1995, Abb. Fig. 19, 7–8, 13–14, Fig. 20, 10, 13, 14, Abb. 21, 9*). The same can be said of the grooved ornaments on the rims of larger vessels.

The pottery surfaces covered by ***barbotine***, and ***Schlichwurf*** were already known in the Linear B phase of the Starčevo culture, but became really characteristic elements only in the Spiraloid phase. (*Dimitrijević 1974, 102–106; Kalicz 1990.66–68*). Channelling of the clay slip in zigzags and wavy patterns is known from Croatia already in the Late Classical Starčevo phase (*Minichreiter 1992, Pl. 6, 1–10*), but barbotine with patches and irregular channelling is most frequent in the Spiraloid B phase (*Dimitrijević 1974, Pl. 7, 12, Pl. 10, 1–7, Pl. 15, 5, Pl. 18, 13; Minichreiter 1992, Pl. 5, 1–13, Pl. 11, 4–6, 9, Pl. 12, 1–11, Pl. 13, 1–7*). This type of ornament is also characteristic of Syrmium (*Petrović 1984–85, Pl. 1–3; Leković 1995, Pl. 1–2, 4, 6*). Similarly finished pottery is known from other sites of South-Transdanubia (*Kalicz 1990, Pl. 42, 1–10, Pl. 43, 2, 5–11*). It is apparent that the quantity of patched barbotine pottery in SW Transdanubia, notably also at Vörs and Gellénháza, is not so essential as in other areas of the Starčevo culture (SE Transdanubia, Slavonia, Syrmium: *Kalicz 1990, 35. t. 6–12, Taf. 36–38, 41–42, 44; Dimitrijević 1974; Minichreiter 1992; Petrović 1984–85; Leković 1995, see above*). *Schlickwurfbarbotin* became one of the most important features of the Transdanubian (Central European) LBC, which can be considered as a successor to the Starčevo culture (*Kalicz 1978–79, Pl. 8,. 2–12, Pl. 9, 6, Pl. 10, t. 11; Kalicz 1993, Fig. 18, 5, 8–9, 12, Fig. 19, 7–8, 11–12, Fig. 21, 13–14, Fig. 22, 13, 15, Fig. 23, 4, Fig. 33–34; Kalicz 1995, Fig. 22–24*).

## CONCLUSIONS ON THE CHARACTER OF THE POTTERY FINDS

Finds from Vörs-Máriaaszony-sziget represent the latest, Spiraloid B phase of the Starčevo culture, comprising already a number of features becoming typical of the Oldest Linearband Pottery culture. Such features include deeply incised linear patterns

in uncommonly high quantities within the Starčevo context, the dominance of biconical forms, the appearance of knobs dissected by cuts, and the application of the Schlickwurf technique.

Among others, these features help date the Vörs settlement finds to the end of the Spiraloid B phase, i.e., the formation period of the Transdanubian Linearband Pottery Culture. The geographical position of the site should be emphatically mentioned, lying along the northern marginal zone of the Starčevo culture, where local differences accumulate.

At the same time, the importance of these settlements in a marginal position is stressed, because they appear in a zone playing a decisive role in the formation of the (Transdanubian) LBC complex. In our day, we have growing evidence on this formerly hypothetical process, which is also reflected in the material of the Vörs.

## Vörs-Máriaasszonysziget: the lithic evidence

Among the objects studied from an Early Neolithic assemblage, lithic finds have a very special importance. That is, due to technical innovations and revolutionary changes in economy basically modifying the "cultural" flora and fauna assemblage of the site, lithic artefacts – in the first place, chipped stone tools – should represent a continuity with genetically related ancestral groups. Chipped stone tools are fairly "conservative" over long periods: in spite of new activities related to the Neolithic (productive) way of life, basic techniques, morphological tool types and – last but not least – the raw material basis can be considered fairly stable.

The Carpathian Basin seems to have, from a purely geographical point of view, a key role in European neolithisation. The Hungarian lithic evidence, however, did not support these views until recently. Epipaeleolithic/Mesolithic assemblages in the region are few, both in site numbers and artefact numbers, and the authenticity of most sites has been questionable or rejected. To date, the intensive study of the Mesolithic sites in the Jászság region has increased the evidence greatly (*Kertész 1996*).

Early Neolithic lithic assemblages have also been regarded as scarce, especially compared to site density and intensity of settlement features and pottery. Even the systematic surveys of recent decades (*Bácskay 1976, Bácskay, Simán 1987*) could show only a limited number of very small and poor find complexes.

The first sign of another possibility – i.e., a stone-tool rich, Early Neolithic horizon, was raised in connection with Méhtelek-Nádas, a settlement of the Körös-Starčevo-Criş complex (*Kalicz, Makkay 1974; 1976*). The publication of the lithic assemblage was completed recently (*Chapman 1987; Starnini 1993*). The site was interpreted as an outpost en route to obsidian sources, which is rather surprising at a distance of around 100 km from the source regions. Only the large-scale rescue excavations of the past few years has proved that Méhtelek is not an exception, but more a regular Early Neolithic settlement, with an abundant chipped stone industry, both to the east and west of the Danube (*Biró 1996 in press*). As regards the specific subject of this paper, formerly, we had no information on Starčevo lithic material in Hungary, and only a very modest amount of doubtful (mixed) material for the earliest Neolithic horizon of most parts of Transdanubia, the oldest LBC complex (*Biró 1987*). By now, we have to consider large lithic assemblages from the Starčevo and/or Old LBC context from the southern parts of Transdanubia (Gellénháza, Zalaegerszeg-Gébárti tó, Szentgyörgyvölgy-Pityer: *Simon 1996; Bánffy in press*).

One of the sites with a considerable lithic industry discovered lately is Vörs-Máriaasszonysziget.

A minor portion of the assemblage was presented in the above-mentioned paper, based on 22 items from the site (*Biró 1996 in press Fig. 1.1–7*). The total assemblage now comprises 126 items[6]. The main features of the material will be summarised below.

## Character of the assemblage

The Vörs-Máriaasszonysziget lithic assemblage is a medium-sized find assemblage among Hungarian prehistoric sites. The intensity of occurrence can also be considered as average (126 items on 500 m$^2$ excavation surface, 0.25 items/m$^2$) Comparable data are available mainly from "stone-rich" settlements (*Biró 1994* in press)[7]. The distribution of the mate-

6 As the lithic industries of the earliest Neolithic settlements have special importance, we are planning to publish the complete inventory of stone tools in the site report.

7 The question of "much" or "few" in the case of lithic assemblages is not easy to decide on (see *Biró 1998.18, 29*). However, lithic artifact density is a marker, even if it is deficient due to several factors like excavation techniques and intra-site topography.

rial is uneven within the site: most of the material comes from sections I and IV, especially unit I/2 unit and unit IV/36. Activity areas seem to be separable within the site, with more or less tool production vs. use[8].

The type/raw material distribution of the material is presented in Table 1. Type groups and raw material categories were analysed according to categories specified first for the study of LBC material (*Biró 1987*) and applied subsequently to Neolithic assemblages, including not only morphological tool types or "retouched tools", but also technological categories, polished tools and other stone utensils (*Biró 1998 with further references*).

## Typology

I. ***Raw material blocks*** and ***residues*** ("rm" on Fig. 10; 11) are not present in the assemblage. This feature indicates several important things. Raw material reached the site already in an elaborate form (pre-cores, but more typically, cores and/or blanks). The inhabitants of the site, indicated by other features of the type spectrum, as well, were regular "users" or "consumers", but not stone-working artisans, even less miners. If they had a direct role in any related activities, the products were very carefully selected elsewhere.

II. ***Cores*** and ***core residuals*** ("core" on Fig. 10; 11.) are found in very small number (11 pieces, 8.7%). This feature again denotes that stone tool production was subordinate to use for the Máriaasszonysziget Early Neolithic people. The cores are of medium and small size, heavily exploited (*Biró 1996 in press Fig. 1.4, 6, 7, Fig. 12.2, 8, Fig. 14.1, 6, 9)*, mainly irregular flake-cores and a few conical, micro-blade cores (Fig. 14.9). The bipolar technique, typical "pf" Mesolithic/Early Neolithic chipped stone industries is also present (*Biró 1996 in press Fig. 1.6, 7*).

III. ***Flakes*** and ***chips*** ("fl" on Fig. 10; 11.) are present in fairly large numbers and considerable size. Part of the tools are also made on flakes (10 of 17), which denotes the flake-based character of the lithic industry rather than blades, consistently with the core forms.

As the dominant raw material of the site, radiolarite favours more of a microlithic character; large flakes (3 flakes over 5 cm, which is decidedly large) are special features here, for both the period and the material In this feature, Vörs differs essentially from Gellénháza and Z. Gébárti tó, and also from Szentgyörgyvölgy-Pityer (oldest LBC) where the character of the chipped stone industry is definitely microlithic. Vörs is larger on average, and resembles in this feature - as well as many elements of the retouched

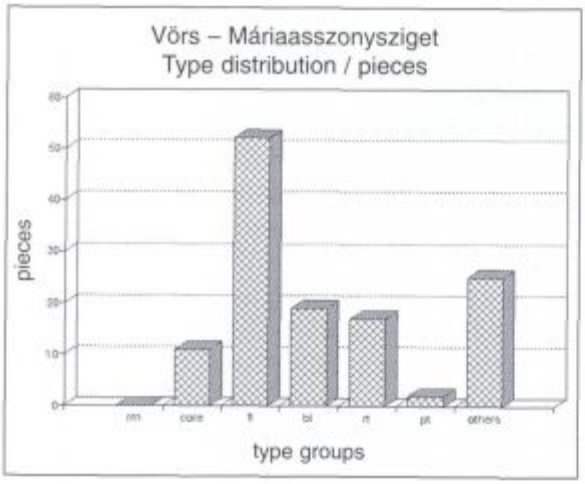


***Fig. 10. Vörs-Máriaasszonysziget – Type distribution according to pieces. Key: rm: raw material, core: cores and core residuals, fl: flakes and chips, bl: blades and blade-like blanks, rt: retouched tools, pt: polished tools, others: other stone utensils (grinders, polishers etc.).***

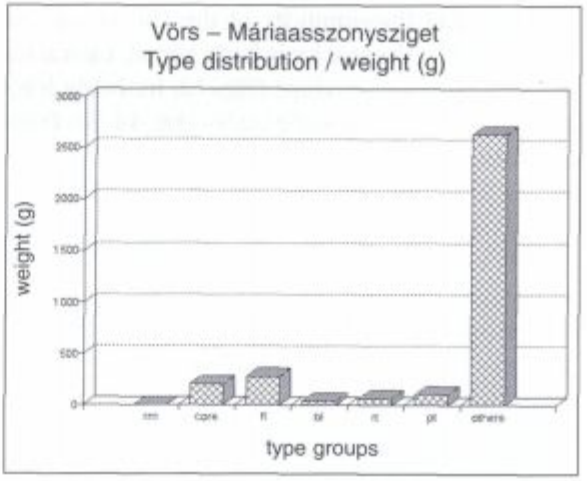


***Fig. 11. Vörs-Máriaasszonysziget – Type distribution according to weight. Key: rm: raw material, core: cores and core residuals, fl: flakes and chips, bl: blades and blade-like blanks, rt: retouched tools, pt: polished tools, others: other stone utensils (grinders, polishers etc.).***

8 A more detailed analysis of intra-site distribution and a complete catalogue will be published in the site report by the same authors.

tool forms - more closely the Mencshely-Murvagödrök (Classical LBC, *Biró 1992*) and the enigmatic Mencshely-Ragonya-Vöröstó assemblages (?Mesolithic-all phases of LBC, *Mészáros 1948*).

IV. ***Blades*** and ***blade-like blanks*** ("bl" on Fig. 10; 11; *Biró 1996 in press Fig. 1.2, 3; Fig. 12.7, 9, 10; Fig. 13.6, 9; Fig. 14.4*). The number of blades (knives, blade-like flakes) is comparable to the number of retouched stone tools (blanks 19, blade-based retouched tools 7) and a blade-making tradition is also attestable in some core forms. Cutting edges were obviously important elements of the inventory, but the character of the whole industry is more flake-based than blade-like.

V. ***Retouched tools*** ("rt" on Fig. 10; 11; *Biró 1996 in press. Fig. 1.1; 12.1,3,5,6; 13. 1,2,4–5, 7,8; 14. 3, 5, 7*) Formerly, all of our typological knowledge was derived from retouched tool types. Classical typological systems are based on the study of retouched (morphological) tool types, especially in the Palaeolithic period. Adding the technological types as it was presented here completes the image and multiplies evidence. The main basis of comparison within lithic inventories, however, is observations made on the class of retouched tools.

The Vörs material is relatively rich in retouched tools (17 pieces, 13.5%). Compared to the size of the assemblage and the simplicity of the LBC retouched tool inventory, the tool kit is fairly varied. Lateral retouching is found on chips (Fig. 12. 6), blade fragments (Fig. 13. 4) and knife-blades (Fig. 14. 3). Truncation is fairly common (Fig. 12. 3; 13. 5; 14.5), but no "classical trapezes" have been found at Vörs so far. The other diagnostic "Early/Middle Neolithic form", segment, is represented by two examples, Fig. 13. 1, which is unusually large, reminding one again of the Mencshely-Vöröstó finds and the especially interesting, refitted, segment-like tool in Fig. 13. 4,5). Borers and burins are present in a wide variety and relatively large number (Fig. 12. 1,5; 14. 7). End-scrapers, very common in later periods, are almost absent (Fig. 13. 8; even this piece can be regarded as a combined tool with a lateral burin). Side-scrapers, on the other hand, are well represented (3 pieces: *Biró 1996 in press. Fig. 1.1, Fig. 13.7*)[9]. Later on, side-scrapers very rarely occur in Neolithic materials, so this feature can be added to the "Early Neolithic" characters (also mentioned in *Biró 1987*).

VI. ***Polished tools*** ("pt" on Fig. 10; 11; 14. 8) The Vörs material is not especially rich in polished stone artefacts. From the two implements classified here, ID Nr. 21 (a profiled hammer) is of very complex form (Section IV, unit 28) which could belong on mere formal criteria to a younger horizon. A piece which belongs undoubtedly to the Early Neolithic material is a very usual trapezoid chisel or wedge (Fig. 14. 8), also in a photo (Fig. 17). The material of the piece, however, is most interesting: on macroscopic observation, the raw material was identified as of the porcellanite phase of Transdanubian radiolarite present in the chipped stone inventory of this and other Starčevo materials (e.g., Gellénháza). More recent finds (Lengyel III from the source environs) also yielded

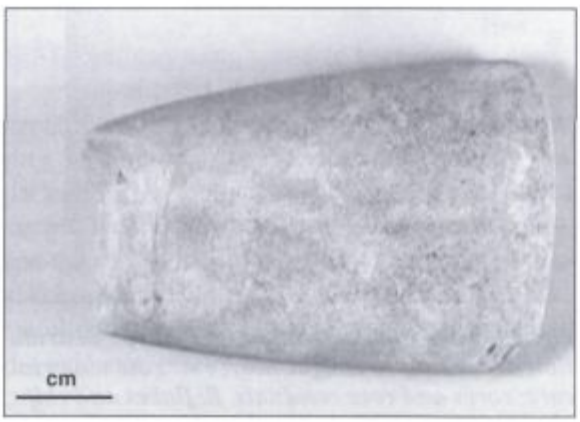


***Fig. 17. Section II unit 13. Object ID 107. Fragment of polished stone tool, Transdanubian radiolarite, porcellanite, 51 x 35 x 14 mm.***


***Fig. 18. Section II unit 18. Object ID 117, polisher plate with "axe print", light yellow fine sandstone 90 x 61 x 20 mm.***

9 ID 59, not represented here in drawing.

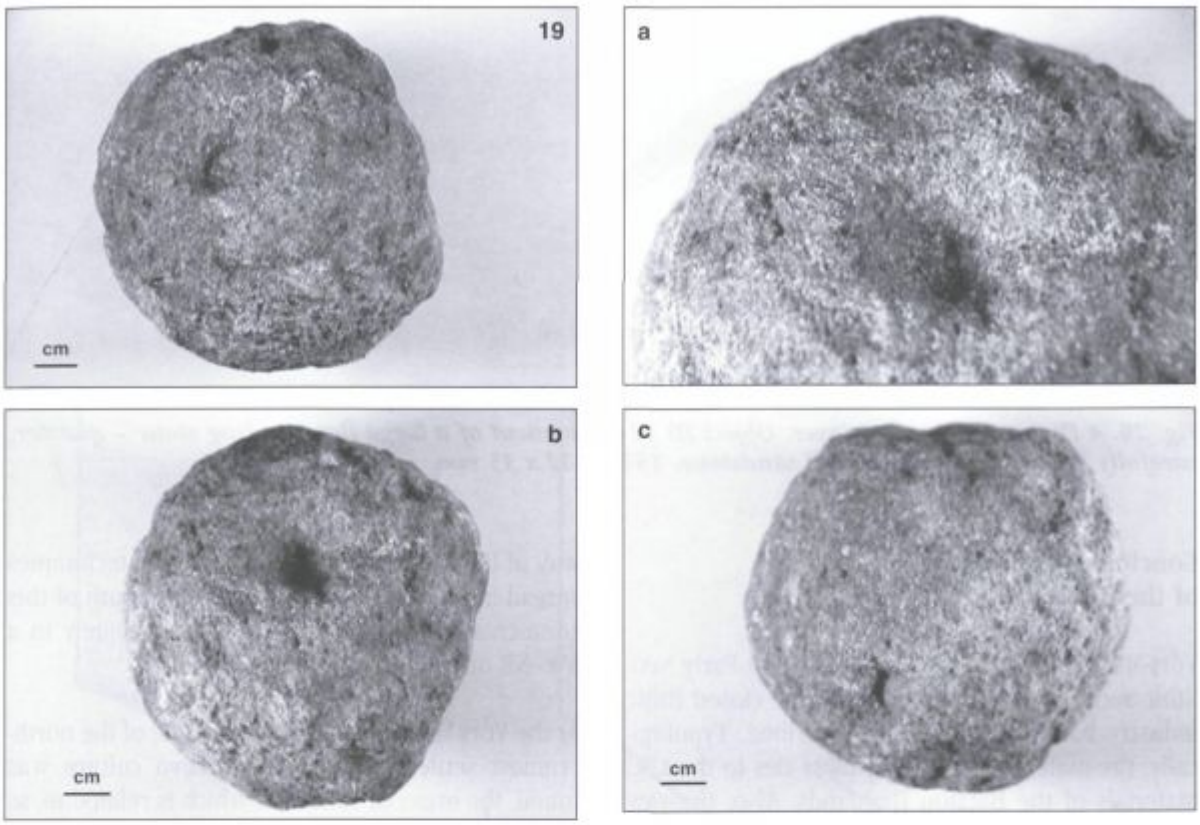


***Fig. 19. a, b, c. Section II unit 13. Object ID 118, irregular pear-shaped stone ball, with bored shallow hole in it – bola?, "Permian" red sandstone, 72 x 75 x 75 mm.***

polished stone tools from this material, so its presence is not unparalleled, but certainly surprising.

VII. Other stone utensils: ***grinders, polishers, used pebbles*** etc. ("others" on Fig. 10; 11) are integrated elements of the lithic inventory and comprise pieces which are very important for the technology (ID 117, Fig. 18) and stable contacts (ID 124, Fig. 20) of the site. Also, there is a special tool among these pieces, a spherical pear-shaped object with a bored, shallow hole in it, found also in a clear Early Neolithic context. The form is closest to a bola; however, the clearly intentional hole may indicate some other (so far, unknown) function (ID 118, Fig. 19). Grinders and polishers are important elements of the tool kit and show some intra-site regional distribution pattern which will be important in interpreting the site features.

## Raw materials

The raw material distribution of the Vörs site is fairly homogeneous and denotes strong and stable northern contacts with the areas of the Balaton Highlands (Permian sandstone) and the Southern Bakony area (Transdanubian radiolarite, primarily Szentgál (red) variant). All these mass supply goods fall within the range of normal regional supply; the problem is that we still have no convincing evidence on the inhabitants(?) explorers(?) of the region. Notable raw materials on the site are Balaton-Highland hornstone and one doubtful piece with potentially southern connotations, a grey (Mecsek?) radiolarite (Fig. 12. 9). Different varieties of sandstone were used on the site, among which the most characteristic is the Permian red sandstone, known as an excellent building stone in the eastern parts of the Balaton Highlands (around Balatonalmádi). In our case, this material seems a very strong contact indicator, as sandstone objects are rather heavy and cannot just "accidentally" occur at such a distance from the source. With the more easily transportable, chipped stone tools (cores, precores) a chain-like transport model can also be assumed[10], but the heavy sandstone probably needed very direct and deliberate action, eventually pointing in the same direction.

10 With whom?

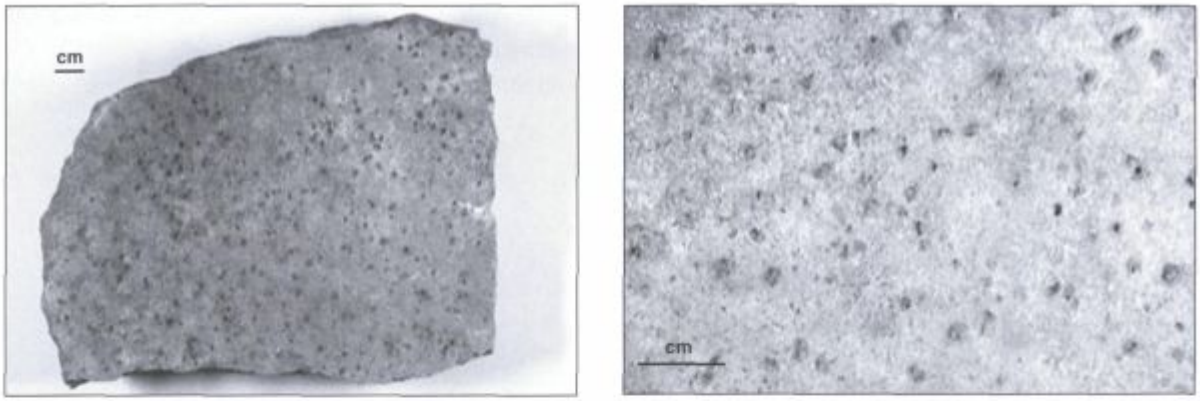


***Fig. 20. 4 IV Section 4 techn. layer. Object ID 124, fragment of a large flat grinding stone – quarter, carefully finished, "Permian" red sandstone, 151 x 122 x 35 mm.***

## Conclusions on the character of the lithic industry

Vörs-Máriaaszonysziget is among the first Early Neolithic settlements where an authentic closed lithic industry has been found and described. Typologically, the material shows very close ties to the LBC materials of the Balaton Highlands. Also, the raw material's provenance points to the same region (and, beyond to the Southern Bakony) for contacts. "Contact" in this period, however is an empty term without content.

The analysis of Early Neolithic assemblages of similar age (Gellénháza, Zalaegerszeg, Szentgyörgyvölgy) is in progress, but they all indicate very intensive use of the above territories.

## SUMMARY

The Northern distribution limit of the Starčevo – Körös – Criş cultures forms not only the periphery of the earliest Neolithic communities, but at the same time represents a frontier zone between the earliest farmers and local hunter-gatherers at the turn of the 7/6$^{th}$ millennium BC. On the northern side of the frontier zone, in the northern part of the Carpathian Basin, hunter-gatherer communities probably subsisted at the same time as the first farmers, although this could only be proved with certainty in a small micro-region within Hungary.

The formation of the agricultural frontier zone was primarily governed by a complex interaction of different factors such as climate, hydrology, vegetation etc., which did not favour, to the north of the frontier zone, the establishment of the early farming way of life. Consequently, early farming techniques spread in the given period only to the south of this zone crossing the Carpathian Basin obliquely in a SW–NE direction.

At the Vörs-Máriaasszonysziget site, one of the northernmost settlements of the Starčevo culture was found, the material culture of which is related to, as regards pottery in the first place, to early farming communities living between the Drava and Sava. There are, however, new features present in the pottery that turned out to be the main characteristics of the Oldest Linearband Pottery culture evolving later to the north of the frontier zone.

The raw material of the stone tools found at Máriaaszonysziget originates almost exclusively from the Balaton Highlands and the Southern Bakony, both lying to the north of the frontier zone where no traces of the Starčevo culture were found. This means that the vital raw materials were obtained from potentially uninhabited areas or, more probably, the sources were supervised by the Mesolithic forager (hunter-gatherer) communities. The system of contacts with this hypothetical base population, the nature of which is so far unknown, supplied the Starčevo population with the preferred raw material, i.e., Szentgál radiolarite, which turned to be the dominant raw material of the subsequent LBC population. These systems of contacts contributed later to the spread of notions on a productive way of life without a mass movement of the population towards the north.

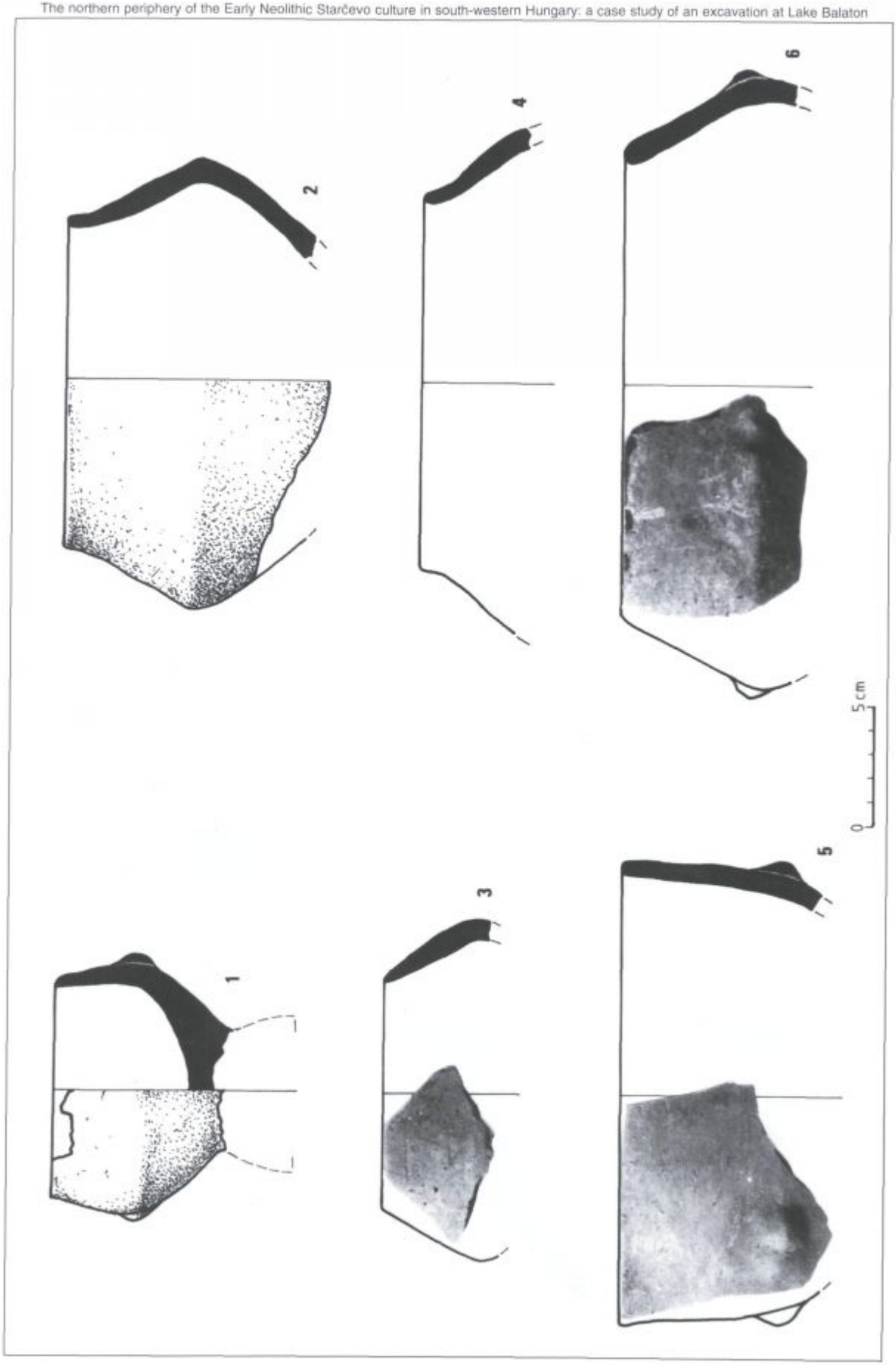


*Fig. 5a. Vörs-Máriaasszonysziget, pottery finds.*

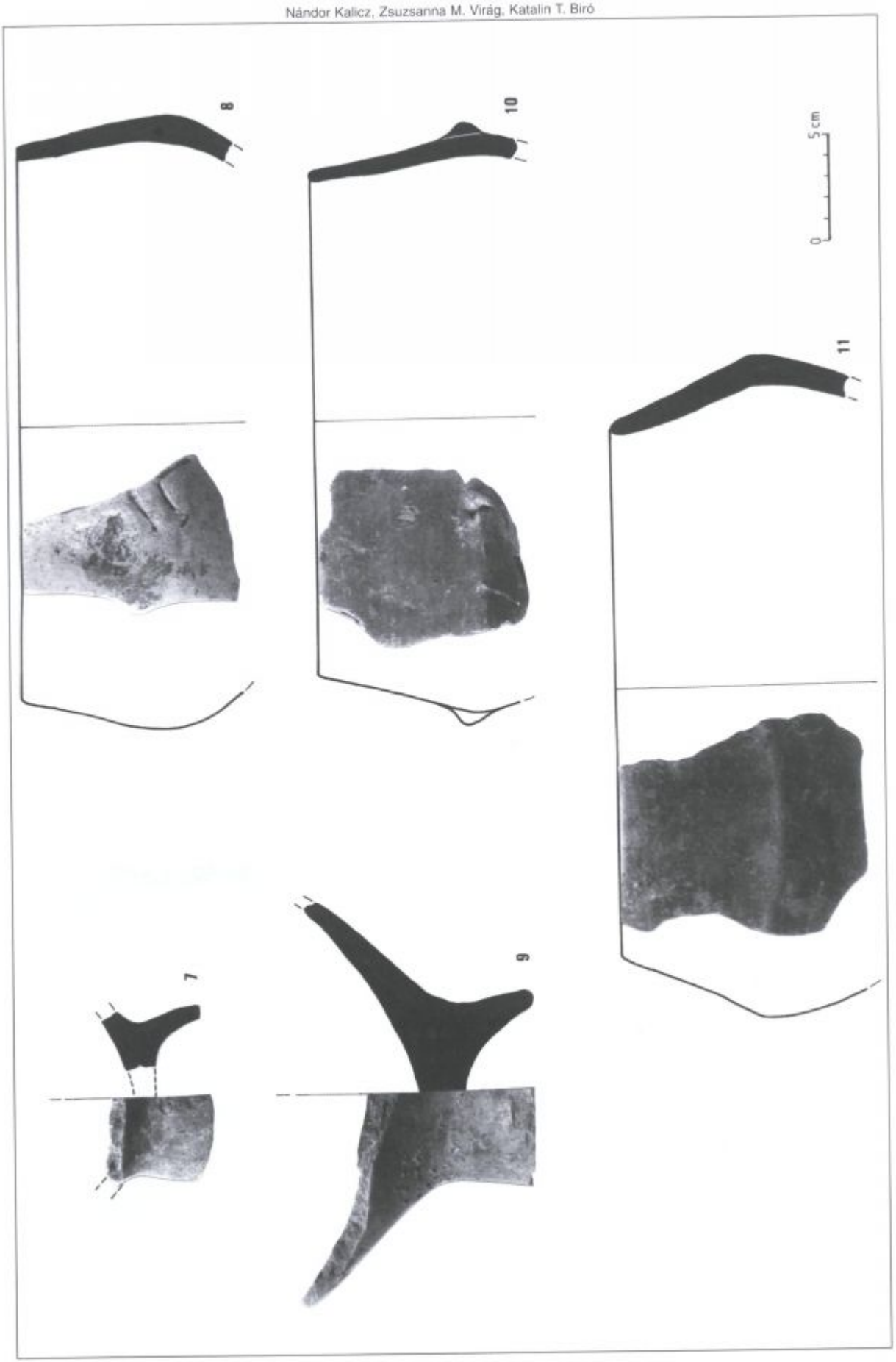


*Fig. 5b. Vörs-Máriaasszonysziget, pottery finds.*

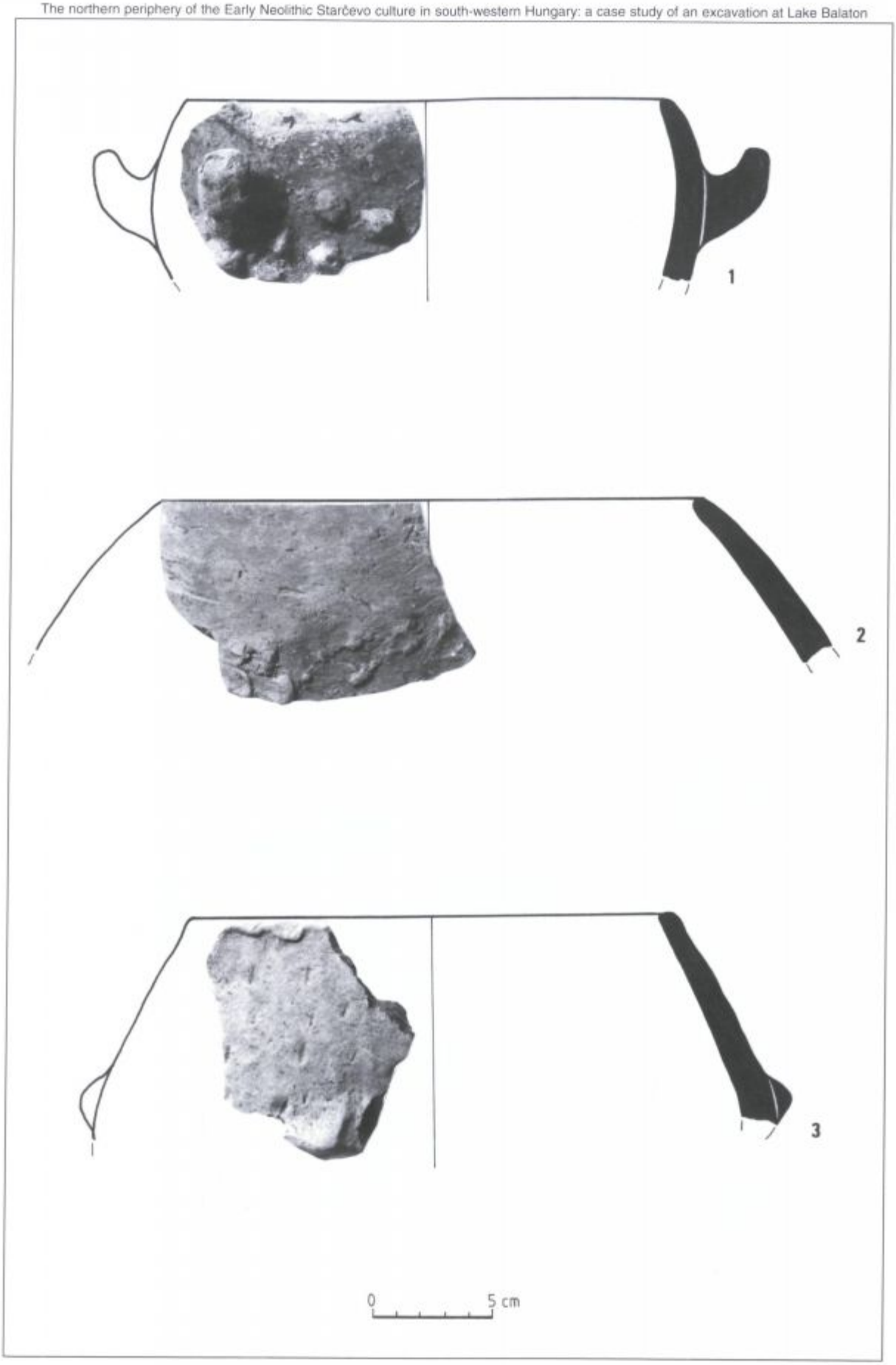


*Fig. 6a. Vörs-Máriaasszonysziget, pottery finds.*

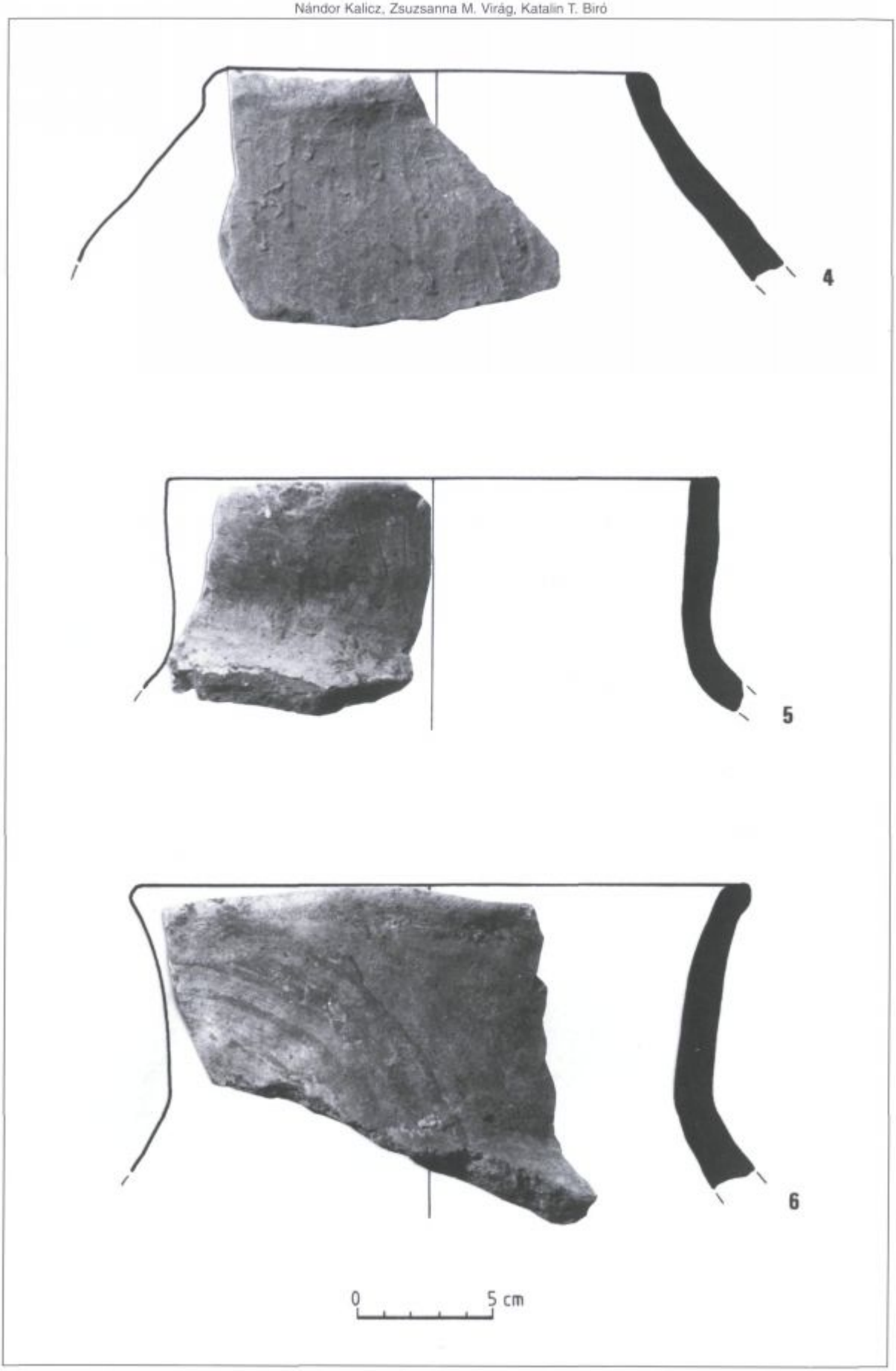


*Fig. 6b. Vörs-Máriaasszonysziget, pottery finds.*

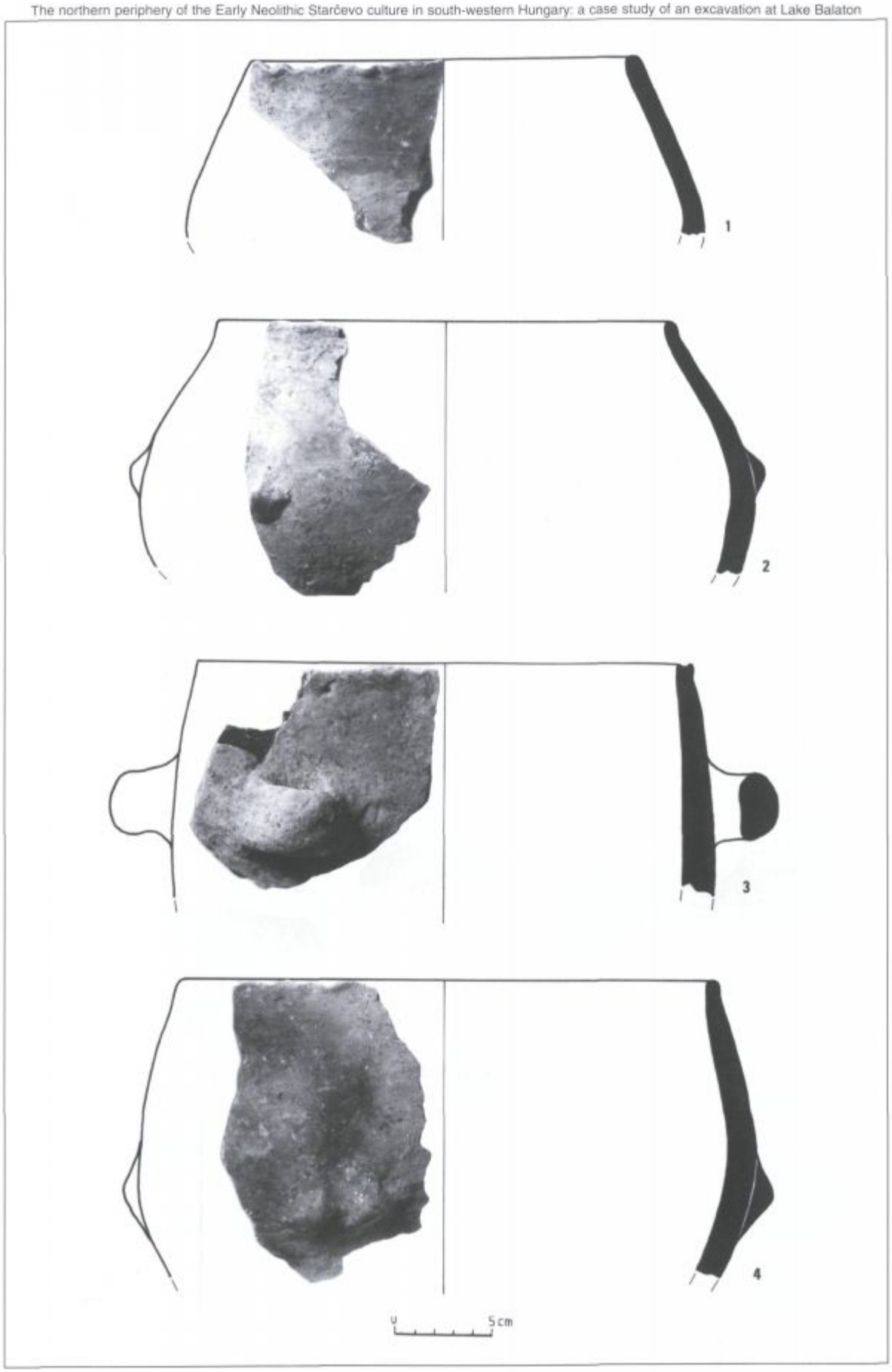


*Fig. 7. Vörs-Máriaasszonysziget, pottery finds.*

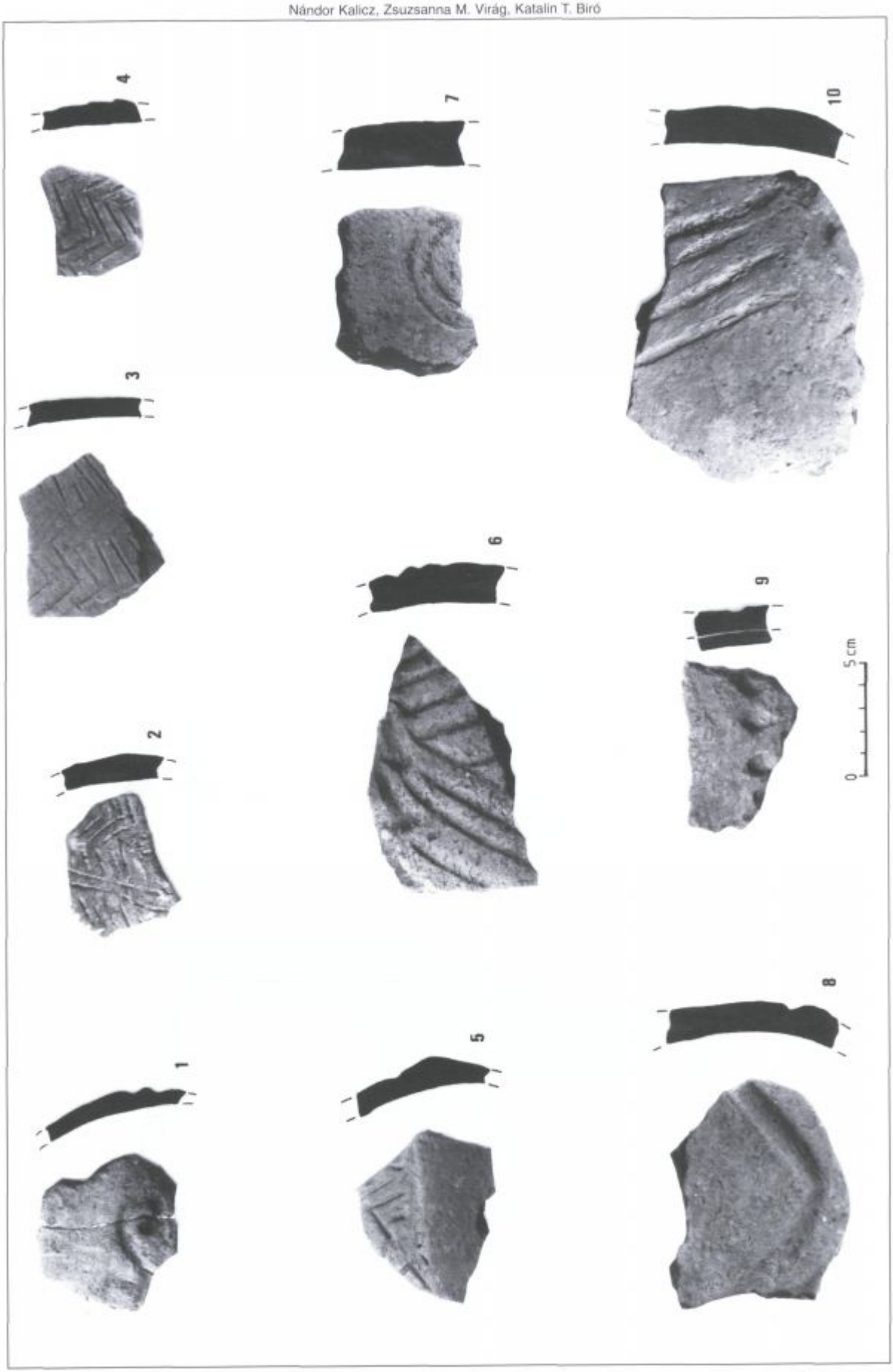


*Fig. 8a. Vörs-Máriaasszonysziget, pottery finds.*

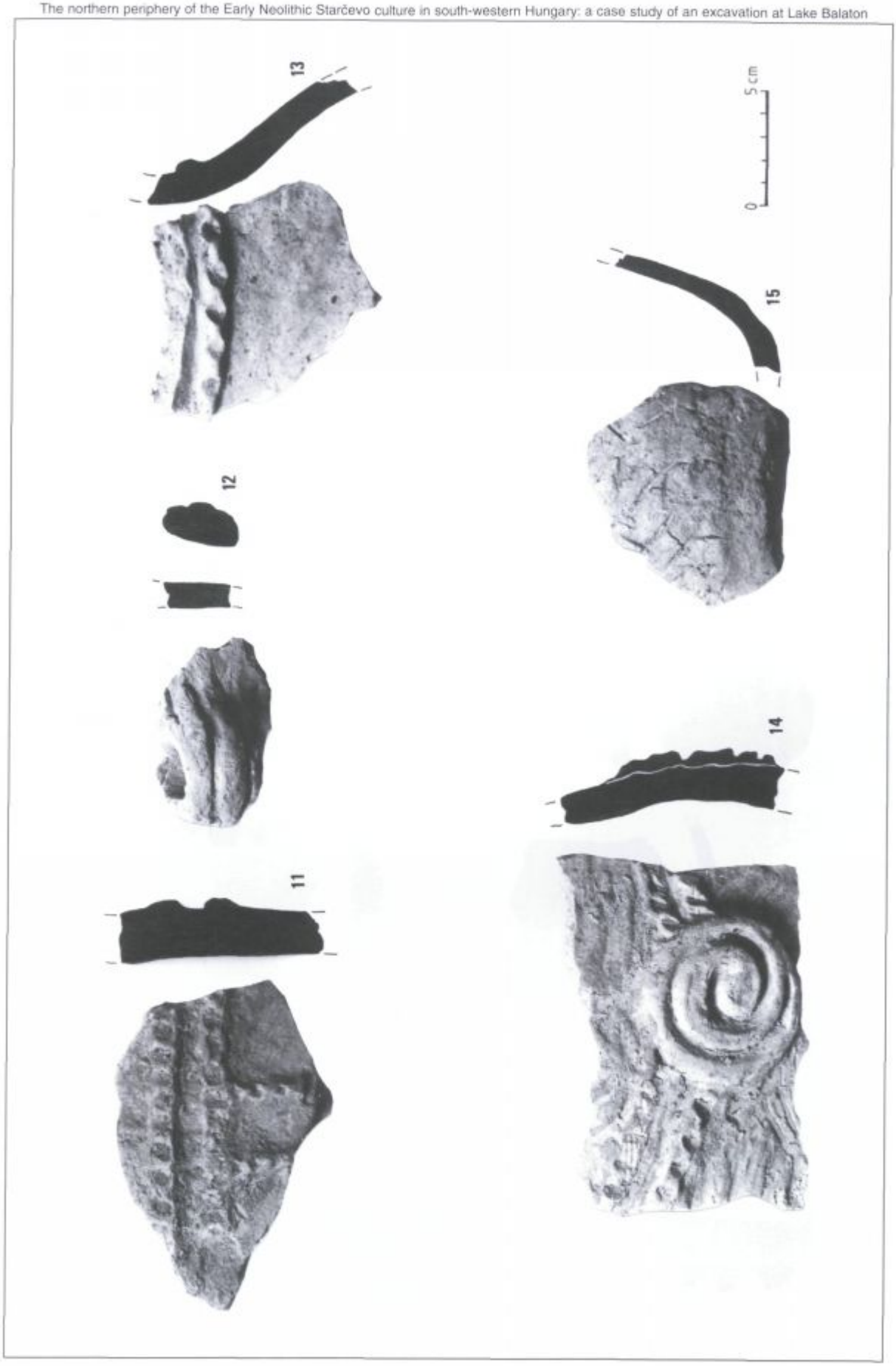


*Fig. 8b. Vörs-Máriaasszonysziget, pottery finds.*

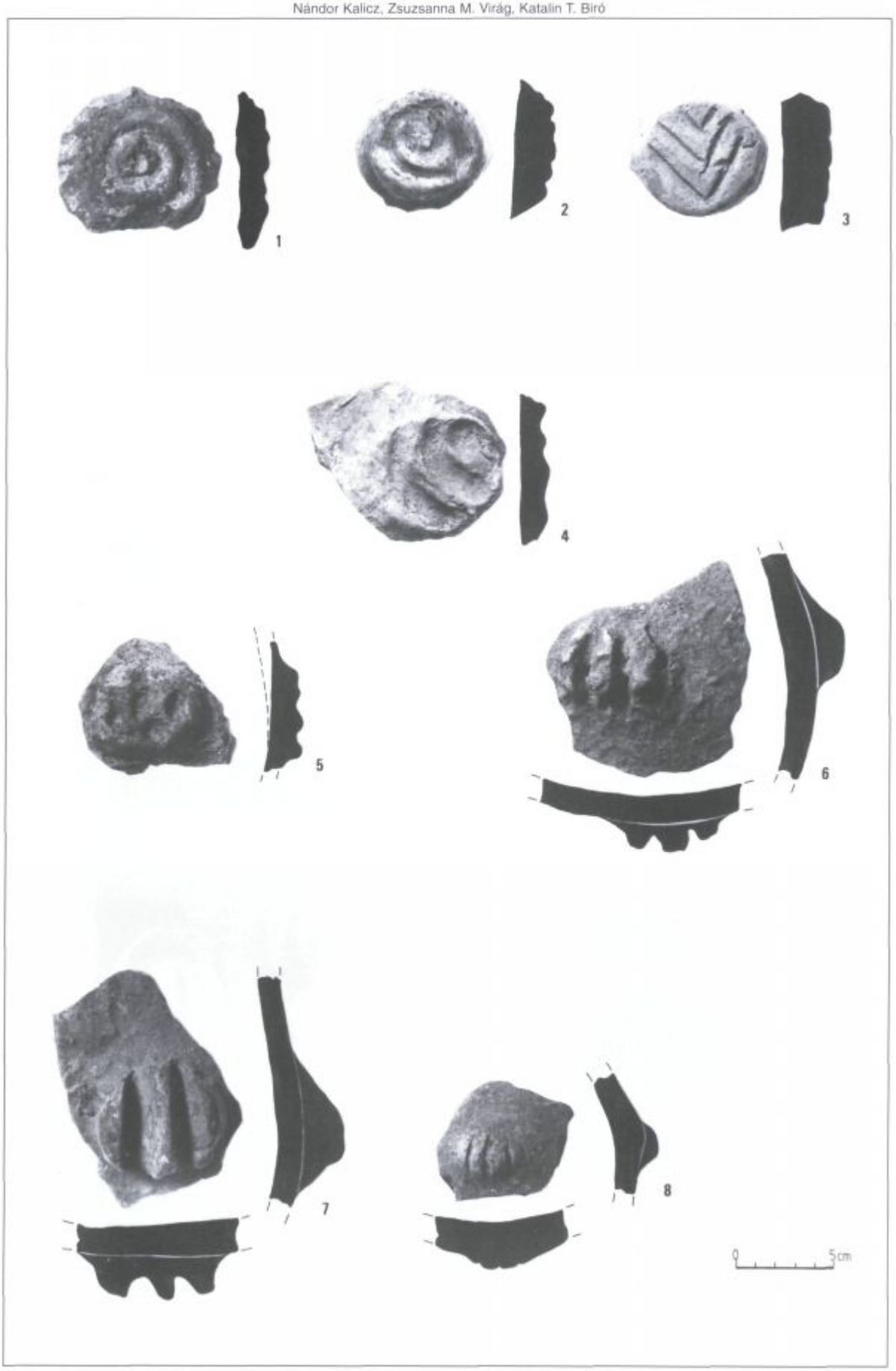


*Fig. 9a. Vörs-Máriaasszonysziget, pottery finds.*

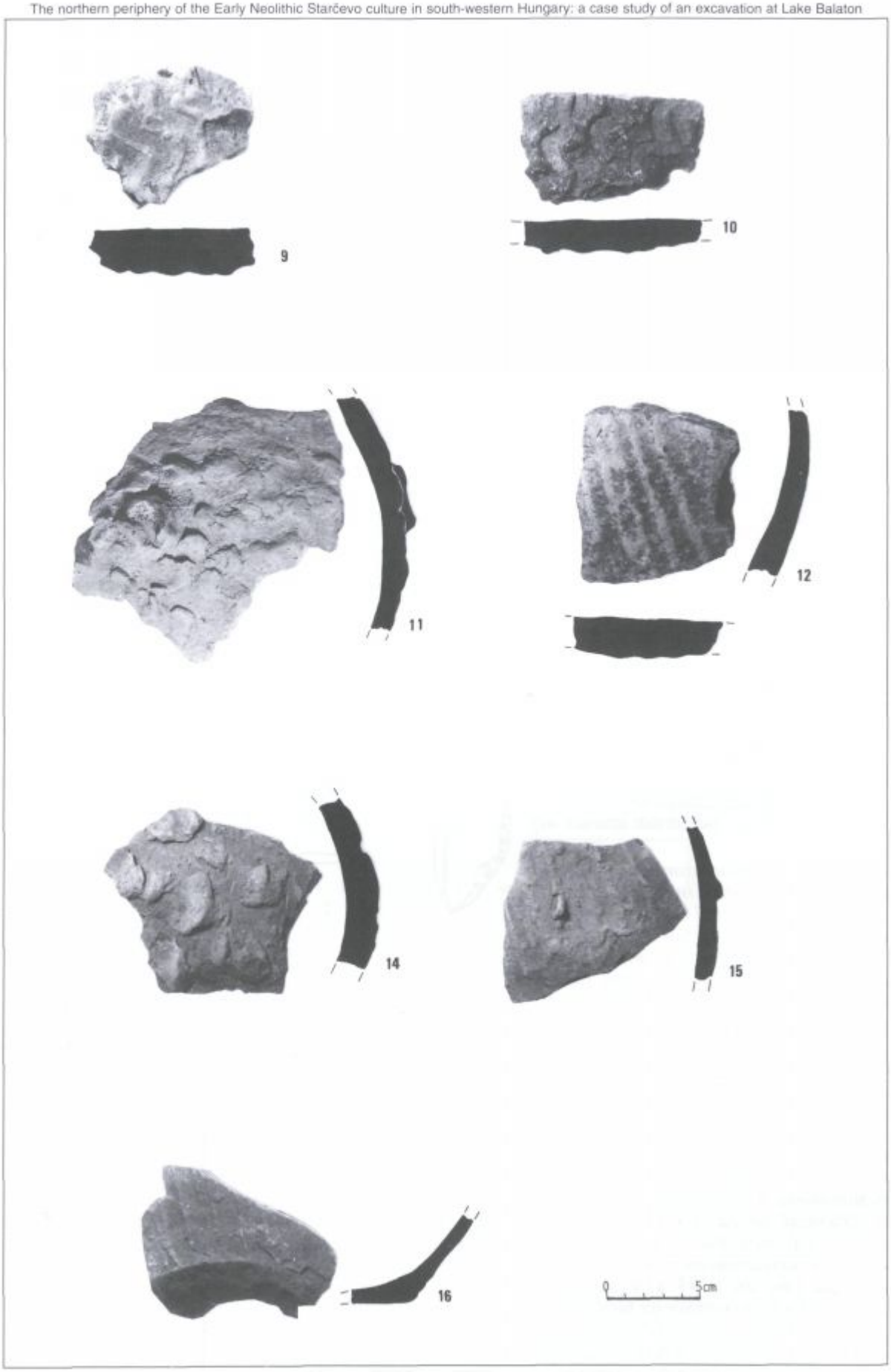


*Fig. 9b. Vörs-Máriaasszonysziget, pottery finds.*

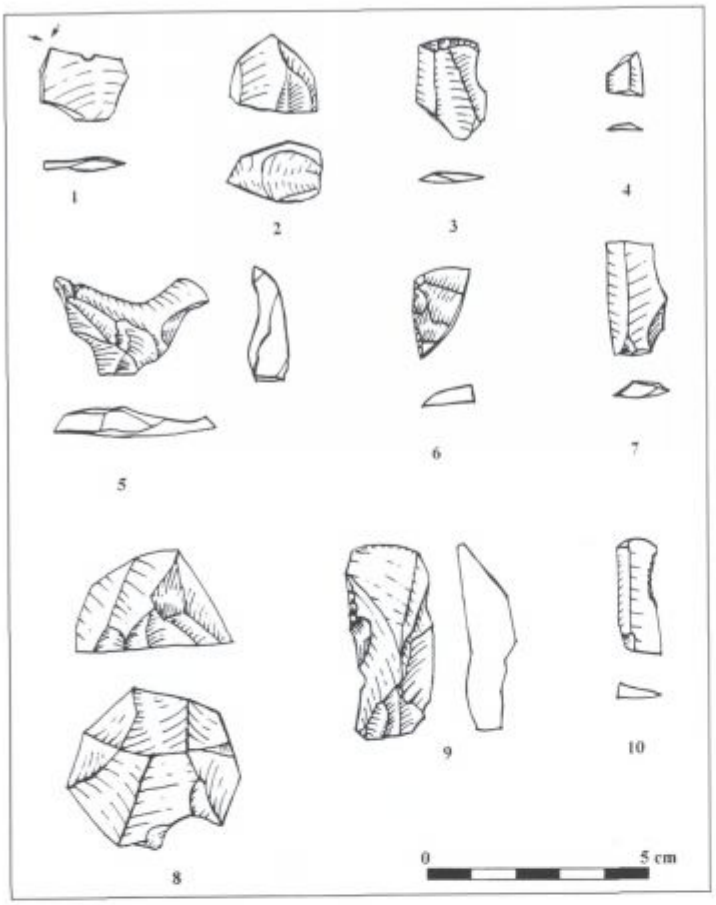


*Fig. 12. Vörs-Máriaasszonysziget – Selection from the lithic industry. 1. Burin on small chip, Transdanubian radiolarite – Szentgál var. 17 x 19 x 3 mm, 2. Microcore remnant, Transdanubian radiolarite, reddish brown 17 x 16 x 12 mm, 3. Truncated blade-like flake fragment, Transdanubian radiolarite – Szentgál var. 22 x 16 x 3 mm, 4. Trapeziform micro-chip, Transdanubian radiolarite – Szentgál var. 9 x 8 x 2 mm, 5. Combined burin-borer (zinc) on transversal small flake, "bird-like" form. Transdanubian radiolarite – Szentgál var. 24 x 34 x 6 mm, 6. Retouched small chip, form reminiscent of an angular scraper. Transdanubian radiolarite – Szentgál var. 18 x 12 x 3 mm, 7. Blade, Transdanubian radiolarite, light porcellanite 24 x 14 x 3 mm, 8. Low conical core, with flake scars. Transdanubian radiolarite, reddish brown 20 x 36 x 33 mm, 9. Blade-like flake, Mecsek radiolarite(?), grey 41 x 18 x 11 mm, 10. Micro-knife blade with worn edge. Transdanubian radiolarite – Szentgál var. 25 x 8 x 3 mm.*

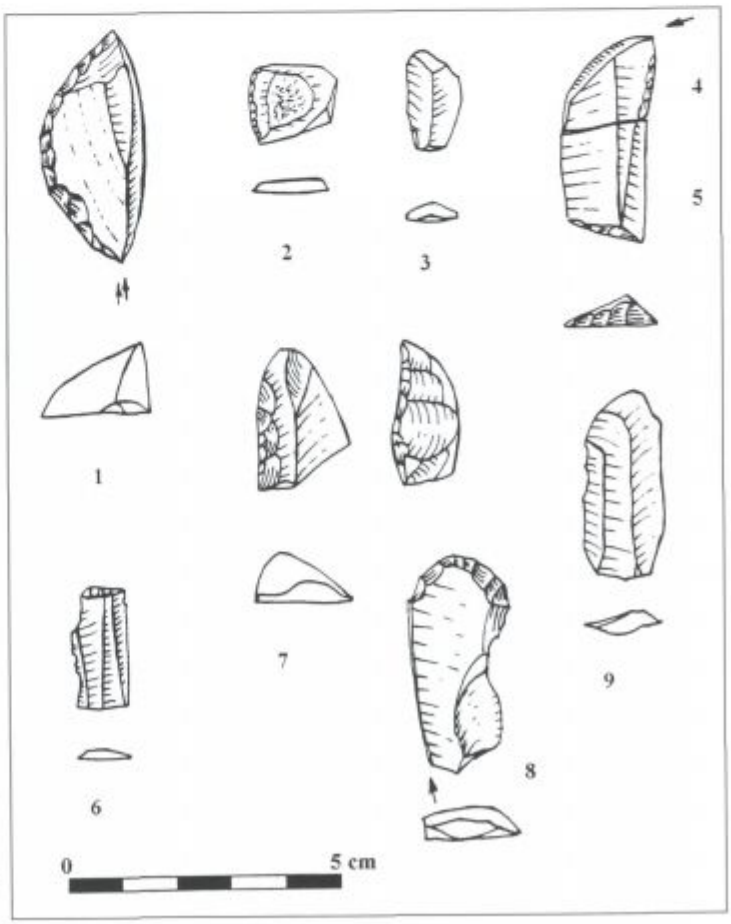


*Fig. 13. Vörs-Máriaasszonysziget – Selection from the lithic industry. 1. Segment-form special tool on flake. Transdanubian radiolarite, porcellanite. 41 x 17 x 11 mm, 2. Retouched chip, Transdanubian radiolarite – Szentgál var., burnt, 13 x 16 x 3 mm, 3. Micro-chip, from unusual material, grey andesite, 15 x 10 x 3 mm, 4. Fragment of retouched blade, (fragment of a segment form tool). Transdanubian radiolarite, porcellanite, 15 x 15 x 4.5 mm, 5. Truncated blade fragment, (fragment of a segment form tool). Transdanubian radiolarite, porcellanite 21 x 15 x 4 mm, 6. Microblade, Transdanubian radiolarite – Szentgál var. 22 x 8 x 2 mm, 7. Side-scraper on small flake, with steep retouch. Transdanubian radiolarite – Szentgál var. 26 x 15 x 9 mm, 8. Atypical, high end-scraper on blade-like flake. Transdanubian radiolarite – Szentgál var. 38 x 16 x 6 mm, 9. Blade, Transdanubian radiolarite – Szentgál var. 34 x 14 x 3 mm.*

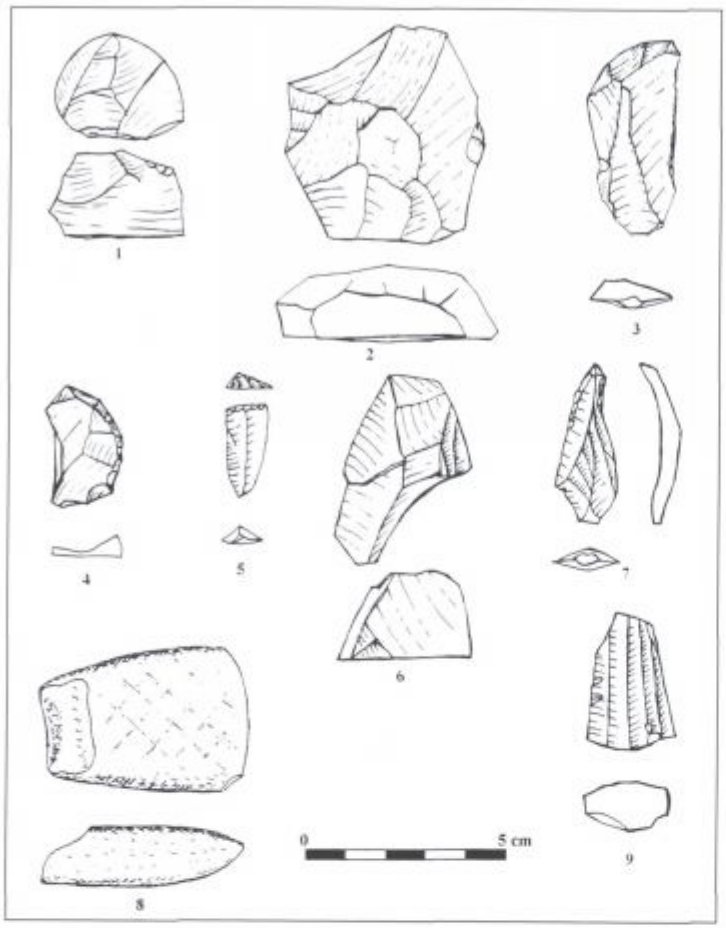


*Fig. 14. Vörs-Máriaasszonysziget – Selection from the lithic industry. 1. Micro-core, heavily used. Transdanubian radiolarite – Hárskút var. 28 x 28 x 23 mm, 2. Large flake, with core base rim. Transdanubian radiolarite – Szentgál var. 51 x 50 x 18 mm, 3. Retouched knife blade, hafted with fine retouch (of use?). Transdanubian radiolarite, reddish brown 48 x 25 x 9 mm, 4. Segment form unretouched knife, with fragmented edge. Transdanubian radiolarite – Urkút-Eplény var. 28 x 17 x 8 mm, 5. Truncated microblade, Transdanubian radiolarite, reddish brown 22 x 11 x 4 mm, 6. Core remnant, cusp. Transdanubian radiolarite, light porcellanite 48 x 28 x 25 mm, 7. Borer on retouched blade, with atypical distal medial borer tip. Transdanubian radiolarite – Szentgál var. 38 x 13 x 4 mm, 8. Trapeziform polished stone chisel, with fragmented butt. Transdanubian radiolarite (light porcellanite)(?) 51 x 35 x 14 mm, 9. Micro-blade core remnant. Transdanubian radiolarite, light porcellanite 33 x 21 x 13 mm.*

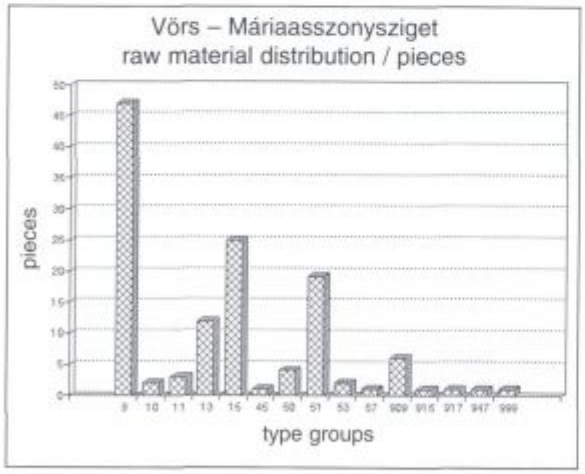


*Fig. 15. Vörs-Máriaasszonysziget – Raw material type distribution according to pieces. Key: 9; Transdanubian radiolarite, Szentgál var. 10; Transdanubian radiolarite, Úrkút-Eplény var. 11; Transdanubian radiolarite, Hárskút var. 13; Transdanubian radiolarite, reddish-brown 15; Transdanubian radiolarite, others 45; Hornstone (Balaton Highlands) 50; fine sandstone 51; rough sandstone 53; quartzite 57; volcanites 909; Transdanubian radiolarite, Szentgál var. (?); 915; Transdanubian radiolarite, other (?) 917; Mecsek radiolarite (?), 947; basalt (?) 999 others.*

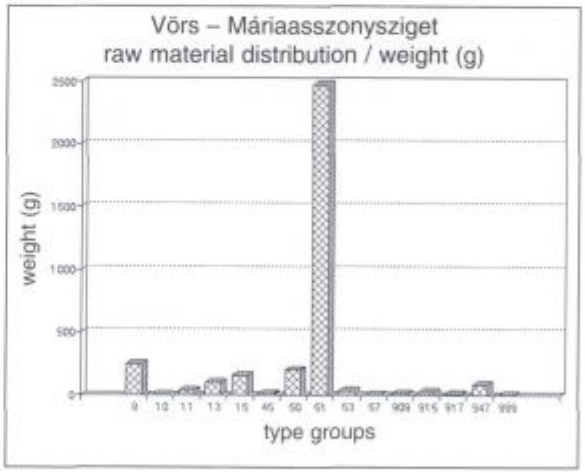


*Fig. 16. Vörs-Máriaasszonysziget – Raw material type distribution according to weight. Key: 9; Transdanubian radiolarite, Szentgál var. 10; Transdanubian radiolarite, Úrkút-Eplény var. 11; Transdanubian radiolarite, Hárskút var. 13; Transdanubian radiolarite, reddish-brown 15; Transdanubian radiolarite, others 45; Hornstone (Balaton Highlands) 50; fine sandstone 51; rough sandstone 53; quartzite 57; volcanites 909; Transdanubian radiolarite, Szentgál var. (?); 915; Transdanubian radiolarite, other (?) 917; Mecsek radiolarite (?), 947; basalt (?) 999 others.*

## Vörs - Máriaasszonysziget

| type | r 9 | a 10 | w 11 | 13 | m 15 | a 45 | t 50 | e 51 | r 53 | i 57 | a 909 | l 915 | s 917 | 947 | 999 | total pieces | total weight | type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **B1** | 1 | | | 1 | | | | | | | | | | | | 2 | 78.44 | **B1** |
| **B1w** | | | 1 | | | | | | | | | | | | | 1 | 18.03 | **B1w** |
| **B2** | 3 | | | 1 | 2 | | | | | | | | | | | 6 | 97.16 | **B2** |
| **B2w** | 1 | | | 1 | | | | | | | | | | | | 2 | 12.78 | **B2w** |
| **B3** | 5 | | 1 | 3 | 7 | 1 | | | | | 1 | | | 1 | | 19 | 235.9 | **B3** |
| **B3/9** | | | | 1 | | | | | | | | | | | | 1 | 2.52 | **B3/9** |
| **B3w** | 2 | | | 1 | | | | | | | | | | | | 3 | 7.848 | **B3w** |
| **B4** | 10 | | | | 2 | | | | | | | | | | | 12 | 22.27 | **B4** |
| **B4/9** | 2 | | | | | | | | | | | | | | | 2 | 0.544 | **B4/9** |
| **B4w** | 5 | | | | 1 | | | | | 1 | | | | | | 7 | 2.477 | **B4w** |
| **B5** | 9 | | | | 1 | | | | | | 1 | | | | | 4 | 4.11 | **B5** |
| **B5/9** | 1 | 1 | 1 | | | | | | | | | | | | | 3 | 2.016 | **B5/9** |
| **B5w** | 1 | | | | | | | | | | | | | | | 1 | 0.352 | **B5w** |
| **B6** | | 1 | | | | | | | | | | | | | | 1 | 3.808 | **B6** |
| **B6w** | 1 | | | | 1 | | | | | | 1 | | | | | 3 | 3.291 | **B6w** |
| **B7** | 1 | | | 2 | 1 | | | | | | | | 1 | | | 5 | 25.61 | **B7** |
| **B7/9** | | | | | | | | | | | 2 | | | | | 2 | 4.188 | **B7/9** |
| **B8** | | | | 1 | | | | | | | | | | | | 1 | 1.08 | **B8** |
| **B8/9** | 1 | | | | | | | | | | | | | | | 1 | 0.567 | **B8/9** |
| **B9** | 1 | | | | 4 | | | | | | | | | | | 5 | 6.243 | **B9** |
| **B9w** | | | | | | | | | | | 1 | | | | | 1 | 0.012 | **B9w** |
| **C4** | 2 | | | | | | | | | | | | | | | 2 | 1.272 | **C4** |
| **C5/9** | | | | | 1 | | | | | | | | | | | 1 | 1.013 | **C5/9** |
| **C6** | | | | 1 | | | | | | | | | | | | 1 | 10.8 | **C6** |
| **D5/9** | | | | | 1 | | | | | | | | | | | 1 | 1.26 | **D5/9** |
| **D5w** | | | | 1 | | | | | | | | | | | | 1 | 0.968 | **D5w** |
| **D7/9** | 1 | | | | | | | | | | | | | | | 1 | 1.056 | **D7/9** |
| **F/C5** | 1 | | | | | | | | | | | | | | | 1 | 1.976 | **F/C5** |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **F/G3** | 1 | | | | | | | | | | | | | | | 1 | 4.896 | **F/G3** |
| **F4** | | | | | 1 | | | | | | | | | | | 1 | 1.296 | **F4** |
| **G4** | 1 | | | | | | | | | | | | | | | 1 | 0.969 | **G4** |
| **G4w** | 1 | | | | | | | | | | | | | | | 1 | 0.27 | **G4w** |
| **I7** | 1 | | | | | | | | | | | | | | | 1 | 3.648 | **I7** |
| **J3** | | | | | 1 | | | | | | | | | | | 1 | 21.84 | **J3** |
| **J3w** | 2 | | | | | | | | | | | | | | | 2 | 6.822 | **J3w** |
| **M3** | | | | | 1 | | | | | | | | | | | 1 | 7.667 | **M3** |
| **P** | | | | | | | 1 | | | | | | | | | 1 | 78.75 | **P** |
| **P9** | | | | | | | | | | | | 1 | | | | 1 | 24.99 | **P9** |
| **csi.** | | | | | | | 1 | | | | | | | | | 1 | 109.8 | **csi.** |
| **csi9** | | | | | | | 1 | 1 | | | | | | | | 6 | 188.1 | **csi9** |
| **g.** | | | | | | | | 1 | | | | | | | | 1 | 405 | **g.** |
| **kav** | | | | | | | | | 1 | | | | | | | 1 | 18.58 | **kav** |
| **ôrl9** | | | | | | | | 12 | | | | | | | | 12 | 1880 | **ôrl9** |
| **tör.** | | | | | | | 1 | 1 | 1 | | | | | | 1 | 4 | 30.04 | **tör.** |
| **total pieces** | 47 | 2 | 3 | 12 | 25 | 1 | 4 | 19 | 2 | 1 | 6 | 1 | 1 | 1 | 1 | 126 | | **total pieces** |
| **total weight** | 240.2 | 4.22 | 35.55 | 100.4 | 158.5 | 15.05 | 202.5 | 2475 | 32.84 | 0.45 | 10.92 | 24.99 | 8.11 | 80.9 | 0.09 | | 3330 | **total weight** |
| | **9** | **10** | **11** | **13** | **15** | **45** | **50** | **51** | **53** | **57** | **909** | **915** | **917** | **947** | **999** | **pieces** | **weight** | |

***Tab. 1. Type-raw material distribution of the Vörs-Máriaasszonysziget lithic assemblage.***
***Key: Type codes: B1 core, B1w micro-core, B2 core remnant, B2w micro-core remnant, B3 flake, B3/9 fragment of flake, B3w microflake, B4 chip, B4/9 chip fragment, B4w micro-chip, B5 blade, B5/9 fragment of blade, B5w microblade, B6 knife, B6w micro-knife, B7 blade-like flake, B7/9 fragment of blade-like flake, B8 blade-like chip, B8/9 fragment of blade-like chip, B9 fragment, B9w micro-fragment, C4 retouched chip, C5/9 fragment of retouched blade, C6 retouched knife blade, csi. polisher, csi 9 fragment of polisher, D5/9 truncated blade fragment, D5w truncated microblade, D7/9 truncated blade-like flake, F/C5 borer on retouched blade, F/G3 borer on retouched blade, F4 borer on chip, g. ball, G4 burin on chip, G4w burin on small chip, I7 end-scraper on blade-like flake, J3 side scraper on flake, J3w side scraper on flake, kav pebble, M3 segment on flake, ôrl9 fragment of grinding stone, P polished stone tool, P9 fragment of polished stone tool, tör. fragment.***
***Raw Material types: 9; Transdanubian radiolarite, Szentgál var. 10; Transdanubian radiolarite, Úrkút-Eplény var. 11; Transdanubian radiolarite, Hárskút var. 13; Transdanubian radiolarite, reddish-brown 15; Transdanubian radiolarite, others 45; Hornstone (Balaton Highlands) 50; Fine sandstone 51; Rough sandstone 53; Quartzite 57; Volcanites 909; Transdanubian radiolarite, Szentgál var. (?); 915;Transdanubian radiolarite, other (?) 917; Mecsek radiolarite (?), 947; Basalt (?) 999 others.***

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UDK 903(4-191.2)"6323/634"
Documenta Praehistorica XXV (Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji XXV)

# Ältestbandkeramische Kultur, La Hoguette, Limburg, and ... What else? – Contemplating the Mesolithic-Neolithic transition in southern Central Europe

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ABSTRACT – *Arguing against a sole migrationist or sole diffusionist model for the Neolithization of southern Central Europe, a combined scenario is presented. The result might have been Early Neolithic societies in which immigrant farmers and local hunter/gatherer/horticulturalists interacted in diverse ways. This interaction led to an assimilation of the local population, however not always in a pleasant way.*

POVZETEK – *Pri neolitizaciji južnega dela srednje Evrope ne zagovarjamo zgolj migracijskega modela ali zgolj modela difuzije, ampak predstavljamo kombiniran model. Rezultat so bile morda zgodnjeneolitske družbe, v katerih so na različne načine vplivali drug na drugega priseljeni kmetovalci in lokalni lovci/nabiralci/hortikulturalisti. Ti medsebojni stiki so pripeljali do asimilacije lokalnega prebivalstva, ki ni vedno potekala na prijeten način.*

## INTRODUCTION

The transition to farming has been a major focus of research in Central Europe. Since the times of Gordon Childe (*1929*), the introduction of the new economy has been linked to the migration of people from Trans-Danubia up to the Rhine and Elbe Rivers and into Little Poland, and ultimately – in the later stages – to the Paris basin and Moldavia (*e.g. Buttler 1938; Quitta 1964; Bogucki 1988; Lüning 1988; Modderman 1988; Thorpe 1996*).

However, this picture became somewhat complicated by the notification of typological and technological links between Late Mesolithic and Early Neolithic lithic assemblages (*Taute 1973/74; Gronenborn 1990; 1994*) and the recent discovery of new pottery styles and indications for small-scale farming among hunter-gatherers in southwestern Central Europe (*Jeunesse 1986; Erny-Rodmann 1996*). Thus the previously neglected role of the local Mesolithic population in the process of the Neolithization has had to be reviewed. In the course of these reconsideration, some researchers have presented models of a solely autochthonous development of the Neolithic economy in southern Central Europe. Arguments for the various models are evaluated and a combined model of migration and local assimilation is presented.

## MESOLITHIC PRELUDE

Sometime between 7200 and 6700 BC Mesolithic assemblages in central Europe and elsewhere on the continent undergo remarkable typological and technological changes. After a transitional phase between 7200 and 6700 BC, during which early trapezes make their appearance (*Gronenborn 1997 c*), the whole set of Late Mesolithic artefacts appears with the typical regular blades and various trapezoidal microliths. These assemblages are subsumed under the term Late Mesolithic (*Taute 1973/74 a; 1973/74 b*).

A remarkable phenomenon of the Late Mesolithic is the decrease in the number of sites. This decrease

has been interpreted as a shift in settlement pattern: Jochim (*1990*) and, following him, Tillmann (*1993*) have hypothesized that during the Late Mesolithic, groups lived in more stable base camps which would have been located along water courses and are now buried by sedimentation. From these base camps parts of the group would have radiated to small hunting/fishing camps. The concentration into larger base camps would have resulted in larger social entities, which then led to an increase in complexity (*Tillmann 1993*). This model, attractive as it is, still awaits archaeological proof, as in central Europe large Late Mesolithic base camps have escaped archaeological recognition, only small temporarily occupied hunting/fishing camps have been discovered so far.

Among the little archaeological remains we have from the Late Mesolithic there are some indications that times might actually have been quite stressful. Good evidence comes from the Ofnet cave in Bavaria, where 34 skulls have been found, deposited in two "nests". Excavated early this century (*Schmidt 1913*) the material has been examined repeatedly. Already during excavation it became clear that some of the skulls show definite indications of violence inflicted by polished celts (*Mollison 1936*), a hypothesis backed by a recent reexamination (*Orschiedt 1998*). The crania with definite indications of trauma seem to belong to a group deposited in a single event, the cause of death of the others is not clear. Some skulls show cutting marks on the cervical vertebrae, indicating beheading. In total, seven C14 dates have been obtained, both conventional and accelerator dates, all of which lie between 6400 and 6200 BC (*Hedges et al. 1989*).

A similar situation has been discovered at Hohlestein rock shelter, where crania of three individuals, one male adult, one female adult, and one child with indications of hydrocephaly were found grouped together (*Orschiedt 1998*). Cutting marks on the cervical vertebrae again suggest beheading after death, and break patterns on the crania suggest the infliction of death by a strong blow with a hard and heavy object, possibly a club. 14C dates place the untimely death of the Hohlestein family between 6760 and 6480 cal BC, thus a few centuries earlier than Ofnet (*Haas 1991*). Comparable cases, less well known, can be named from other parts of southern Central Europe (*Orschiedt 1998*).

These skull depositions have been interpreted as ordinary burials and in the case of Ofnet, as a communal grave (*Jochim 1990*; *Orschiedt 1998*). While certain communal activities may be reflected, the indications of violence have been somewhat neglected. However they do strongly testify to remarkable social processes, namely the outbreak of inter-group (Hohlestein) and possibly intra-group (Ofnet) violence, and Keeley (*1996.102*) goes so far to speak of "trophy skulls" for Ofnet. While this explanation must await some further support, Ofnet and Hohlestein nevertheless indicate severe social stress during the 7th millennium cal BC in southern central Europe. Despite these violent inter- and intra-group disagreements, bands had far-reaching contacts: snails recovered at Ofnet came from the Lower Danube (more than 3000) and also from the French Midi (few) (*Rähle 1978*). These are precisely the regions where, some centuries later, the earliest elements of a Neolithic economy originated; thus the entry routes were already known a thousand years before the arrival of farming (*Gronenborn 1994*).

The burials from Ofnet and Hohlestein remain the only more extensive group of burials for the southern Central European Late Mesolithic. While in the coastal regions of southern Scandinavia (*e.g. Madsen 1986*; *Andersen 1993*), along the Atlantic coast (*Schulting 1996*), or in the extensive woodlands of North-Eastern Europe (*Zvelebil & Dolukhanov 1991*) burial grounds do indicate a somewhat stationary life, in inland Central Europe only occasional burials of small children were unearthed in rock shelters (*e.g. Grote 1994.82*), certainly indications of a continuously mobile way of life with brief, intermediate stops. Also, as already noted above, the few known open-air sites are small and seem to have been occupied only briefly in the course of hunting/fishing excursions (*e.g. Kind 1997*).

Indeed it becomes increasingly questionable whether large sites as they are known from the Iron Gates region (*e.g. Radovanović 1996*) ever existed in southern Central Europe. While a model accounting for more sedentary groups, and maybe increased complexity in societal structure seems appealing, there is still no evidence, even in areas which would be favorable for the location of such base camps like large river flood plains, or lake shores. If Late Mesolithic sites are found, they are always the remains of briefly occupied hunting/fishing camps. Nevertheless an increasing degree of territoriality may be evidenced in the Ofnet burials, with indications of intergroup stress and also, much later, in the evidence from Schötz 7 (5900–5700 BC) in Switzerland (*Wyss 1979*), where deer remains show a decrease in size,

possibly indicating intensive hunting, hence pressure on resources. Such a behavior is unusual for hunter/gatherer populations as over-exploitation is usually avoided. Thus, it is quite likely that Late Mesolithic times in Central Europe were not as pleasant as the evidence from Lepenski Vir might suggest; on the contrary, it must have been a time of social and economic insecurity. Nevertheless, steps towards a more stable settlement pattern seem the logical consequence of the evidence at hand; however, it seemingly did not result in increased complexity, and also a transitional stage between hunter-gatherer/farmers cannot be established for wide parts of Central Europe.

However, exceptional palaeo-botanical evidence has recently been published from the western Alps and the Alpine foreland. It does seem that already during Late Mesolithic times people engaged in small-scale farming, the earliest evidence might even date back to the latter part of the 7th millennium cal BC (*Erny-Rodmann et al. 1997*). Secure evidence dates after 5750 cal BC and should thus be roughly contemporaneous to the early secure dates for pottery and animal husbandry in southern France.

Pottery, stylistically linked to southern France (*Jeunesse 1987*; *Lüning et al. 1989*) made its appearance in western Central Europe and western Europe probably around the same time, shortly after 5750 BC. Two different stylistic groups are differentiated, one being the so-called La Hoguette (LH) pottery groups, with its distribution in SW Germany, Switzerland, Upper Rhone valley and also towards Normandy (Fig. 1) (*Van Berg 1990*; *Lüning et al. 1989*). The other group is the so-called Limburg (LB) pottery group, which is mainly distributed in the NW-European lowlands, with extensions towards the south (Fig. 1).

LH pottery is characterized by applied bands with single or twin rows of pointed incisions; LB pottery is decorated with incised lines, chevron motifs, and bands filled with lines. In a recent article, Jeunesse (*1998*) has suggested a continuation of these decorative styles and an adaptation by the *Rubané moyen* and *récent* in the west. This is indeed a tempting hypotheses, as the lithic industry of the western LBK also shows remarkable Mesolithic traditions, notably projectile points. Indeed, Löhr (*1994*) has shown that the *lateralization*[1] of certain types of LBK projectile points can be linked to Mesolithic microliths and long term stylistic provinces can be established, even beyond the onset of the 7th millennium cal BC. Moreover, if plotted on a map, the distribution of LH pottery shows a remarkable overlap with microliths with left *lateralization,* and LB pottery shows a remarkable overlap with microliths with right *lateralization* (Fig. 1). These long-term stylistic provinces should reflect Mesolithic territories of intense interaction that persisted well into Early Neolithic times.

So far, unfortunately, except for a few sites, either LH or LB pottery was found only in association with the LBK, or as single stray finds. Therefore, little is known about subsistence during this period generally termed the "Terminal Mesolithic". So far, only the site of Stuttgart-Bad Cannstatt has revealed faunal and botanical evidence in clearly undisturbed association with LH pottery. Apart from domesticated sheep/goats and cattle, remains from game animals was found and also charred cereals (*Brunnacker et al. 1967*; *Meurers-Balke personal communication*). However, a recently obtained 14C-date indicates an occupation around 5200/5100 BC, well after the appearance of LBK in the region. It is thus not very clear to what extent the settlers were influenced by LBK subsistence, as there is ample evidence of contact between LH and LBK (*Gronenborn 1990, in press*; *Jeunesse 1998*). Other evidence for possible subsistence during the Terminal Mesolithic stems from a site in the Doubs valley in Eastern France. The multi-layered rock shelter of Bavans has produced layers with LH, below those with LBK pottery. The LH layer contained some sheep/goat remains, about 3% of the total faunal remains. Similar evidence comes from other sites around the western and northwestern margins of the Alpine region (*Chaix 1997*). It can be considered as beyond doubt that already before the onset of the Earliest LBK, Terminal Mesolithic groups engaged in animal husbandry. These domestic animals must have been introduced from abroad, as no wild predecessors of sheep/goat existed in Europe. Albeit this transitional stage towards the Neolithic traditional patterns still continued. No firm domestic structures have been found up to this day, thus there is no evidence for extensive base camps. Data comes only from rock-shelters. So the introduction of animal husbandry and small scale horticulture into the western Alpine region is best understood as an adaptation of some Neolithic elements by local groups. Nevertheless, earlier hunter-gatherers' subsistence and settlement patterns continued and remained dominant.

1 For a definition and explanation of the term see Rozoy (*1968*) and Löhr (*1994*).

To sum up, it is presently possible to outline Late/Terminal Mesolithic cultural development as follows: a change in settlement patterns occurs in course of the Late ML. However, this change is hard to detect archaeologically and can only be inferred from a bundle of clues. While previously groups led a largely mobile way of life with seasonal shifts of camps by the whole group, during the Late Mesolithic, groups remained at a base-camp for prolonged stays with excursions of part of the group to utilized resources (hunting bands). These special activity camps have been discovered archaeologically, while the large base-camps remain have not yet been found. The postulated decreased mobility led to increased territoriality, which resulted in increased inter-group and intra-group stress. In some cases an outbreak of violence can be demonstrated archaeologically.

At least in parts of southern central Europe small scale farming was practiced sometime after 5700 BC, this economy originating very likely from northern Italy and/or the French Midi. However, it needs to be stressed that horticulture and animal husbandry played a minor role in the economic system and only supplied the earlier hunter-gatherer subsistence strategy which continued to be practiced; no far-reaching consequences for settlement pattern and the social/political structure of groups can be traced archaeologically.

## The Early Neolithic of the "Danubian Tradition" – the Linear Pottery Culture (LBK)

Meanwhile, "on the other side of Central Europe", remarkable changes were coming about: influenced by fully developed Neolithic societies in the southern Balkans, local groups began to incorporate animal husbandry, domesticated plants, and pottery into their subsistence and material culture. More or less permanently settled hamlet- or village-like structures sprang up (*see Whittle, this volume*). These Early Neolithic representations are subsumed as the so-called Starčevo-Körös-Cris cultures and their antecedents (*Pavlu 1989; Pavúk 1995*). The earliest evidence might date back to the end of the seventh millennium BC.

North and northwest of the Starčevo-Körös-Cris distribution a yet archaeologically unknown Late Mesolithic substratum is presumed to have existed. It is

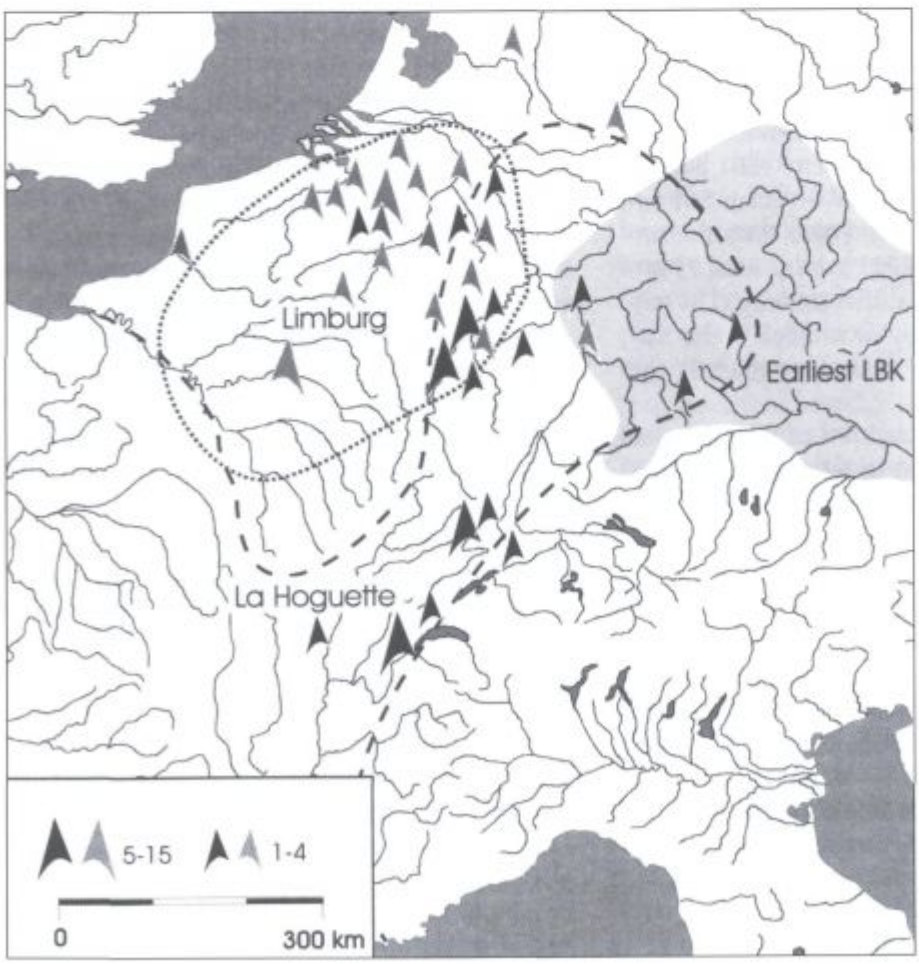


***Fig. 1. Distribution of La Hoguette and Limburg pottery (after van Berg, 1990), and so-called Danubian points from Late Mesolithic and Earliest LBK sites (after Löhr, 1994).***

precisely here where the characteristic ware of the Earliest Linear Pottery Culture (German: *Linienbandkeramische Kultur*, LBK) evolved which is also termed "LBK of Central European Type" or "Trans-Danubian LBK", to distinguish it from a similar phenomenon in the Great Hungarian Plain (*Alföld*), the so-called AVK (after the Hungarian *Alföldi Vonaldíszes Kerámia* (*Kalicz & Makkay 1977.12*)).

Stylistic influences between Starčevo-Körös-Cris and Earliest LBK can be made out in pottery forms and decorations (*e.g. Kalicz 1993*) notably in the earliest sites such as Brunn II, near Vienna (*Stadler online*). These early stylistic traits in LBK pottery are limited to the northwestern Carpathian basin (*Pavúk 1996*), where this initial phase should date between 5700 and 5600 BC (Fig. 2). With the onset of the fifty-fifth century BC, LBK began to spread northward and westward and reached the site of Schwanfeld in Franconia as well as Eitzum, north of the Harz mountains around 5500 cal BC (*Gronenborn 1994, in press*). At the same time the early Vinča Culture evolved in the Banat area and its vicinity (*Schier 1997*), bringing about many economic changes in the northern Balkans (*Whittle 1996*; *Gronenborn in press*).

This first expansion of the LBK up to Schwanfeld and Eitzum was followed by a halt, maybe for a generation. In a subsequent, second advance, loess territories up to the Rhine were settled. Here a complex situation of increased contact and interaction with the Terminal Mesolithic groups, the manufacturers of LH pottery, developed, lasting between 5400 and 5250 BC, after which the LBK spread further westwards, settling in the Rhineland and Dutch Limburg (*Gronenborn 1990 in press*).

Earliest LBK settlements varied somewhat in their extent and structure. Many of them seem to have been more or less widely-spaced hamlets or villages, such as Schwanfeld (*Gronenborn 1997a*), Nieder-Eschbach (*Hampel 1995*), or Brunn (*Stadler online*). However, denser house clusters also seem to have existed, as is the case in Bruchenbrücken (*Gronenborn 1997b*). Houses differ somewhat from later LBK

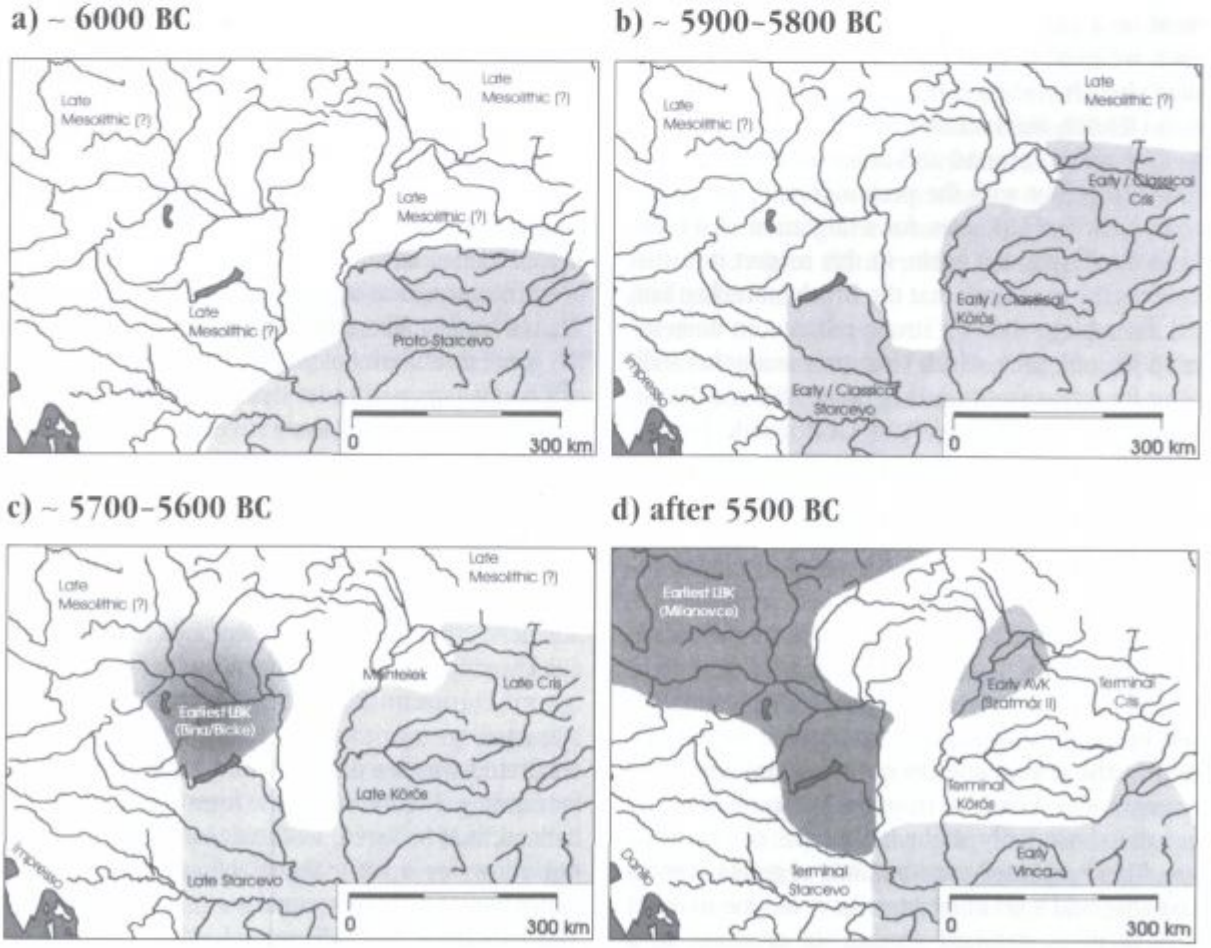


***Fig. 2. Hypothetical development and expansion of earliest LBK in the Carpathian Basin during the first half of the sixth millennium BC.***

constructions, notably through the presence of so-called wall trenches, the real purpose of which remains unclear. The fact that some of the Earliest LBK houses do not show interior roof support posts might indicate two differing building traditions, one influenced by the Carpathian basin, where interior posts are equally absent during the Early Neolithic (*Gronenborn in press*), the other constituting a central European innovation with heavy roof structures (*Lenneis 1997*). During the Earliest LBK a mixed farming system, with the cultivation of *emmer*, *einkorn*, lentils, and peas, was practiced (*Kreuz 1990*). Faunal remains show that cattle were domesticated, but some of the sites show a preponderance of sheep/goat, notably those further southeast, similar to the economy of the Starčevo-Körös-cultures in Carpathian Basin (*e.g. Bökönyi 1992*). However, the northern sites at Eilsleben and Eitzum show a heavy dependence on cattle (*Döhle 1994*), perhaps as an adaptation to the specific environmental conditions. The earliest LBK faunal assemblages also contain a high percentage of game (*Uerpmann and Uerpmann in press*), which has recently been interpreted as an indication of an autochthonous development on a Late Mesolithic basis (*Kind 1998*). However, we need to bear in mind that Starčevo-Körös sites also often show a high percentage of wild animals (*Whittle, this volume*), thus the argument might well be turned around and taken as a further indication, together with the preponderance of sheep/goat at Earliest LBK sites, for a migration of settlers from the Carpathian basin. In this respect it is also noteworthy to remark that the Bruchenbrücken faunal assemblage shows a strong reliance on domesticated pig and game, which I interpret as another indicator for intensive contacts between LBK and Terminal ML, the manufacturers of La Hoguette pottery (*Gronenborn in press*).

Burials dating to the earliest LBK are rare. The data for the only burial ground excavated so far, Vedrovice in Moravia, has so far only been published in preliminary form (*Podborsky 1993*). Some burials here, as well as a settlement burial at Schwanfeld (*Gronenborn 1997a.41*; *Caspar 1997*), contained sets of trapezes which were made solely for deposition in the graves and do not show any use wear traces. A shoe-last adze from the Schwanfeld burial equally shows only slight indications of extensive use. These repeated combinations of goods, a shoe-last adze and a set of trapezes have led me to interpret them as standard symbols of members of a hunter/warrior association which is still visible in later LBK times (*Gronenborn in press*). At Vedrovice, some burials also contain objects, which are interpreted as indicators of a certain social status, notably *spondylus* armlets (*Nieszery 1995*; *Müller 1997*). I have argued that the occurrence of such objects already in Earliest LBK times would indicate a more diverse social differentiation from the beginning of the LBK onwards (*Gronenborn in press*), such has so far been only hypothesized for later LBK (*Jeunesse 1997*; *Van de Velde 1990*). A remarkable burial in Little Poland might indicate another group of individuals with specific assignments within Earliest LBK society. At Samborzec, an interment of an adult woman with red ocher sprinkled around the cranium and a necklace of animal teeth was discovered within the settlement (*Kulczycka-Leciewiczowa 1988*). This woman might have been occupied with magic and religious practices; perhaps she was a shaman. The red ocher is reminiscent of the little clay figurines typical of early LBK phases, which equally show a red-dyed hairdo (*e.g. Hampel 1989*). Hence, these figurines might not be stylized "idols", but rather represent actual individuals with obligations in the realm of the supernatural [2]. Otherwise, very little is known about the Earliest LBK societies.

## The main question: "demic diffusion" or autochthonous development?

Probably going back to Gordon Childe (*1929*), the sudden appearance of the LBK has for a long time been interpreted as an immigration of groups from Trans-Danubia. The main arguments for this were the general similarity of pottery over wide distances of Central Europe and its stylistic affiliation to certain ceramic forms and decorative modes of the Starčevo-Körös cultures (*e.g. Quitta 1960*; *Kaufmann 1991*). In 1964, Quitta for the first time presented an elaborate model of the LBK expansion through migration: a late Mesolithic population in Trans-Danubia comes into contact with the Starčevo culture and hence the Neolithic economy. Farming becomes quickly adopted, as does pottery, but with distinctive central European traits. Starting from Trans-Danubia, small groups migrated into the loess patches north and westward and started clearing the land for farming. The forests on the loess soils were uninhabited, it is believed, as the dense vegetation did not allow for a high annual biomass production, hence hunter-gatherers would not find enough game. This hypothesis of immigration has been held up by

2 See also Biehl (*1996*) for a similar interpretation.

researchers for years (*e.g. Modderman 1988*; *Lüning 1988*) and found its culmination in the "demic diffusion" model of Ammermann & Cavalli-Sforza (*1984*). Recently, however, the model of immigrating "Neolithic people" has come in for severe criticism. The starting point of these considerations was the analysis of Late Mesolithic and Neolithic lithic assemblages (*Taute 1973/74*) and specifically those from the earliest phase of LBK. At the Bruchenbrücken site, typological and technological indications were found which strongly suggest a Mesolithic contribution (*Gronenborn 1990; 1994; 1997b* ); moreover, at many sites, local Mesolithic influences are visible in the microlith forms (*Gronenborn 1994; 1997a*). These observations and the implied overlap of the distribution of Mesolithic groups with LBK territory have led Tillmann (*1993*) to propose a local autochthonous development of LBK which has recently been supported by Kind (*1998*). Certainly, it is tempting to interpret the many "Mesolithic traits" in the earliest LBK lithic assemblages in such a way, but to reduce the view to lithics alone is simply the wrong way. All components of LBK material culture need to be considered. Certain traits in pottery clearly show links to Starčevo and Körös (*Kalicz 1993*; *Pavúk 1994; 1996*); even more evident are these links in the realm of the ritual: clay altars or bone *spatulae* (*Kaufmann 1991*). Furthermore, all of the domesticates, except perhaps pigs, stem from regions abroad, and this is true for plants as well as animals (*Kreuz 1990*; *Döhle 1994*). Even if there is a higher component of wild animals in the earliest LBK diet – which can be linked to Starčevo-Körös patterns – it does not indicate "complex hunter-gatherers" as suggested by Kind (*1998*). Still, domestic animals do constitute a good proportion of the spectrum and the expertise to manage farming successfully should have come with the stock and seeds.

Based on an analysis of Earliest LBK lithic artefacts, I have suggested a combined model, where immigrating farmers set up pioneer settlements which then attract the local Mesolithic population. My main argument was the appearance of Szentgál-type radiolarites on sites as far afield as Schwanfeld (Fig. 3), which could be interpreted as the archaeologically visible remains of a far-reaching exchange network maintained by groups with close social, possibly kinship, ties (*Gronenborn 1994; 1997a*). The fact that LBK is at least partly a result of immigrating groups from Trans-Danubia becomes very obvious in the west, along the Rhine river. Here the immigrant farmers were in vital contact with the local Mesolithic groups (*Gronenborn 1990; 1994; 1997a*). It is likely that in eastern parts such contacts resulted in the relatively rapid assimilation of the local population into the newly emerging early Neolithic societies. Also, no Terminal Mesolithic economy with partial yet minimal reliance on domesticates and the manufacturing of pottery can so far be established for the east. Furthermore, these regions had long established contacts with the Carpathian basin, as indicated by snails from the Middle Danube in some southern German rock shelters (*Rähle 1978*). Towards the west, however, contacts and local resistance against all too rapid acculturation seem to have persisted into the Flomborn phase of LBK. It is only then that the characteristic LH sherds disappear from the LBK sites (*Lüning et al. 1989*) and, shortly after, pottery forms appear on LBK sites which show a blend of LBK and LH, or LB decorative styles (*Jeunesse & Winter 1998*). In the NW and the Paris basin, contacts probably endured much longer; however, a certain Mesolithic contribution has also been suggested for the emergence of the Middle Neolithic in southern Central Europe, where notably the burial rites show influences from practices known from the Mesolithic of the northern European lowlands (*Häusler 1994*). The sometimes implied revival of a Mesolithic economy has, however, recently been disproved as, at least in western Central Europe, Middle Neolithic faunal assemblages do not indicate notable amounts of wild animals (*Jeunesse & Arbogast 1997*). Indeed the question emerges: from where would those influences have come? Where were those late Mesolithic survivors; where did they hide for some three hundred years?

In recent years, models of the Neolithization of Central Europe have been enriched by another component. Notably, Kind ( *1997*) has continuously argued that in some parts of southern Germany late Mesolithic groups and their traditional economy continued to exist throughout the Early Neolithic. He baptized the material remains of these survivors the *Buchauer Gruppe*. According to him (*Kind 1997.144*), these groups would be different from those engaging in small scale horticulture and would not use LH pottery, but instead have a highly mobile settlement pattern. He based his ideas on excavations in the Federsee region of Württemberg, where at some sites he obtained C14-dates which extend well beyond the 53rd century BC, the proposed date for the advent of Earliest LBK in the region. However, these dates stem from series which also include measurements which would date the sites before the advent of the Earliest LBK, and hence cannot be taken as proof of the contemporaneous presence of highly

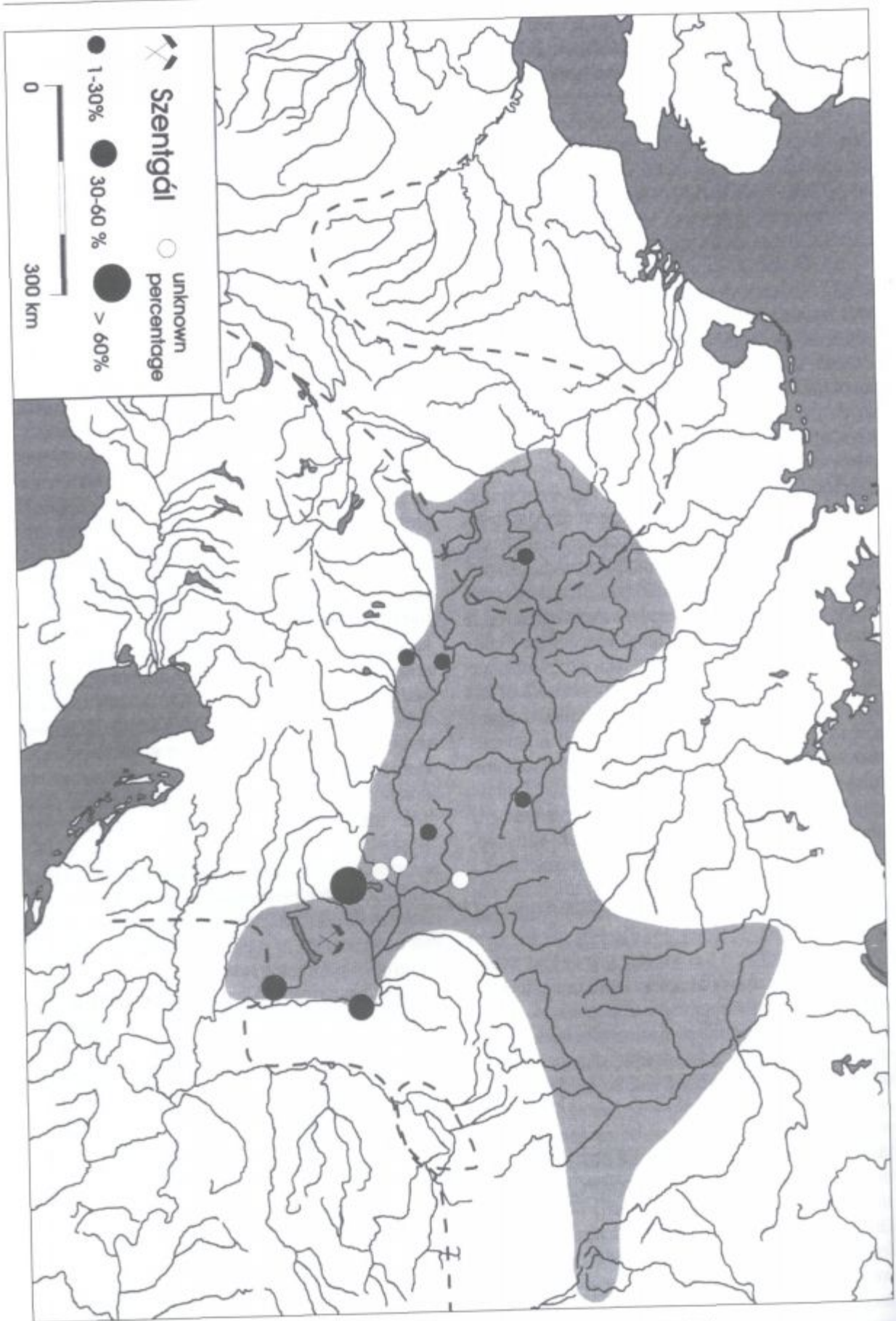


*Fig. 3. Szentgál-type radiolarites on Earliest LBK sites (after Gronenborn 1997a).*

mobile, Late Mesolithic hunter-gatherers and Earliest and later LBK (*Gronenborn 1997a*). Indeed, the situation is difficult to assess, as clearly visible contact finds are extremely rare. For southern Germany so far only the harpoon fragment from Grießen in the Upper Rhine valley (*Gersbach 1956*) can be named. Furthermore, of course, there are the LH sherds within the LBK context (*Lüning et al. 1989*). Possible indicators for an at least partial overlap stem from the Mesolithic sites of Henauhof-Nordwest in the Federsee-region (*Jochim 1993.109–110*), where a grinding stone seems to have been embedded in the Late Mesolithic layers (however, see *Tillmann 1997*), and Lautereck rock shelter (*Taute 1967*), in the Upper Danube valley, with a Terminal Mesolithic occupation which, according to a C14 date would be contemporary with the Earliest/Earlier LBK. LBK pottery stems from the layers above, but there are no definite contact finds. Furthermore, the situation at Stuttgart-Bad Cannstatt (*Brunnacker et al. 1967*) needs to be carefully examined. So to firmly establish Kind's *Buchauer Gruppe*, it would require, in my opinion, a little more hard archaeological evidence. In this way the situation is somewhat similar to that in NW Europe, e.g. the Hesbaye, where Keeley & Cahen (*1989; Keeley 1996*) have proposed a model of violent conflict between Late Mesolithic indigenous populations and LBK "invaders/conquerors"[3]. But here, too, hard facts that provide evidence for such a conflict cannot be brought forward; the model relies largely on the territorial exclusion of Late Mesolithic and LBK sites.

## What happened to the last hunters?

I should stress at this point that I do not deny the existence of an indigenous, assimilated population within LBK (*Gronenborn 1997a*). However, the point is this: the fact that local groups became assimilated during Flomborn times, as the pottery evidence in Hessia and Baden-Württemberg suggests, reduces their visibility. It is questionable whether the lithic technology of the Late Mesolithic groups would not equally have undergone change, just as did the LBK technology; even more so when we have evidence of contact. It is even more surprising that those sites cited by Kind did not produce any evidence of contact, whereas it is quite frequent on LBK sites. I would therefore suggest that the sites named by Kind (*1997*) are not Late Mesolithic sites contemporaneous with LBK, but rather actually date before the advent of the Neolithic of the Danubian tradition. So, where are those people that were indigenous? If I am correct, their material culture should be hard to detect as it became mingled with that of the immigrants. It might be helpful to look at the anthropological record, the evidence from burials. One site in particular has just very recently produced astounding evidence: at Vaihingen, in a fortified settlement, dating from Flomborn to a younger LBK, human bones from disarticulated skeletons in refuse pits differ from those stemming from ordinary burials in the refilled ditch surrounding the settlement in that they are more robust (*Krause 1997, online*). This circumstance reminds us of other cases where differences in robustness have been noted for LBK burials (for instance, in Rixheim; *Gerhardt & Gerhardt-Pfannenstiel 1984/85*). Robustness has a variety of causes, one of them being physical stress. Indeed, such is partly the case in Rixheim. But in addition, two different physical types were discernible there. Would it be possible to ascribe one of them to a local Mesolithic population? In Vaihingen, the robust remains were not properly buried. This allows two possible interpretations: firstly, their burial rites did not include interment. In recent years it has become increasingly clear that burial rites practiced in LBK were twofold: interment, and another type that largely escapes archaeological recognition, such as cremation or above- ground burial. I have suggested (*Gronenborn in press*) considering a Mesolithic tradition for the latter practice. If this was the case in Vaihingen, the bone remains of the decomposed burials made their way into the refuse pits through taphonomic processes. The other explanation is less pleasant. Disarticulated settlement burials have been considered to be the remains of those who led a marginalized life within societies (*Veit 1993*). Indeed, ethnographic evidence abounds for such practices, where prisoners of war were enslaved and occasionally sacrificed (*Weule 1916; Feest 1980; Keeley 1996; Donald 1997*). That a conflict-laden situation existed at Vaihingen is demonstrated by the fortification ditch around at least part of the village and, for the later LBK, warfare and harshly violent conflicts become increasingly evident (*Teschler-Nicola et al. 1996; Alt et al. 1997; Spatz 1998*). Those on the losing side in the conflict around Vaihingen may have led a less fortunate life and, after hard labour, were disposed of and left to decay. But it could well be that their ancestors were local hunter-gatherers.

Certainly these clues are far form being complete, and I am well aware that some colleagues will find

3 For a similar model for Dutch Limburg with less emphasis on violence Wansleben & Verhart (*1990*).

this approach hair-raising. But still I consider it a worthwhile path of inquiry since, if migrations occurred for which there are, in my belief, still very good arguments, differences between the locals and the immigrants after the contact phase should be archaeologically visible only on a very subtle level.

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# Slighting the sea: stable isotope evidence for the transition to farming in northwestern Europe

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ABSTRACT – *While it is accepted that the Neolithic was an intrusive phenomenon across much of Central Europe, the transition to food production on the northwestern fringes of the Continent has been viewed in terms of complex interactions between incoming and indigenous populations, leading to 'continuity' and 'acculturation' rather than replacement. Much current opinion holds that this was in many areas (in particular southern Scandinavia and the British Isles) a gradual process, and that radical changes did not occur in the subsistence economy, which is seen as retaining a fishing-hunting-gathering character. However, such a view is not in accordance with a considerable body of stable isotope evidence, presented and discussed here. This evidence, it is argued, has very different implications for the nature of the transition.*

POVZETEK – *Velja mnenje, da je bil neolitik v večjem delu Evrope vsiljen pojav, v skrajni severozahodni Evropi pa je bil prehod v pridelovalno gospodarstvo posledica kompleksnih medsebojnih vplivov med prišleki in domorodnim prebivalstvom. Zaradi tega tu ni prišlo do zamenjave, ampak do "kontinuitete" in "akulturacije". Danes so številni arheologi mnenja, da je na mnogih območjih (posebno v južni Skandinaviji in na Britanskem otočju) proces potekal postopoma, brez nenadnih sprememb v gospodarstvu, kar se kaže v ohranjanju ribiško-lovsko-nabiralniškega značaja gospodarstva. Vendar pa to stališče ni v skladu z obsežnim sklopom podatkov, ki jih dajejo stabilni izotopi, o čemer bomo govorili v pričujočem članku. Ti podatki kažejo na čisto drugačno naravo prehoda.*

## INTRODUCTION

This paper addresses the process of neolithisation in selected areas of northwest Europe (Fig. 1), focusing on the nature of subsistence changes across the transition. In the literature of Western Europe since the 1960s, the two periods have been largely defined in terms of the subsistence economy – hunting of wild game, fishing and collection of wild plants in the Mesolithic, versus husbandry of domestic animals and cultivation of domestic cereals in the Neolithic. This is a very general scheme – it works best in areas such as central Europe, where incoming groups appeared with a fully-formed farming 'package', making their archaeological identification relatively straightforward. But the distinction blurs along the peripheries of northwestern Europe, where the process was potentially a long, drawn-out one, possibly including intermediate stages (*Zvelebil and Rowley-Conwy 1986*). Problems arise in identifying the basis of the economy using traditional archaeological methods, particularly given the small and potentially unrepresentative faunal assemblages available in the study areas. Plant remains are even less well-represented. The issue is important whether one considers the Mesolithic and Neolithic to be definable by their subsistence economy or not, since the degree to which the various recognised elements of the Neolithic were associated with one another remains a valid and open question. Much of the recent literature downplays the extent of subsistence change across the transition in northwestern Europe. There is a feeling, particularly in Britain, that changes in the subsistence economy lagged behind, or were of secondary importance, to changes in other aspects of society, particularly in worldview or cosmology (*Bradley 1993; Hodder 1990; Whittle 1996*). The continued importance of 'wild' resources


***Fig. 1. Map of Europe showing selected study areas.***

has been emphasised, although the evidence for this is really quite limited. I will argue in this paper that there was a significant change in subsistence orientation beginning with the Neolithic even in areas outside of the LBK sphere of influence.

## A BRIEF OVERVIEW OF THE STABLE ISOTOPE TECHNIQUE

One of the strongest new lines of subsistence evidence comes from bone chemistry. By directly addressing the long-term diet of the individual, dietary reconstruction using bone chemistry analysis bypasses many of the difficulties associated with more traditional archaeological approaches to subsistence. The technique is based on the natural occurrence of heavier, but stable, isotopes of certain elements, the most important of which are carbon and nitrogen (*DeNiro and Epstein 1978; 1981*).

There are two situations in which stable carbon isotopes are useful for dietary reconstruction. The first involves the differentiation of systems based on terrestrial $C_3$ vs. $C_4$ plants. $C_3$ and $C_4$ plants are easily distinguished by their isotopic signatures, as are any food chains based on them. The classic example of a $C_4$ plant in the New World is maize, while millet serves as an important Old World example. Neither of these plants are relevant within the study area, nor are there any other $C_4$ plants of dietary importance among the indigenous plant species of temperate Europe. It is the second application that is important here: that is, that systems based on terrestrial $C_3$ plants can be easily distinguished from marine systems. The proportion of $^{13}C$ is higher in the marine carbonate reservoir drawn upon by marine organisms. These initial differences are maintained along their respective food chains; carbon from plants/phytoplankton eaten by herbivores/zooplankton is incorporated into the proteins of those organisms, preserving the isotopic signature of their origins, and so on up the food chain. An enrichment of about 5‰ occurs between diet and consumer bone collagen in mammals. Thereafter, trophic level effects are either small (ca. 1‰) or non-existent and need not concern us here. The technique is well-established and has proven very useful in quantifying the human use of marine foods in various parts of the world (*Chisholm et al. 1983; Hobson and Collier 1984; Lee-Thorpe et al. 1989; Lovell et al. 1986; Lubell et al. 1994; Sealy and van der Merwe 1985; Tauber 1981, 1986; Walker and DeNiro 1986*).

Isotopes of stable nitrogen ($^{15}N$) are also enriched in marine systems relative to terrestrial systems, but more importantly, the degree of trophic level fractionation is significantly greater (ca. 3‰). Thus nitrogen isotopes can be used to characterise the trophic level of the organism in question. There are two situations in which this is particularly useful. The first involves an estimate of the relative importance of plant and animal protein (blood, meat and milk products) in the diet. In a diet based primarily on plant foods, humans will look like herbivores, while in a diet with a substantial terrestrial meat component they will appear as carnivores, and their $\delta^{15}N$ should be about 3‰ higher than seen in herbivores. The second use of the technique takes advantage of the fact that marine food chains are on average much longer than terrestrial chains. Thus a seal, for example, can be a fourth- or fifth-order carnivore – no terrestrial mammals attain such a position. Humans consuming a substantial proportion of fish and/or sea mammals will thus have a far higher stable nitrogen value than is possible to attain in a purely terrestrial system. A reliance on lake fish, would, following the same logic, also result in high-

er stable nitrogen values than expected in a land-based terrestrial system, so that aquatic systems can also be distinguished from land-based terrestrial systems (*Katzenberg 1989*). In a situation where both marine and freshwater aquatic foods were available, interpretation of stable nitrogen values alone would be problematic; fortunately, this situation would be resolved, in the absence of $C^4$ plants, by a consideration of stable carbon isotope values.

For true quantification to be possible, it is of course necessary to know the 'endpoints' for the systems under discussion in order to estimate the relative contribution of marine and terrestrial protein, and/or plant and animal protein. For stable carbon, a purely terrestrial $C_3$ system has been shown to result in human bone collagen values of -20 to -22‰, while a purely marine system will in most cases give values of about -12 to -13‰ (*Chisholm et al. 1983*). Stable nitrogen isotopes undergo a 3 ± 1‰ enrichment per trophic level. Air, the standard, has a $\delta^{15}N$ value of 0; most temperate, non-nitrogen fixing plants will have values around +3‰; herbivores (including vegetarian humans) will be about 6‰; first-order carnivores will have values of about 9‰, second-order carnivores 12‰, and so on (Fig. 2). For example, analysis of human and faunal remains from the Iron Gates Mesolithic and Neolithic found an average $\delta^{15}N$ value for 10 bovids of 5.6 ± 1.0‰ (*Bonsall et al. 1997*), which fits reasonably well with the expected value of 6‰ for herbivores. There is a degree of regional variability in nitrogen values, and ideally faunal samples from the same sites as human bone samples will act as controls to identify the isotopic position of herbivores and carnivores.

Another important issue to be considered involves the turnover rates of collagen in human bone. An average of five to ten years is often cited, and this

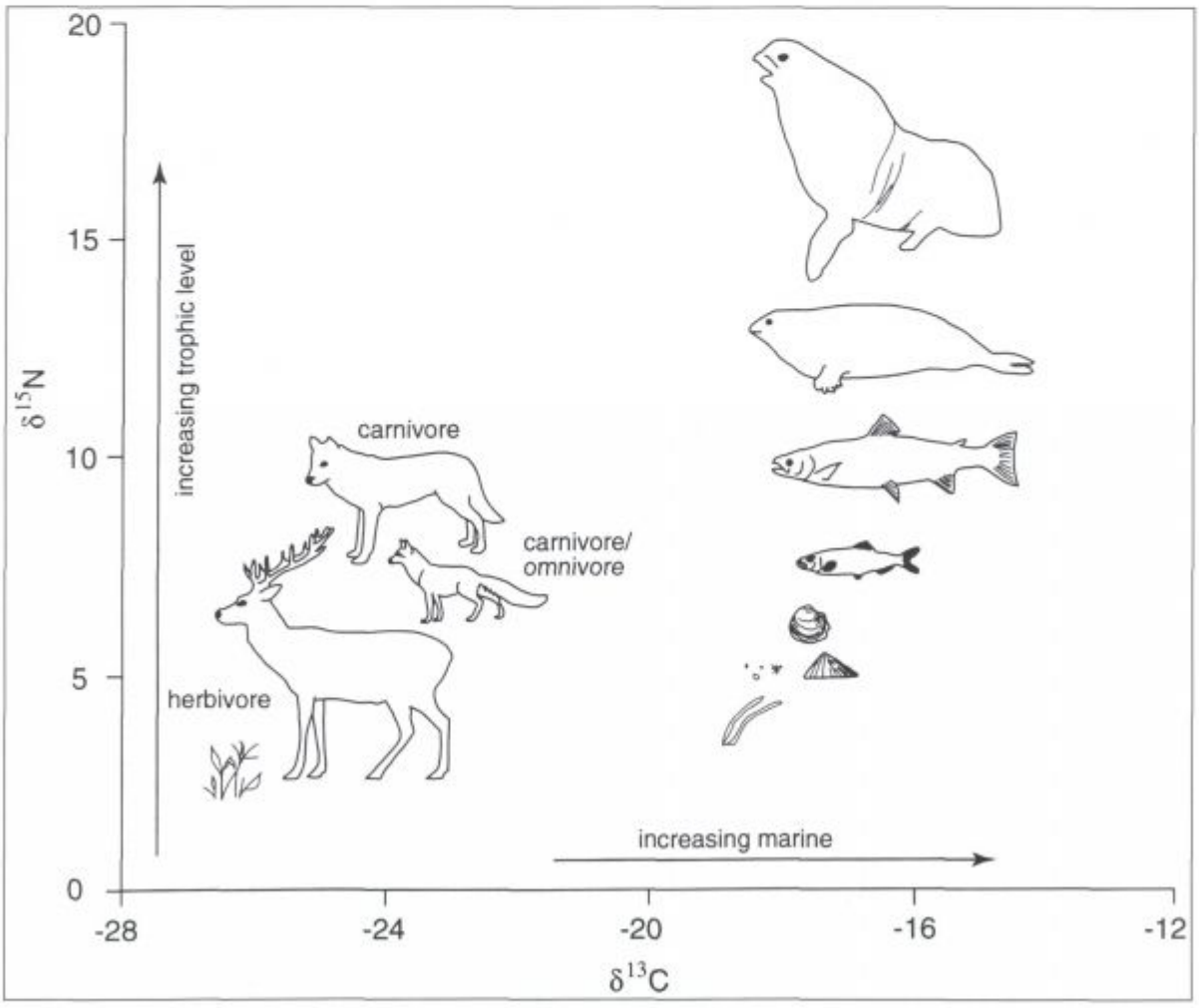


***Fig. 2. Simplified summary of stable carbon and nitrogen values for terrestrial and marine ecosystems (values are for flesh; to convert to bone collagen values, 5‰ should be added to $\delta^{13}C$ values; $\delta^{15}N$ values are the same for flesh and bone, but approx. 3‰ must be added to diet item in order to arrive at consumer values); note the higher trophic levels possible in a marine foodchain.***

serves well enough for most purposes (*Chisholm 1986*). That is, stable isotope results on human bone reflect on roughly the last five to ten years of that individual's diet. Finally, it must be emphasised that both stable carbon and stable nitrogen values of bone collagen reflect primarily the *protein* component of the diet. This is a critical fact and has often been overlooked by archaeologists, and until quite recently was not accepted by all stable isotope specialists either. It has now been demonstrated by feeding experiments with mice and rats (*Ambrose and Norr 1993; Tieszen and Fagre 1993*). The sources of carbohydrates and lipids – the other two major components of the overall diet and those usually providing most of the daily energy requirements – make a minimal contribution to the carbon in bone collagen. The $\delta^{13}C$ values of bone apatite (bioapatite) *do* reflect overall diet (*Kreuger and Sullivan 1984*), but this component is still infrequently measured, and is more difficult to deal with due to problems with diagenesis. The situation with nitrogen is more straightforward, since dietary protein is the only possible source for animals.

We can use our knowledge of the isotopic signatures of various foods, and their caloric and protein contents, to construct a series of model diets and estimate the stable carbon and nitrogen isotope values they would bring about in human bone collagen (Tab. 1 and Fig. 3). A number of points worth noting emerge from this exercise. The contribution of high-starch and low-protein characteristic of many

| Diet | Description (% refers to calories) | $\delta^{13}C‰$ | $\delta^{15}N‰$ |
|---|---|---|---|
| ***inland hunter-gatherers*** | | | |
| 1 | emphasis on game (>70%) | -20.9 | 8.3 |
| 2 | game w+ some freshwater fish (20%) | -20.7 | 9.5 |
| 3 | emphasis on freshwater fish (50%) | -20.3 | 11.4 |
| 4 | emphasis on non-cereal plants (>75%) | -20.9 | 7.9 |
| ***coastal fisher-hunter-gatherers*** | | | |
| 5 | balanced terrestrial/marine (50:50) | -16.5 | 12.2 |
| 6 | emphasis on marine fish (>50%) | -13.9 | 14.0 |
| 7 | emphasis on marine mammals (>60%) | -13.9 | 15.8 |
| 8 | non-cereal plants with marine fish/mammals | -15.2 | 12.0 |
| ***farmers*** | | | |
| 9 | emphasis on domestic animals (>50%) | -20.9 | 8.9 |
| 10 | emphasis on cereals (>70%) | -21.0 | 7.1 |

***Tab. 1. Predicted carbon and nitrogen bone collagen stable isotope values for model human diets.***

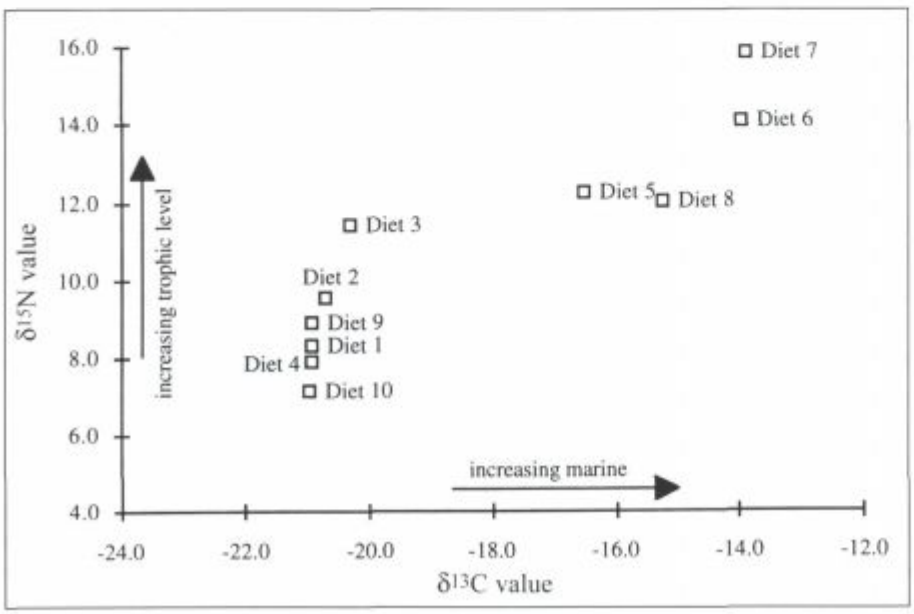


***Fig. 3. Plot of stable carbon and nitrogen values for model diets.***

tubers and roots has a small impact on the stable isotope values seen in consumer bone collagen, even when they form a significant portion of the overall diet in terms of caloric requirements. For example, a diet in which 80% of the caloric requirements was met by tubers and roots could contribute only 40% or less of the protein intake. Thus the importance of high-energy, low-protein foods will be underestimated by stable isotope measurements *on collagen*. Leafy green vegetable foods, providing both low energy and low protein, do not figure in the diet in the sense of either a major caloric or protein contribution, no matter in what quantity they are consumed. At the other extreme, the importance of low-calorie, high-protein foods will be exaggerated. The protein content of lean fish, one of the best examples, far more significant than its caloric content.

While this greatly undermines our ability to reconstruct overall diet with stable isotopes in certain situations, it could be argued that starchy foods would be of relatively little importance in prehistoric north-temperate Europe. Certainly the ethnographic data summarised by Lee (*1968*) support such a position. The potential importance of plant foods is receiving increasing attention for the European Mesolithic (*Zvelebil 1994*). But the food value of plants such as bracken is questionable, in terms of both caloric and protein yields, and also protein quality and digestibility. Because foods such as hazelnuts and especially cereals are higher in protein, they are affected to a far lesser extent, although they are still underrepresented in collagen isotope values compared to game and fish.

Finally, it should be noted that anadromous fish such as salmon spend most of their lives feeding in the sea, and so have a marine isotopic signature. The effects of this on human isotopic values in situations with high reliance on salmon have been dramatically demonstrated on the Northwest Coast and Plateau culture areas of North America, where human bone from archaeological sites hundreds of kilometres from the coast show $\delta^{13}C$ values indicating a considerable input (up to 50% or more) of marine protein (*Lovell et al. 1986*). The potential importance of salmon in the Mesolithic diet of north-western Europe has often been alluded to, but little direct evidence is available. Human bone from inland contexts is rare within the present study area, and so it is difficult to address this possibility. However, none of the few available $\delta^{13}C$ values from appropriate inland riverine contexts from either Britain or the western Continent suggest that salmon were an important resource in the either the Mesolithic or the Neolithic (*Schulting and Richards in press*). Another anadromous fish, the sturgeon, seems to have been significant in the diet of the Mesolithic inhabitants of the Iron Gates, but this area is beyond the scope of the present discussion.

## STABLE ISOTOPE DATA FROM SELECTED AREAS OF NORTHWEST EUROPE

### Denmark

Southern Scandinavia is of special importance in discussions of the Mesolithic-Neolithic transition in northwestern Europe, because of the quality and quantity of its evidence, the long history of research, and the presence of the Late Atlantic period coastline that is elsewhere submerged. Stable carbon isotope studies in Denmark were among the first to be undertaken. They demonstrate a very abrupt change in diet at the Mesolithic-Neolithic transition, from a fairly heavy reliance on marine resources in coastal situations to heavy reliance on terrestrial resources (*Tauber 1981; 1986*). In fact, with the exception of a few Early Mesolithic individuals, which must be seen as reflecting an inland adaptation, there is a complete lack of overlap in the distribution of values for the two groups (Figure 4). The trend towards increasing $\delta^{13}C$ values through time in the Mesolithic data can be at least partly attributed to sea-level changes and site survival. Mesolithic dogs follow a remarkably similar pattern to that seen in the humans, with the exception of two late animals (ca. 5250 BP) with exclusively 'terrestrial' signatures. Of these two exceptions, the Prestalyngen dog has been used as evidence for a distinct inland adaptation in the Late Mesolithic (*Noe-Nygaard 1988*). Various explanations are possible for the 'terrestrial' dog on the coastal site of Ølby Lyng on Zealand (*Rowley-Conwy in press; Schulting 1998*).

One of the most telling examples of the remarkable suddenness of the transition involves three individuals from two graves at Dragsholm in northwest Zealand. One of the two Mesolithic adult females contained in a single grave was dated to 5160 ± 100 BP (K-2224), and they yielded $\delta^{13}C$ values of -11.5‰ and -12.2‰ (*Brinch Petersen 1974*). This must be regarded as the endpoint for a marine signature. In other words, essentially all of the protein in the diet of these two individuals over at least the last 10 or so years of their lives came from the sea. The Neoli-

thic individual, an adult male found only a few metres away, has been dated to 4840 ± 100 BP (K-2291), with a $\delta^{13}C$ value of about -21.5‰. This value presents a typical terrestrial endpoint - there is no evidence for the consumption of marine protein by this individual. What is most remarkable is that the radiocarbon estimates actually overlap at a 95% confidence interval (*i.e.*, two sigmas), and this becomes even more apparent when a correction for the marine reservoir effect is applied (a complex issue that will not be further explored here; see Schulting 1998 for further discussion). There is little question but that the diets of the 'Mesolithic' and 'Neolithic' individuals at Dragsholm were diametrically opposed. While these results are quite extreme in terms of the strength of the marine signature of the Mesolithic individuals, the general pattern is one that applies throughout Denmark.

Denmark also saw one of the first applications of stable nitrogen analysis to human remains, which again demonstrates a clear separation of later Mesolithic and Neolithic populations. As would be expected, the stable nitrogen values support the stable carbon results, and are completely non-overlapping for seven Late Mesolithic individuals (averaging 13.9‰) and five Neolithic individuals (averaging 8.9‰) (*Schoeninger et al. 1983*). This is exactly what would be expected given a high reliance on marine fish and mammals in the Mesolithic, versus an emphasis on terrestrial animal protein in the Neolithic. The $\delta^{15}N$ values for the Neolithic remain relatively high, and do not suggest a high reliance on plant protein; however, contemporary local fauna - both herbivores and carnivores - should be measured before this conclusion can be regarded as firm, and a closer approximation of the proportions of animal and plant foods given. The Mesolithic average of 13.9‰, while far higher than expected for a non-aquatic, terrestrial foodchain, is relatively low for a marine system, suggesting that shellfish and fish played a greater role than marine mammals in the protein component of the diet of the individuals measured ($\delta^{15}N$ values for 19 recent coastal fisher-hunter-gatherers from Greenland and Alaska, for example, averaged 18.7‰ [*Schoeninger et al. 1983*]).

## Scotland

Until recently, little use has been made of the stable isotope technique in Britain. Fragmentary human remains found in two shell middens on Oronsay, on the Scottish West Coast have recently been reported (*Richards and Mellars 1998*). The results from one site, Cnoc Coig, indicate that the protein component of the diet was largely marine-derived. Interestingly, the single sample from the second site, Caisteal nan Gillean II, yielded a $\delta^{13}C$ value of -15.8‰, which is significantly lower (*i.e.*, less marine) than the closely grouped values (averaging -12.6‰) for the five Cnoc Coig specimens (possibly representing only two individuals). A change in diet over time is one possible explanation for the difference in stable carbon between the two sites; while radiocarbon dates show the sites to date to roughly the same period (ca. 5500 BP), there are no dates directly on the human bones (such are being undertaken). The sites are so close to the appearance of the Neolithic on the West Coast that the Caisteal nan Gillean II individual might conceivably reflect a transitional diet.

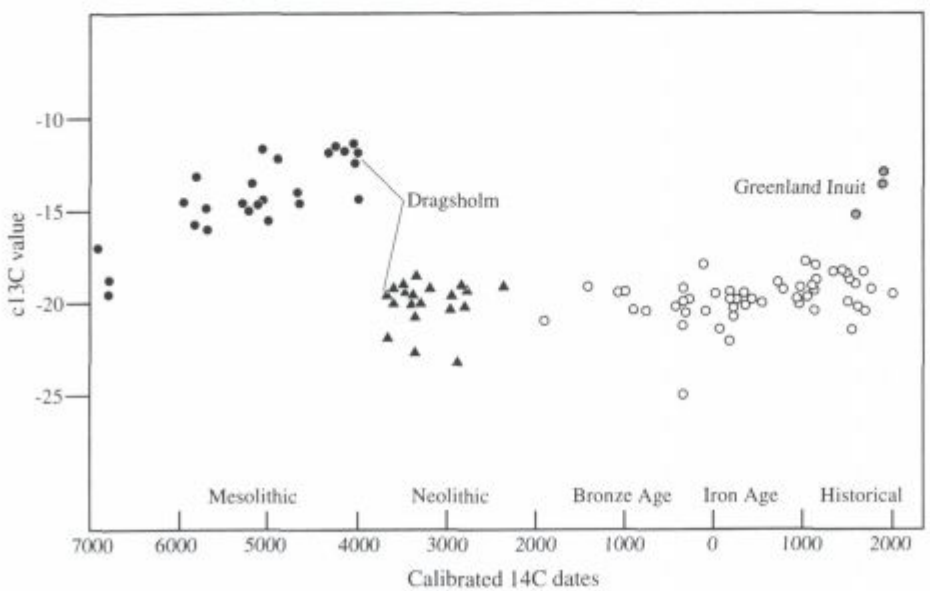


***Fig. 4: Stable carbon isotope values associated eith radiocarbon dated human bone from Denmark (after Tauber 1986, Figure 3).***

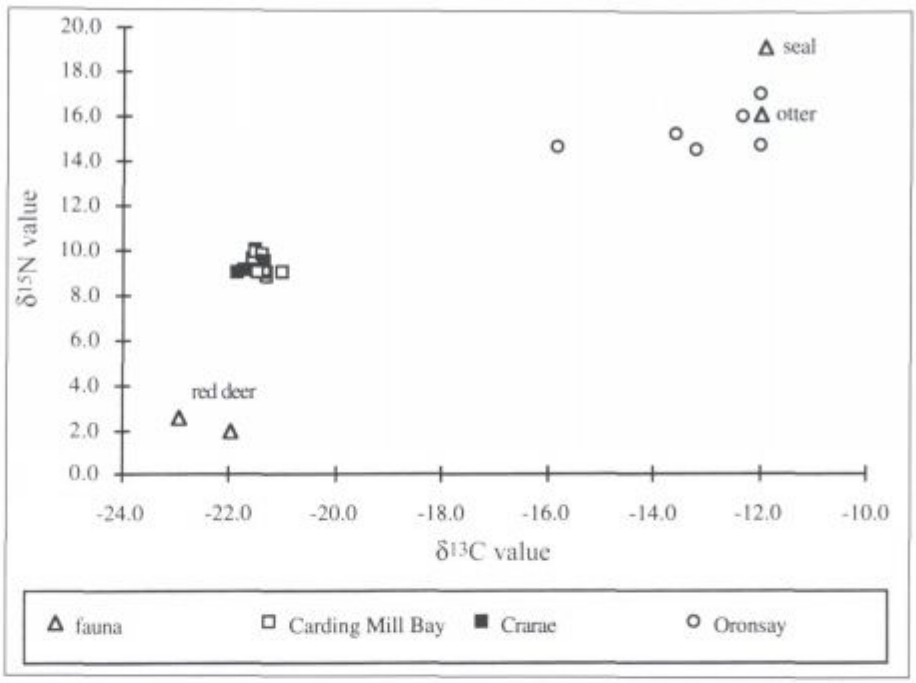


***Fig. 5. Bone collagen stable carbon and nitrogen isotope values for human and faunal samples from various sites on the West Coast of Scotland (source of Oronsay values: Richards and Mellars 1998).***

But there are other possible explanations (*Schulting and Richards in press*). The individual may have spent part of his/her life in an inland situation, later moving to the coast. The number of samples from these sites is too small and the chronological resolution too poor to discuss the various alternatives further at this point.

Human bone samples from two additional sites on the Scottish West Coast have recently been analysed: the shell midden at Carding Mill Bay near Oban, and the Neolithic chambered tomb of Crarae on Loch Fyne. It was hoped that the human remains found in various contexts at the Carding Mill Bay shell midden would span the transition (available radiocarbon dates range from ca. 5200 to 4800 BP [*Connock et al. 1992*]), allowing an investigation of the relative importance of marine resources in the Mesolithic and Neolithic. However, the stable isotope results show no use of marine protein, strongly suggesting that the human remains all date to 5000 BP or later. The low standard deviations for both the stable carbon and nitrogen measurements emphasises the remarkable isotopic homogeneity of the diet of this population. If some of the human remains are indeed associated with the dated 'Obanian'/Mesolithic levels, it would indicate a surprising separate terrestrial adaptation on the Scottish mainland. Alternatively, the remains may be intrusive from a later period, as there is a Bronze Age cist burial near the top of the midden deposits (*Connock et al. 1992*). A series of accelerator dates will resolve this issue.

The stable carbon results from the earlier Neolithic chambered tomb at Crarae on Loch Fyne again show no contribution of marine protein in the diet of these individuals (possibly only one but more likely at least two individuals are represented by the three measurements), despite the proximity of the tomb to the sea and the large numbers (some 5000) of intentionally deposited oyster and other marine shells found both in the tomb and in the forecourt (*Scott 1961*). This conclusion is further supported by the $\delta^{15}N$ values, which indicate predominantly terrestrial meat protein, presumably cattle. It is worth noting that the tomb is situated in a relatively fertile pocket of an otherwise rocky, hilly area. This, rather than the site's proximity to marine subsistence resources, may have been a prime factor in the choice of location for the site. Also, the potential importance of the sea as a communication route should not be overlooked.

Comparing the available values from Scotland, the separation between a 'Mesolithic', marine-based diet and a 'Neolithic', terrestrial-based diet is quite striking (Fig. 5). The tight clustering of all human samples from Carding Mill Bay and Crarae strongly implies an isotopically homogeneous diet with minimal input of marine foods. The separation along the $\delta^{15}N$ axis between the humans and the red deer may be exaggerated (cattle values tend to be higher), but nevertheless it is unlikely that cereals or other plants contributed much to the protein component of the diet. This conclusion is strengthened by the relative absence of habitats suitable for fresh-

water fish on the Scottish West Coast, which could provide an alternative to terrestrial mammals that would be disproportionately reflected in the $\delta^{15}N$ values. It is likely, then, that the majority of the protein in the diet of these individuals was acquired from domestic animals. By contrast, the Mesolithic values from Cnoc Coig on Oronsay are very similar to the values for otters from Carding Mill Bay and from Oronsay itself, and suggests that the diet of these individuals was similarly dominated by fish.

## England and Wales

In England and Wales, a small number of Mesolithic radiocarbon dates with associated $\delta^{13}C$ values are available from the literature (mainly from the journals *Radiocarbon* and *Archaeometry*). Most belong to the earlier part of the Mesolithic; given changes in sea-levels, these must be seen as representing largely inland adaptations. Nevertheless there is some hint of a pattern, with humans from sites near the modern coast showing slightly higher values (*i.e.*, more marine) than their Neolithic counterparts (*Schulting 1998*). With one possible exception, no Late Mesolithic burials are known from southern Britain, so that it is not possible to simply measure known burials for their isotopes and compare them to Neolithic individuals. Rather, relevant samples must be actively sought out. Caldey Island was chosen as a promising location: the island would have remained relatively close to the Atlantic period coastline, so that human communities would have been close enough to the coast to expect the use of marine resources. The mixed cave deposits at a number of sites on the small island contained fragments of human bone together with fauna and tools spanning the Late Pleistocene and most of the Holocene. The site of Ogof-yr-Ychen has already provided the latest Mesolithic date on human bone from any context in England/Wales, ca. 7000 BP (7020 ± 100 BP, OxA-2574) (*David 1990*). Lithic assemblages also indicate a Late Mesolithic presence at a number of the sites (*David 1990; Davies 1989; Lacaille and Grimes 1955; Nedervelde et al. 1973*). Human bone samples were obtained from five locations on the northeast corner of the island: Nanna's Cave, Potter's Cave, Daylight Rock, Ogof-yr-Ychen, and Ogof-yr-Benlog (see David [*1990*] and Schulting [*1998*] for further discussion of the sites).

The isotope results clearly show the presence of individuals with significantly different diets. Values for $\delta^{13}C$ and $\delta^{15}N$ are strongly correlated ($r^2 = 0.81$), both demonstrating that some individuals had diets in which a large part of the protein was acquired from marine resources (Fig. 6). In particular, all five samples from Ogof-yr-Ychen, representing three or possibly four individuals, reflect considerable use of marine protein. This is in marked contrast to the eight human bone samples from Nanna's Cave, none of which indicate any use of marine resources. The same applies to the single sample from Ogof-yr-Benlog, while both Potter's Cave and Daylight Rock

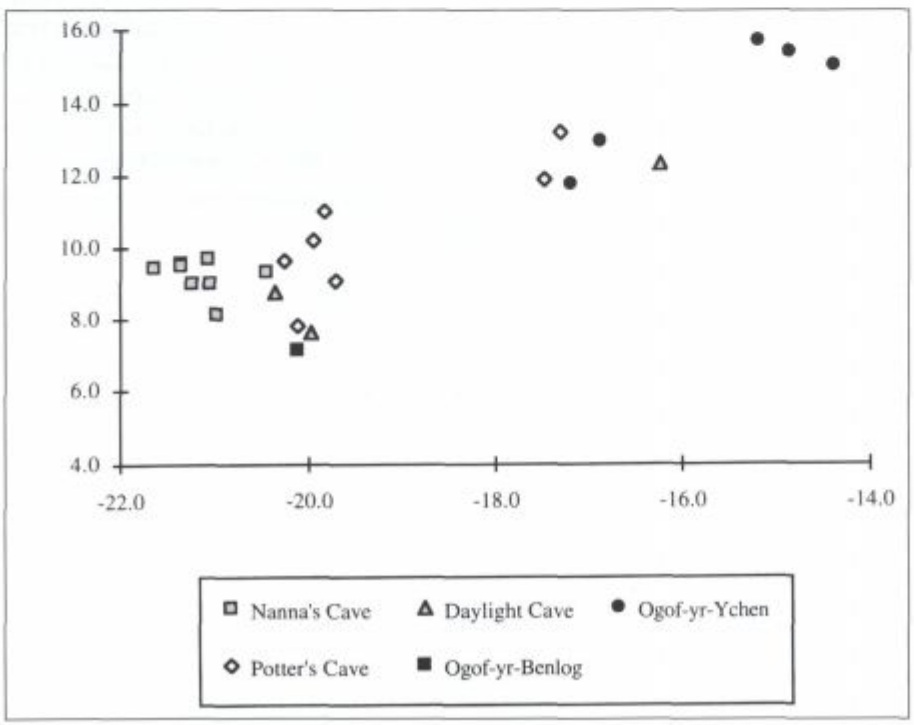


***Fig. 6. Bone collagen stable carbon and nitrogen isotope values for human and faunal samples from various sites on Caldey Island, south Wales.***

clearly divide into two groups, one of which exhibits an entirely terrestrial diet, while the other shows the use of approximately one-third or more marine-derived protein. It is hypothesised that these differences primarily reflect the date of the human remains, and that, consistent with what is known from elsewhere in western Europe (outside of northern and eastern Scandinavia), those individuals exhibiting high $\delta^{13}C$ values are of Mesolithic age. No such precise prediction can be made for individuals exhibiting a terrestrial diet – these could either be Palaeolithic/Early Mesolithic (when marine resources may not have been emphasised, and the sea would have been at a considerable distance even if they were), or Neolithic or later, when domesticated resources came to dominate subsistence in both inland and coastal locations.

Those samples demonstrating 'mixed' terrestrial/marine protein (two from Potter's Cave, one from Daylight Cave and two from Ogof-yr-Ychen) are of particular interest, since there are a number of possible interpretations, involving variation within one population at one time, change through time in the degree of use of marine resources, and/or patterns of seasonal movement. AMS dates will help choose between these alternatives.

In contrast, a series of stable carbon isotope values on dated earlier Neolithic individuals from coastal and near-coastal sites in southwest England and Wales show little or no indication of the use of marine-derived protein. While the majority of the values are by-products of accelerator dates, those from the chambered tomb of Parc le Breos Cwm on the Gower Peninsula have been analysed specifically for palaeodiet (*Richards in Whittle and Wysocki in press*), and are consistent with the other values. A few values of around -19.5‰ do suggest some minimal input of marine protein (on the order of 5-10% of protein intake) in the diet of some individuals at Parc le Breos Cwm and Little Hoyle Cave. Little Hoyle Cave is of special interest, since the site is located on the mainland adjacent to Caldey Island. The human remains here span the earlier Neolithic (4930 to 4660 BP) (*Hedges et al. 1993*), yet if anything the two earliest individuals show less indication of a marine signature than the two later individuals, although the difference is insignificant. Thus no trend can be detected, either at Little Hoyle or at Parc le Breos Cwm, for any gradual change in subsistence from a more 'Mesolithic' diet (*i.e.*, one including seafoods) in the Early Neolithic to a more 'Neolithic' diet in the Middle Neolithic. It may be that such a transition did take place in the few centuries prior to ca. 5000 BP, but since human remains are as yet unknown in this area from the critical period between 7000 and 5000 BP, this possibility must remain open for future investigation.

**Brittany**

Téviec and Hoëdic are Late Mesolithic shell middens presently located on small islands off the coast of Brittany, although during the Atlantic period sea-levels would have been considerably lower (*Schulting 1996*). Téviec and Hoëdic are known for their relatively elaborate graves, including single, double and multiple interments, some of which, associated with simple stone cists, are clearly successive in the same tomb (*Péquart et al. 1937; Péquart and Péquart 1954*). Cemeteries present the ideal context for isotopic studies, presenting relatively large numbers of individuals from a single location; they often show continued use through a considerable period of time as well. To take full advantage of the opportunities offered, however, it is essential to analyse as many individuals as possible. Human bone samples were obtained from a total of 25 individuals (14 from Téviec and 11 from Hoëdic) for the purposes of stable isotope analysis and accelerator dating. This represents all the individuals that still exist in museum collections, with the exception of two for which permission was denied. Accelerator dates were obtained on a sub-set of 14 of these individuals, comprising 8 from Téviec and 6 from Hoëdic (*Schulting in press*).

The stable carbon isotope results from Téviec and Hoëdic present a very consistent set of data that make it clear that a significant portion of the protein component of the diet was derived from the sea (Fig. 7). This is particularly the case at Hoëdic, which shows on average a significantly greater reliance on marine-derived protein than seen at Téviec. While the average $\delta^{13}C$ value of -14.2 ± 0.9‰ for Hoëdic suggests that from approximately 70 to 90% of the protein in the diet of those individuals measured was from seafoods, the average of -15.5 ± 0.9‰ from Téviec indicates a more balanced economy incorporating both marine and terrestrial protein sources in near-equal proportions. The $\delta^{13}C$ results are supported by trend in the $\delta^{15}N$ results, which are on average higher for Hoëdic than for Téviec.

It is interesting to note that very little in the way of a temporal trend can be detected in the isotopic data (Fig. 8). It might be expected – baring for the moment the appearance of a 'Neolithic' economy – that

the data would show increased use of marine resources through time, if for no other reason than the sea would be moving closer over time. This is clearly not the case, and even the those individuals dating very late in the sequence, when elements of a Neolithic economy might indeed be expected to be making an appearance, show the continuation of a pattern apparently established by at least 7000 BP on the south Breton coast.

Problems arise in addressing the nature and speed of the dietary shift across the transition due to the lack of comparative Neolithic values. Bone preservation in Brittany is poor outside of shell middens, which do not occur in the Neolithic. And the few dates on human bone that have been reported in the literature often do not include stable carbon measurements. There are two exceptions, both of which are flawed. A multi-phase monument at Beg-an-Dorchenn has provided two human bone dates, one of 5490 ± 90 BP (Gif-A92372) and another of 4140 ± 55 BP (OxA-5363). Unfortunately, the earlier date was not associated with a stable carbon isotope value. The later date provides a terrestrial value of -19.5‰, but this is of little relevance to the transition. A relatively early date of 5270 ± 80 BP (OxA-5974) was obtained on human bone from the passage grave of Ty Floc'h, and yielded a typical terrestrial $\delta^{13}C$ value of -21.6‰ (*Hedges et al. 1997*). However, this site is located some 25 km inland, and it may be that contemporary sites closer to the coast would show some use of marine resources. Furthermore, both Beg-an-Dorchenn and Ty Floc'h are some distance from the Gulf of Morbihan, where Téviec and Hoëdic are located.

Late dates (5680 ± 50 BP (OxA-6662), 5755 ± 55 BP (OxA-6710) and 5080 ± 55 BP (OxA-6705)) from Téviec and Hoëdic, even before correction for the marine reservoir effect, and together with the stable isotope data for these individuals, suggest the continuation of a Mesolithic economy into the period traditionally seen as the Middle Neolithic I of Brittany. But the exact chronological relationship between the two periods or 'cultures' is still poorly understood, and a larger series of accelerator dates and isotope analysis on human bone from early Middle Neolithic contexts is needed. The data presented here suggest that the process of neolithisation might be substantially different in Brittany than in southern Scandinavia. The persistence of a largely marine-oriented economy as inferred from the marine signatures at Téviec and Hoëdic would seem to indicate one of two possibilities: either the economy of the earliest Neolithic in Brittany was not based on domesticates, or two separate economies survived for a period of time side-by-side. The latter alternative itself presents two variants: a high degree of economic heterogeneity within a single 'Neolithic' society, or the co-existence of two distinct societies, *i.e.*, 'Mesolithic' and 'Neolithic'. The question of the definition of these terms becomes awkward at this stage, but the underlying issue remains important regardless.

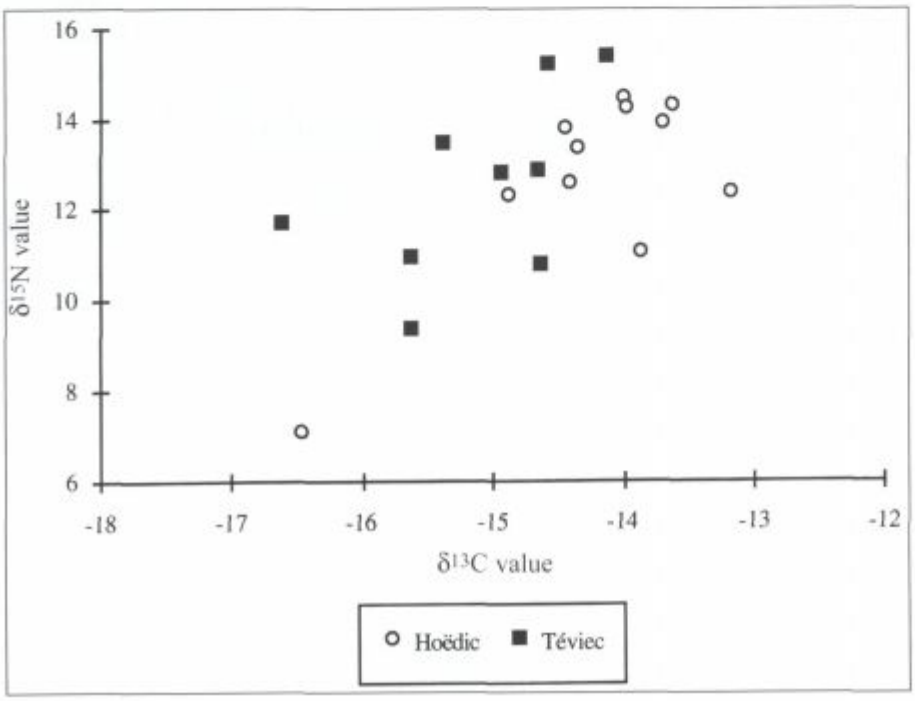


***Fig. 7. Bone collagen stable carbon and nitrogen isotope values for human samples from Téviec and Hoëdic, Brittany.***

## DISCUSSION

It has been argued here that stable isotope analysis presents the best currently available means of broadly characterising Mesolithic and Neolithic diet, and the shift from the one to the other, particularly in coastal areas. This being the case, it is essential to come to terms with the remarkable swiftness and completeness with which the transition to novel resources appears to have occurred, particularly in Denmark, where the evidence is most abundant, but also in other areas. There are a number of possible explanations:

1) the stable isotope technique is providing erroneous results;
2) the human bone samples being analysed are not representative of Mesolithic and/or Neolithic society as a whole;
3) the fully formed Neolithic subsistence package was introduced by an incoming population;
4) changing environmental conditions reached a critical point that dramatically favoured the wholesale and roughly simultaneous adoption of the novel resources by indigenous communities over a wide area;
5) a fairly radical shift in ideology or worldview occurred that encouraged the rapid adoption of novel resources;
6) manipulation of the socioeconomic system by subgroups within Mesolithic communities resulted in novel resources being preferred to traditional resources.

A number of scholars have recently questioned the stable isotope evidence for southern Scandinavia (*e.g., Meiklejohn et al. 1998; Midgley 1992; Thorpe 1996*). While further research is needed to address some of the concerns raised, others are exaggerated and/or have been largely dealt with elsewhere (*Schulting 1998*). For example, it is clear that individuals from both coastal and inland locations have been measured from the Neolithic, negating the criticism that the coastal Neolithic is not represented, thereby biasing the comparison made by Tauber (*1981, 1986*). As some have pointed out (*e.g., Tilley 1996*), it is not possible to differentiate between wild and domestic sources of terrestrial protein. While this is true, it would be remarkable if Neolithic populations suddenly began ignoring the marine resources their immediate predecessors had been relying on for millennia in order to suddenly begin intensively exploiting wild game and plant foods. Moreover, it is questionable whether such a strategy would even be ecologically possible given the postulated population levels at this time on the Danish islands in particular.

It is conceivable that the Neolithic individuals sampled, while providing accurate measures in themselves, reflect only one stratum of contemporary society, presumably an elite with preferential or even exclusive access to the novel resources. The majority of the Neolithic samples do originate from monumental mortuary structures – earthen long barrows and megalithic tombs. While plausible, this explanation does not seem very likely. There are sim-

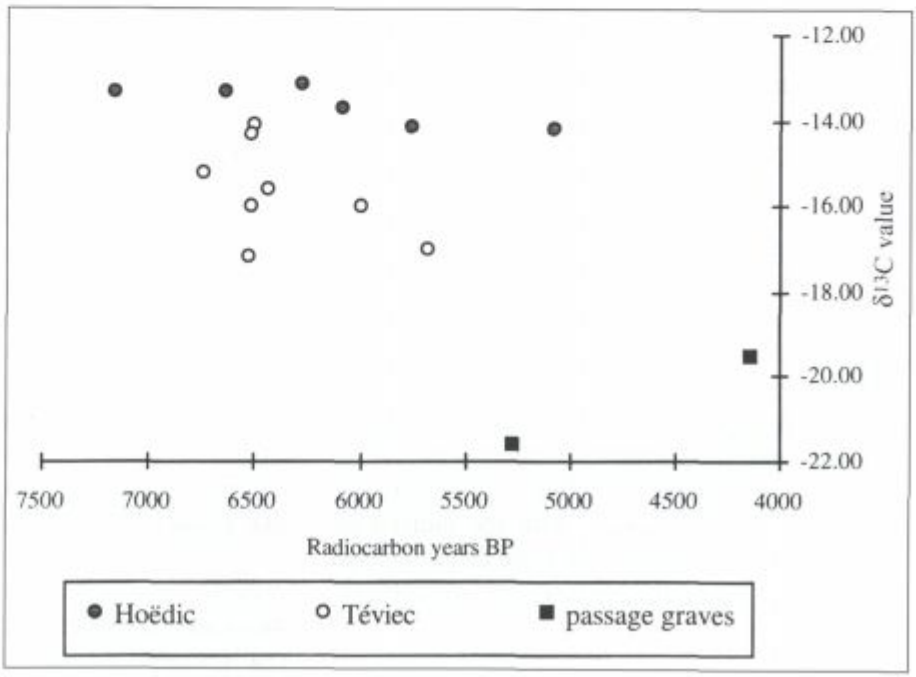


***Fig. 8. AMS dates from Téviec and Hoëdic plotted against stable carbon isotope values; the two passage grave points derive from Ty Floc'h and Beg-an-Dorchenn.***

ply too many measurements on Neolithic individuals, *all* of which demonstrate little or no use of the marine resources that totally dominated the diet of preceding coastal Late Mesolithic populations. Nor are all of these individuals from monumental tombs: the Early Neolithic flat grave at Dragsholm shows no marine influence, nor do a series of dated human skeletal remains from bogs on Zealand (*Rahbek and Rasmussen 1995*), at least some of which were found near enough to the coast to expect the incorporation of marine resources if these were being utilised to any extent. From Britain, individuals from caves and mortuary monuments near the coast have been measured, and neither context shows much in way of evidence of marine resource-use. Finally, in Denmark, limited stable carbon isotope measurements on domestic dogs appear to approximate the same shift in diet as seen in humans (*Noe-Nygaard 1988*).

Clearly the remaining possibilities are not mutually exclusive, but they do have differing implications for the nature of the transition and the archaeological evidence that might be expected. None of the possibilities are unproblematic with regards to the archaeological evidence. The idea that an incoming population is responsible for the appearance of the Neolithic in either Britain or southern Scandinavia currently does not hold favour. Nevertheless, adherents of this view remain, and it should not be dismissed out of hand. But a wholesale population replacement seems exceedingly unlikely. There are numerous continuities in technologies, artefact styles and settlement locations (although the relevance of all three as biological population markers may be questioned). Furthermore, the apparent density of Late Mesolithic populations in southern Scandinavia make it inherently unlikely that they could have been swamped by incoming farming groups. This is not to say that small-scale population movements did not occur, particularly if one envisions a rapid knock-on effect, with 'acculturated' groups expanding (whether physically or in terms of cultural influence) locally at the expense of their immediate fisher-hunter-gatherer neighbours, who then rapidly become acculturated themselves and expand in a similar fashion. Solberg (*1989*), for instance, argues that much of the evidence in southern Scandinavia can be best explained by a merging of incoming late LBK-derived farming groups with the indigenous Ertebølle peoples. However, the rapid dietary change cannot then be explained in terms of a new incoming population.

The view that changing environmental conditions could play such a determining role in the transition has also been strongly criticised (*e.g., Blankholm 1987; Jennbert 1984*), and does appear to fall short of accounting for the extent and timing of the transition. The idea that the changing environment did play some kind of role, however, remains reasonable. But any such model would have to be argued on a broader level than that proposed by Rowley-Conwy (*1984*), who saw the loss of the critical spring oyster resource as the reason for the transition to food production. The relatively high productivity of Late Atlantic marine ecosystems in the North Sea and southern Baltic region has been repeatedly emphasised (*e.g., Paludan-Müller 1978*), and it is clear that a marine adaptation formed the focus of Late Mesolithic subsistence in Denmark (*Andersen 1995; Fischer 1997*). Indeed, it has been suggested that it was the success of this adaptation that allowed Late Mesolithic communities in southern Scandinavia to persist despite the alternative offered by the nearby presence of mixed farming communities (*Zvelebil and Rowley-Conwy 1986*).

But success comes at a price: populations appear to have been at their densest in Late Atlantic times (compared with earlier periods), with increasing use of previously marginal inland areas (*Knutsson 1995; Paludan-Müller 1978*). A general decline in marine productivity, then, caused by falling sea-levels, could have had disastrous effects, and may have brought about a sudden shift in the relative ranking of the two alternative economic systems – fishing-hunting-gathering and food producing. Faced with the prospect of rapidly diminishing returns, exacerbated by the decline in marine productivity, further intensification or even maintenance of the existing system may have not have been feasible, particularly when an alternative was available (thus contrasting with the Northwest Coast of North America, where suitable domestic resources were not available). Domesticated resources had been ignored, other than as exotic curiosities or high-status luxuries, as long as the costs of switching from one system to the other outweighed the immediate perceived benefits. While making many similar points to Rowley-Conwy's model, this scenario attempts to avoid its overriding emphasis on a single resource (*cf. Larsson 1991*). Rather, it is the two systems as integrated wholes that comprise the alternatives. A critical point – a threshold – may have been reached that made the decision to radically switch over to a reliance on domesticated resources more attractive. Although marine resources continued to play some role in the

Neolithic economy, this role was insignificant in dietary terms compared to the Late Mesolithic. It is possible that, as Rowley-Conwy and Zvelebil have proposed, scheduling conflicts between the two subsistence systems, at the level of production required, were insurmountable. Thus the shift, when it came, was of necessity rapid and complete. The continuation of a specialised marine adaptation alongside the new system was not possible due to competing demands on the highly productive coastal strip by both economic systems. Nor would such a solution be acceptable to groups who were now competing socioeconomically and/or establishing group identity through the use of domesticated resources.

Its proponents frequently support the ideological argument by referring to the gradual nature of subsistence change across the transition, and the continued importance of wild resources (*e.g., Bradley 1993; Tilley 1996; Whittle 1996*). But, as should be clear from the evidence presented here, this may not have been the case for much of northwestern Europe. A shift in worldview may have been necessary to permit the modification of the landscape and/or the social relations of ownership needed for a serious commitment to agriculture or herding, but it is difficult to see why this should have such sudden, complete and widespread consequences. Nor has the role of the subsistence economy, shown here to be integral to the transition, received sufficient consideration in this model. Similarly, it is difficult to account for the apparent sudden and complete nature of the change in subsistence with a sociopolitical model emphasising elite competition. One of the basic tenets of this model is that novel resources will be employed only on special occasions. Nevertheless the apparent level of sociocultural complexity of Late Mesolithic societies indicates that social dynamics cannot be ignored. Evidence of exchange of what were likely high status objects, such as the Danubian axes, prior to the transition indicates that lines of contact did exist between farmers and foragers, and could have formed the channels along which domesticated resources initially flowed (*Fischer 1982*).

Thus it is at present difficult to choose decisively between these alternatives. The most plausible scenario may be that a number of factors acted together – perhaps different combinations of factors in different regions. Monocausal explanations, while attractive in their simplicity and elegance, are unlikely to provide adequate accounts of complex events and processes. For example, given the extreme reliance on coastal resources seen in Late Mesolithic southern Scandinavia in particular, I suspect that changing ecological conditions *did* play an important role in the transition there. I doubt that they played a similarly important role in Britain or Brittany, due to the much greater interior land masses of these countries relative to their coastlines.

In conclusion, the stable isotope evidence demonstrates that, whatever else was going on, the change in the subsistence economy was an integral part of the Mesolithic-Neolithic transition, as integral as changes in material culture and mortuary practices, with all that that implies concerning religion and sociopolitical organisation. The change in subsistence appears to have been rapid and complete. This is especially the case in southern Scandinavia, but ongoing research is showing that a similar pattern may apply in Britain. The Mesolithic populations of coastal Europe present a unique subsistence economy; no subsequent period saw anything approaching the same intensive use of marine resources. Much has been made recently of the likelihood of regional variation in the neolithisation process, but Neolithic communities everywhere appear to have very quickly turned their backs on the sea.

## ACKNOWLEDGMENTS

I would like to thank Professor Mihael Budja for the opportunity to participate in what was a most enjoyable conference. The original isotope data discussed in this paper are the result of a collaborative project with Michael Richards of the Oxford Laboratory for Archaeology.

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UDK 330.185:003.314+511.1(35/395)"634/637"
Documenta Praehistorica XXV (Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji XXV)

# Clay tokens – accounting before writing in Eurasia

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ABSTRACT – *A number of small ceramic and stone objects of rather uniform shape, which have been interpreted in Near and Middle Eastern archaeological contexts as counters used for calculating quantities of goods in systems of exchange are discussed in European interpretative contexts of the transition to farming and the secondary products scenario.*

POVZETEK – *V artefaktnih zbirih, ki jih evropska prazgodovinska arheologija označuje kot pečatnike, ušesne čepke, amulete, miniaturne figurice, gumbe itd., je kar nekaj drobnih keramičnih in kamnitih predmetov zelo enotnih oblik, ki so v bližnjevzhodnih neolitskih kontekstih interpretirani kot plačilni žetoni. Žetoni naj bi najprej pomenili vrsto in količino blaga, nato številke, enice, desetice in šestdesetice. Žetone v obliki stožcev, valjev in miniaturnih posod obravnavamo v evropskih kontekstih prehoda na kmetovanje in uporabe sekundarnih produktov.*

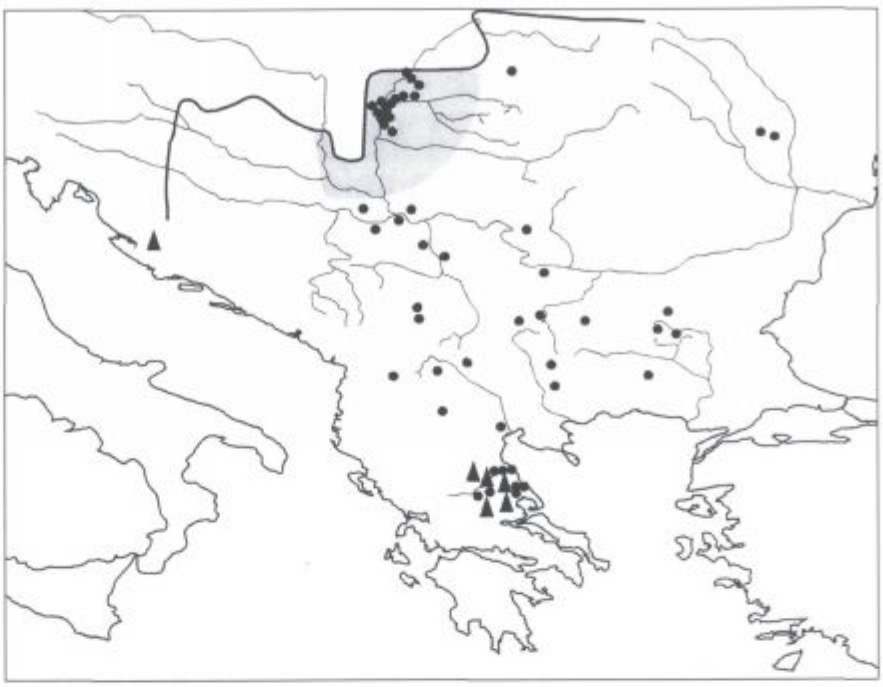
## INTRODUCTION

In artefact assemblages designated by European archaeologists as seals (*Cornaggia Castiglione 1956; Makkay 1984; Ruttkay 1993(1994)*), there are a number of small ceramic and stone objects of rather uniform shape which have been interpreted in Near and Middle Eastern archaeological contexts as counters used for calculating quantities of goods in systems of exchange, and mnemonic devices for recording information (*Schmandt-Besserat 1977; 1985; 1992a, b; 1997a*). This article presents clay tokens in the context of the transition to farming and secondary products scenario.

## THE INTERPRETATION OF TOKENS IN THE CONTEXT OF THE TRANSITION TO AGRICULTURE IN EUROPE

In European Neolithic studies the interpretation of presumed seals, connected with the old axiom *ex oriente lux*, was already established at the beginning of this century (*Childe 1929.414*). Now the phenomenon of clay seals in European Early Neolithic cultures of Proto-Sesklo, Karanovo I–II and Starčevo-Körös, is linked to the process of Neolithisation in south-eastern Europe (*Makkay 1984.73–84*). Explanations with a predominantly diffusionist paradigm are based on two hypotheses. The typological hypothesis claims that the Early Neolithic clay seals from Macedonian Nea Nikomedeia are comparable to Anatolian seals in Çatalhöyük VI–II (*Makkay 1974.131–154; 1984.72–84,100–101; Kircho 1989.123; Onassoglou 1996.163*). The second hypothesis, which is based on distribution, says that the appearance of the first seals in Europe can be related to the expansion of the oldest pottery to Macedonia, Thessaly and to the Balkans; and that, due to its geographical position, a key role was played by Nea Nikomedeia in Macedonia. Apparently rather obvious is its position between the oldest centres for the making of clay seals in Çatalhöyük and Hacilar in Anatolia on one side, and the settlements of the Karanovo and Körös-Starčevo cultures in the Balkans and eastern part of the Carpathian Basin on the other (*Makkay 1984.37, 77–86, 101*).

What needs to be particularly noted in this interpretative context are two arguments which hold that, due to incomparable form and unclear chronological position, the Thessalian stone seals cannot be placed



***Map 1. The distribution of Early Neolithic "stamp seals" (●) (after Makkay 1984) and, tokens (▲) documented in Arggissa, Souphli Magula, Achilleion, Sesklo, Gentiki and Vrbica. The "northern boundary of the Starčevo-Körös (shaded)-Criş complex" was defined by Kalicz (1990.Taf.1. 1; 1993. Fig.2).***

into the above-mentioned clay seals group (*Makkay 1984.79–80; Onassoglou 1996.163*). Concerning the distribution of the oldest seals, we cannot agree with the evaluation that early farming groups from the Konya basin (Çatalhöyük, Can Hasan and Suberde) migrated at the head of a wave-of-advance into the Thessalian plain. Van Andel & Runnels (*1995.481–500*) stated that settlers gradually occupied only the fertile flood plains of rivers and lakes, similar to the environment in the Konya basin. They propose that the periodically flooded sites in Thessaly were colonised first (9000 BP), and after more then a thousand years farmers leapt to the next such environment in Macedonia, Thrace (7800 BP), and Pannonian plain (7500 BP). This explanation was also rejected by Wilkie and Savina (*1997.201–207*).

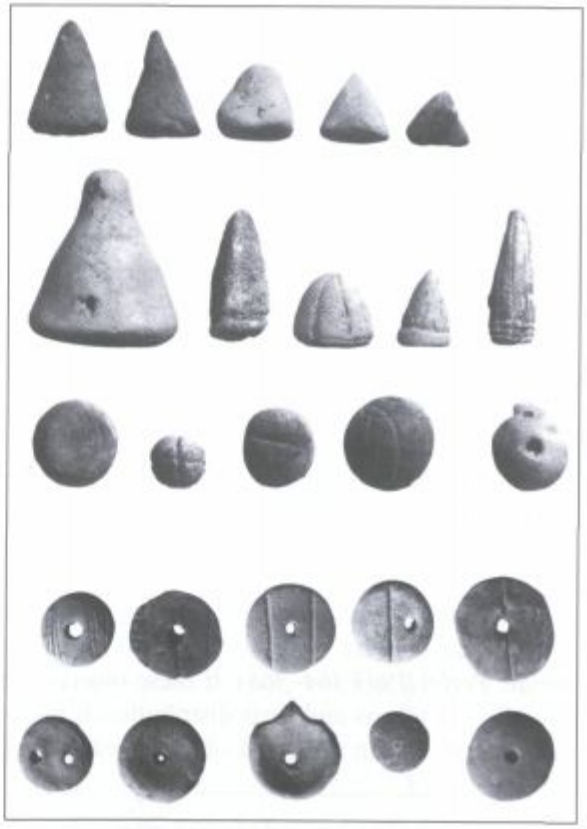
Although a hypothesis on a correlation between the diffusion of agriculture and seal distribution remains, a few obvious facts, which we believe place the Early Neolithic seals in another interpretative context, still need to be emphasised. In the context of the European Early Neolithic, it is impossible to place any of the seals in the oldest phase. Their dating to the Early Neolithic is only approximate; nevertheless, we know that in different geo-cultural areas this period had a different chronological structure (*Budja 1992.97–98*). It is also important to understand that in Thessaly and Macedonia reliable stratigraphical positions are known only for seals from Nea Nikomedeia, and even these are not dated before the Proto-Sesklo phase (*Onassoglou 1996.163, 331–334*). Something similar holds for the clay seals in the eastern, central and northern Balkans. The cultural and chronological label Karanovo I–II means that we can speak only of the latter part of the Early and earlier part of the Middle Neolithic (*Todorova, Vajsov 1993.75–77, Tab. 10; Todorova 1995.83–85*). Even more imprecise is the chronological division of seals in the Körös and Starčevo cultures. The fact that these cultures denote the Middle Neolithic period cannot be overlooked (*Garašanin 1979.142,212; Benac, Garašanin, Srejović 1979. 27; Kalicz 1990. 89–91*). Above all, we cannot overlook the Proto-Starčevo I, II (*Srejović 1971.1–19*), Proto-Körös (*Kalicz 1990.89–91*) and the "Early" and "Monochrome" phases in the context of the "Early Neolithic complex" of the Eastern Balkans, defined for quite some time, in which seals are not documented (*Todorova, Vajsov 1993.74–75, 94–97; Todorova 1995.83*).

In the distribution of the oldest clay seals in the Balkans we cannot distinguish the expected zones of density which could be linked to a "modified version of the wave-of-advance model of demic diffusion", and an agricultural frontier moving from south to north (*Ammerman, Cavalli Sforza 1984; Cavalli Sforza & Cavalli Sforza 1995.134–140,147–157; Cavalli Sforza 1996.52–52, 61–65*). Even more, the greatest concentration of Early Neolithic clay seals has been documented in the Tisza region in the Carpathian Basin (*Makkay 1984. Map on p. 158*), at the northernmost part of the Early Neolithic Körös-Starčevo-Criş complex (Map 1), designated by Kalicz (*1990; 1993; 1998*). It is also highly surprising to see that the seals have been documented only in set-

tlement contexts of the Kõrös culture along the Tisza river since, according to Kalizc's definition, the entire area of the northern border of the Kõrös-Starčevo-Çriş complex is to be understood as a frontier zone, a zone where the processes of interaction between farming and foraging communities consisting of different forms of contact and material and social exchanges are hypothesised (*Zvelebil 1994(1995).107–152; 1998.9–27*).

On the other hand, artefacts, which can be interpreted as tokens appear in the Early Neolithic in the south, in the Mediterranean region. With only one exception (*Talalay 1993.45–46*), until recently their identification and interpretation have been connected exclusively with the Near and Middle East (*Schmandt-Besserat 1985.149–154; 1992a; 1997a. 151–156).* These are plain tokens which are mainly geometric in form: cones, spheres, lenticular discs, cylinders and tetrahedrons (Pl. 1); there are also naturalistic forms such as vessels and animals. The tokens had two main functions from the beginning, when they served as counters to calculate quantities of goods and, as mnemonic devices used to store data. Counting and data storage with tokens began in the eighth millennium BC in open- air settlements where subsistence was based on the raising of cereals. Their first purpose was to record quantities of the traditional Near Eastern staples like grain and small stock, and there is some evidence that the counters were usually discarded during summer, after the harvest. In the fourth millennium, BC when assemblages of complex tokens appear, they kept track of manufactured goods in large centres. Tokens, together with other status symbols, are sometimes included in the burials of prestigious individuals, suggesting that they were used by the elite, which controlled real goods and the economy of redistribution.

The appearance of the first token assemblages in 8000–7500 BC is interpreted as the appearance of a system of counting and recording goods in the processes of the transition to farming. In other words, the token system met the accounting needs brought about by agriculture, and data storage can be considered as directly related to the rise of a household economy and a social elite. This idea is based on the fact that the creation of the token system correlates with a new settlement pattern characterised by larger communities, and with the advent of a ranked society characterised by a new type of leadership overseeing community resources. In Mureybet there is no evidence for the use of counters in the two earliest Natufian phases of the site, in about 8500–8000 BC, when it was a small compound of half a hectare. Tokens occur in the third phase, ca. 8000–7500 BC, when the hamlet had grown to become a village covering 2 or 3 hectares. It is estimated that the community of Mureybet III exceeded the number of individuals manageable in an egalitarian system. The synchronic occurrence of tokens and plant domestication in the post-Natufian period demonstrates that the new economy based on agriculture created a need for accounting. In fact, in each of the five sites that yielded the earliest tokens (Mureybet III, Tepe Asiab, Ganj Dareh E, Tell Aswad I and Cheikh Hassan), the invention of clay counters was consistently related to evidence of harvesting. The link between cereal consumption and recording grain quantities explains the fact that spheres, cones and flat disks, probably representing measures of cereals, were among the most common Early Neolithic tokens. Although the archaeological evidence is elusive, it is hypothesised that the presence of cylinders and lenticular disks stood for numbers of animals in the token assemblages of Cheikh Hassan, Mureybet and Tepe Asiab. Plain tokens continued to be used in the Near East to the very end of the system in the third millennium. The counter continued to exist, and the



***Pl. 1. Susa. Tokens assemblage: cones, spheres and disks (after Schmandt-Besserat 1992a. Fig. 36. 1. 2. 3; 1997a. Fig.2).***

system worked according to the most simple and basic principle of a one-to-one correspondence which consisted in matching each unit of a set to be recorded with a token. There were seemingly only a few tokens that stood for a collection of items, such as a lentoid disc which probably represented a group of perhaps 10 animals. The token system did not allow the abstract expression of numbers. There was no token for "one," "two" and "three" independently of the commodity counted. It is worth noting that the token clusters were always composed of several types of counter (*Schmandt-Besserat 1985.149–150, 152; 1992a.33–48, 166–178; 1997a.151–156*).

It is rather obvious that tokens have been a neglected subject in European Neolithic and Halkolithic studies. In various publications they are described as "stamp seals", "seals", "clay cones", "clay tablets", "miniature clay objects", "miniature clay figurines", "small discs", "buttons", "decorative and other objects" and "ear studs", "nose plugs" or "ear plugs" (*Wijnen 1981.46; Makkay 1984; Papathanassopoulos 1996.330–333; Theocharis 1973.299, 301, Fig. 212, 238, 270; Müller 1994.218; Demoule, Perlès 1993.364–368*). Due to a taphonomic filter, which marginalised their interpretative significance to the level of decorative objects, these artefacts were not included in analyses of the system of exchange and organisation of production in the Mediterranean Neolithic (*Perlès 1992.115–164*) or in analyses of the processes of Neolithization.

We first turn our attention to the stone and clay "ear plugs" documented in the Thessalian Early Neolithic. It needs to be pointed out, however, that both their use and provenance are hotly debated subjects, yet to be resolved. Something similar holds for their chronological positions. It is still not clear whether in the settlement palimpsests they first occur in the Pre-ceramic or in the Achilleion phase of the Early Neolithic; while the basic question of whether the Pre-ceramic Neolithic in Greece can actually be defined remains unanswered (*Bloedow 1991.2–43; Vitelli 1993.39–40*). However, the objects are documented in the initial Neolithic phases in Thessaly in a time span between 6800 BC and 5800 BC (*Demoule, Perlès 1993.364–368*). If these objects are identified as tokens and their distribution is taken into account, we can also speak of the appearance of

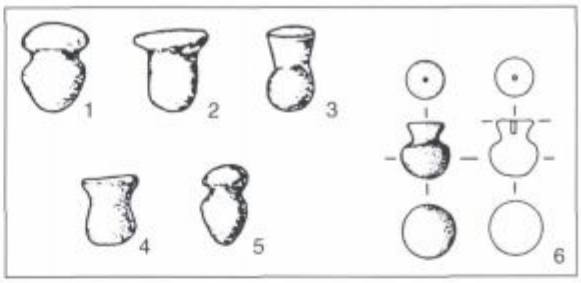



***Fig. 1. Stone and clay tokens, "recovered from the Early Neolithic I strata at Sesklo" (1–5, after Wijnen 1981.46,47. Fig 14. 20–24) and Vrbica (6, after Müller 1994. Taf. 74. 5).***

a system of counting and record-keeping in the processes of the transition to farming in Mediterranean Early Neolithic settlement contexts. Nevertheless, the basic supposition that these artefacts, documented in Arggissa, Souphli Magula, Achilleion, Sesklo, Gentici and Vrbica (*Demoule, Perlès 1993. Fig. 4.15–16; Müller 1994.218–219*) (Fig. 1) are comparable to vessel-type tokens (Fig. 2), as defined in a typological series by Shmandt-Besserat (*1992a.226–227, 13:3,5,15,16, 26; 1992b.xiii–xiv*) must also be true. Due to the greater legitimacy of our typology, let us state that in the Greek Neolithic, vessel-type tokens are not an isolated phenomenon. Disc-type tokens 3:12,15,56, cones 1:3, cylinders 4:20A, ovoids 6:19, and quadrangles 7:6,7, 28–32 (*Shmandt-Besserat 1992a.203, 1:3; 212, 4:20A; 217, 6:19; 218, 7:6,7; 219, 7:28–32)* also appear as "decorative and other objects" or "rectangular solids of unknown use" in Neolithic settlement contexts in the Peloponnese (*Theocharis 1973. Fig. 271; Gimbutas, Winn, Shimabuku, 1989.257; Papathanassopoulos 1996. 332. Cat. No. 275*) and the Balkans (*Čohadžiev 1997.56, Fig. 60.15. 198. 1,4. 199.3,6*).

Vessel-type tokens are interesting because of three interpretative postulates. The first is based on their distribution in the Balkans, which extends as far as Dalmatia in the central Adriatic (Map 1). The westernmost example is documented in the context of the Impresso-cardium culture (Impresso A) in Vrbica (*Müller 1994.218–219, Taf. 74.5*). Unfortunately, we cannot include stone spike artefacts from Podgorie I at Prespan Lake in Albania (*Korkuti 1995. Taf. 8.c–d*) in this typological context, though Müller tries through these to establish a link with the Thessalian artefacts (O.c. 218)[1]. Something similar holds for an

1 The distribution of artefacts in the form of spikes is obviously not a local phenomenon, defined in a short period of time. An identical artefact is also documented in the Eneolithic horizon of the Slatino settlement in Bulgaria. That this is not a coincidence is shown by the presence of disc-type tokens 3: 12, 15 and cylinders (twisted) 4:30,32 after Schmandt-Besserat (*1992a.208, 213*). They were published as "objects of unclear significance" (*Čohadžiev 1997.56, Fig. 60.15, 198. 1-2, 4, 6*).

artefact, a supposed ear (lip) plug, in the context of Körös culture, referred to by Makkay (*1974.150; 1984.81*). Nevertheless, a typological link between the Albania and Greece in Early Neolithic remains. A similar clay seal, comparable to Thessalian (*Korkuti 1995. Taf. 15. 12, 14–16*), was documented in the Early Neolithic settlement deposit in Vashtëmi. On the other hand, clay statuettes (*O.c. Taf. 8. a–b; 14.2*) were documented in both the Podgorie and Vashtëmi settlement and, in Franchthi cave deposits. Matching artefacts have been interpreted in Franchthi cave in the Peloponnese as tokens designed either as contractual devices or as identifying tokens between individuals or groups which symbolised the obligations of an agreement, friendship or common bond. It is hypothesised that in the context of inter-settlement contact in the Peloponnese, various types of bonds among communities would have been beneficial during the Neolithic and that contractual devices or identifying tokens could have been used in a variety of contexts. They may have been used as tokens in a "down the line" mode of exchange or, perhaps, to identify messengers between villages, particularly in times of crisis, or even as markers of inter-village marital connections (*Talalay 1993.45–46*).

The second is linked to the idea that among the many types and subtypes of tokens only four were recovered in sepultures. Among them, miniature vessels are identified. It was recently stated that the ritual of depositing in burials tokens of special types, material and number, gives a valuable insight into the important role of counters as status symbols. The fact that tokens occur only in the graves of prestigious near-eastern individuals points to their economic significance, which may imply that the tokens were a means of controlling goods in the hands of a powerful elite in redistribution centres (*Shmandt-Besserat 1992a.101–107,167–183*).

The third postulate diminishes the significance of the secondary centre of Neolithisation in southern Italy, which supposedly caused demic diffusion and the expansion of agriculture across the Adriatic to the eastern Adriatic coast (*Müller 1994.273,274; Chapman, Müller 1990.128,129,132; Chapman 1994. 143, 144*). The distribution of tokens links the eastern Adriatic coast with Thessaly and not with Apulia.

## THE COMPLEX TOKENS AND SECONDARY PRODUCTS SCENARIO

The second part of this paper presents tokens which are discussed as "small clay cones" in the context of "conical clay stamp seals with circular bases" and "clay cylinders" (*Makkay 1984*). This discussion is linked to a thesis on a supposed discontinuity in the use of seals in the Middle Neolithic and their redistribution in the Late Neolithic. The appearance of the new cone and cylinder types in south-eastern Europe was therefore to prove the second Anatolian influence in the Late Neolithic (*Makkay 1984.83–98*). This can be easily correlated to Sherratt's thesis on the so-called second diffusion of technological inno-

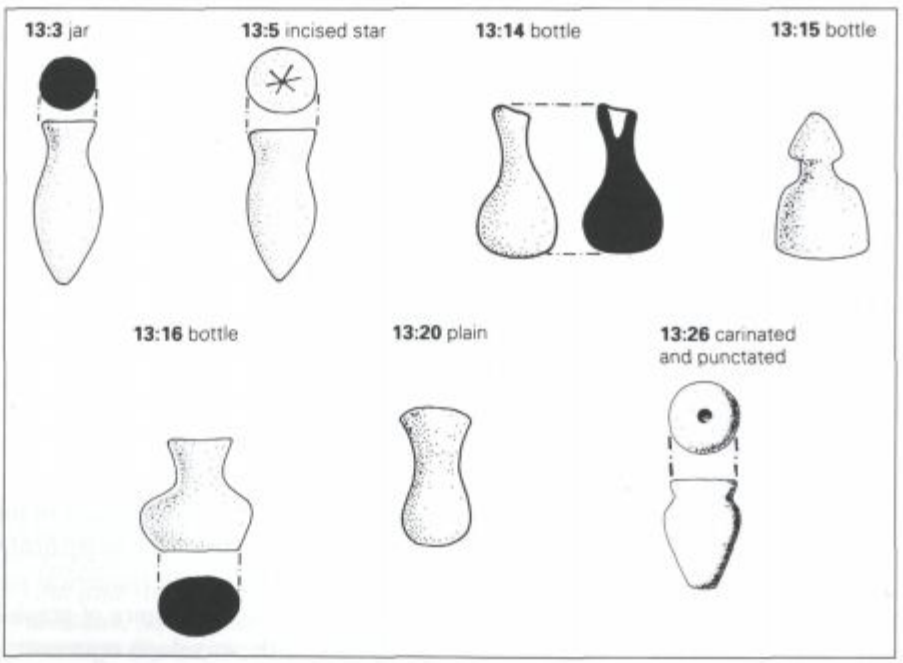


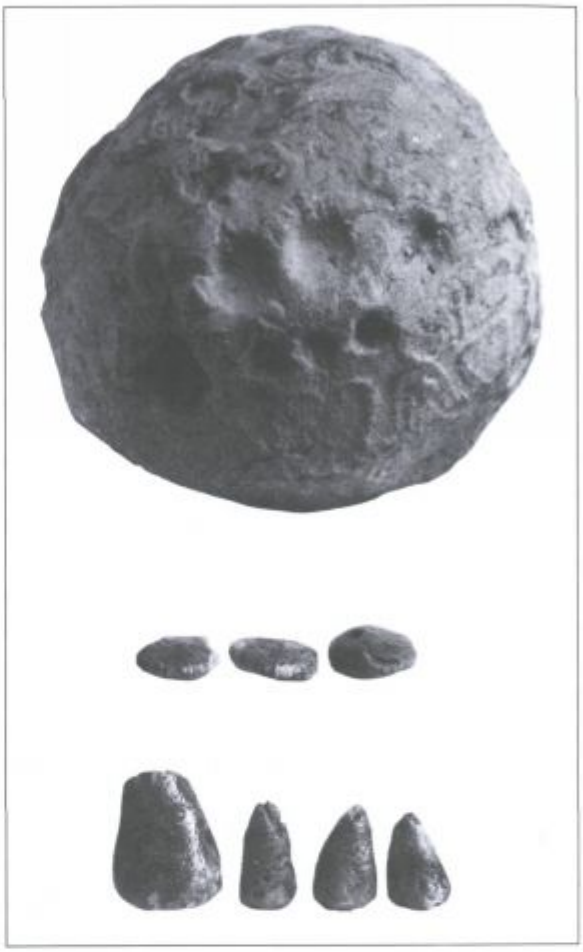

***Fig. 2. Tokens, type 13: vessels (after Schmandt-Besserat 1992a.226–27. 13: 3, 5, 14, 15, 16, 20, 26).***

vations from the Near East and the secondary products "revolution" or "scenario" in the fourth millennium BC in Eurasia (*Sherratt 1981.261–305; 1997a. 1–15; 1992a.6–34; Chapman 1982(1983).107–122*).

We have already mentioned that plain tokens continued to be used in the Near and Middle East to the middle of third millennium. In the sixth millennium, tokens are recurrently found in public buildings. The clusters of tokens found in situ usually range between a dozen to 75 artefacts, which shows that the counters were never kept in large quantities. It is hypothesised that the counters were mostly discarded during the summer, after the harvest, suggesting that an elite who controlled a redistributive economy used them.

In the early fourth millennium BC "complex tokens" appeared in large centres, and the quantum jump in the number of token types and subtypes seems to indicate a concern for more precise data. These tokens, which included many new forms and were characterised by having incised lines and punctuation, presumably corresponded with the creation of workshops, and the more diversified urban economy that followed required more accounting techniques. The evolution of the token system seems to reflect an ever increasing need for accuracy. This is exemplified, for example, by tokens dealing with livestock: the early plain cylinders and lentoid disks apparently stood for "heads of livestock", whereas the fourth millennium complex tokens indicated the breed "fat-tail sheep", the sex "ewe" and the age, "lamb" (*Shmandt-Besserat 1997a.153)*.

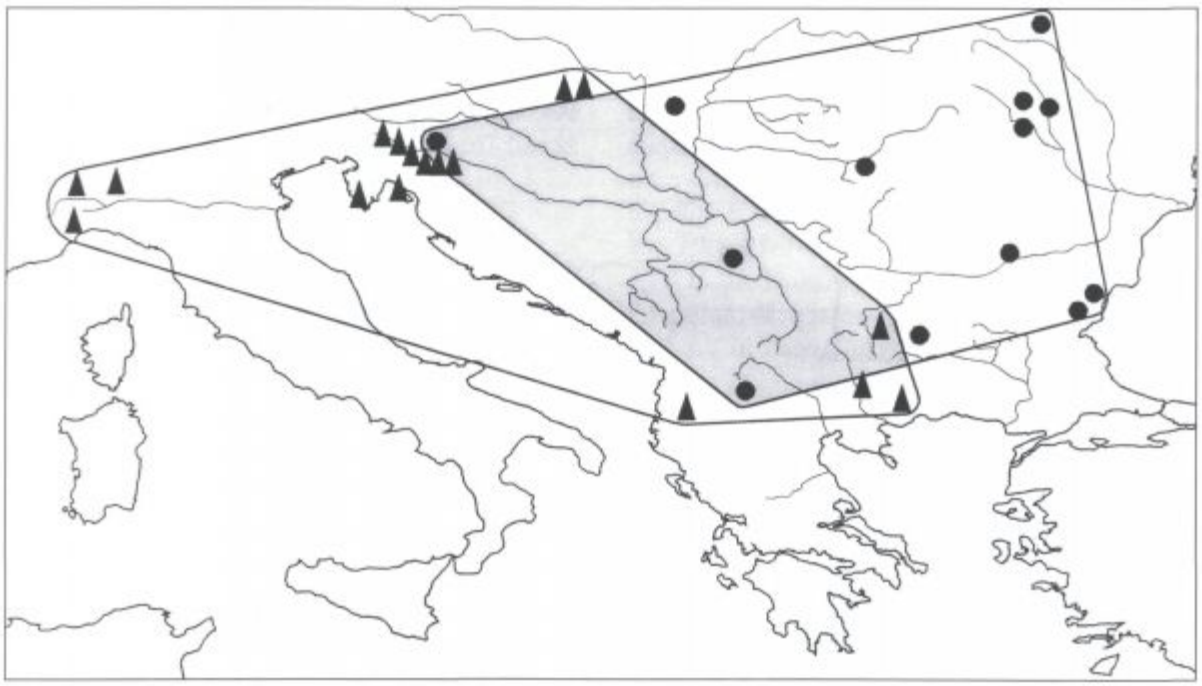
According to Schmandt-Besserat (*1992a.49–128*) it was not a coincidence that the complex tokens phenomenon occurred during the formation of states. In all the major ancient Near Eastern cities such as Uruk, Susa, Chogha Mish and Habuba Kabira, the complex counters occur in levels characterised by seals and seal impressions featuring the ruler, and by pottery which probably served as grain measures. The administrative centres that yield complex tokens were the seats of the same bureaucracy, housed in similar buildings, using the same administrative devices: complex tokens, seals and grain measures and, most importantly, they were headed by the same powerful ruler. Two methods of storing tokens in archives were devised at the beginning of the fourth Millennium BC. The first consisted of enclosing tokens in clay envelopes (Pl. 2); the second, of tying perforated tokens with string. Both of them insured that groups of tokens representing one account were securely held together and that the transaction was identified by seal impressions. Accountants indicated the shape and number of tokens enclosed by imprinting each token on the outside surface of the envelope before enclosing it. The bullae provided the great advantage of securing the tokens tightly and presented a surface where seals could be used for authentication. Their disadvantage was that they completely hid the tokens, so any verification meant breaking the bullae. To overcome this difficulty some bullae have signs impressed on the outer surface, recording not only the numbers, but also the shape of tokens inside: circular impressions for discs and spheres, conical impressions for cones The innovation was of great convenience, as it allowed one to "read" at all times the amount and kind of tokens without breaking the bulla. It seems that only a restricted number of token shapes are represented in the bullae, in particular those which can be paralleled with numerical signs. It is hypothesised that the appearance of graphic symbols on the surface of the envelope represents the transition between to-



***Pl. 2. Susa. Bulla bearing impressed markings corresponding to the tokens inside (after Schmandt-Besserat 1992a. Fig. 73; 1997a. Fig.3).***

kens and the first system of writing in the context of the evolution from tokens to markings on envelopes and impressed signs on tablets. Although impressed signs on the tablets still perpetuated the shape of the tokens, they assumed a new function, identified as "Whereas the markings on envelopes repeated only the message encoded in the tokens held inside, the signs impressed on the tablets were the message" (*O. c. 129*). The first group of impressed tablets has been dated to 3500 BC. In the course of time, solid clay tablets bearing impressed signs replaced the hollow envelopes holding tokens. Most importantly, the evolution from tokens to markings on envelopes and impressed signs on tablets should be understand as the forerunners of the Sumerian pictographic script (*Shmandt-Besserat 1992a.129–165).*

In the context of the secondary products scenario, the fourth millennium BC saw a series of changes which were in large part a consequence of the processes of the transition to agriculture that happened some five millennia earlier. According to Andrew Sherratt, the scenario is based on two premises. First, cereal grains themselves would at first have been "luxury" items of trade, that perceived quite differently from the staple commodity they were to become. The diffusion of cultivated cereals and animal domesticates would have been "a social process of economic transaction and negotiation and not just a passive spread". The expansion of cereal cultivation "around the inner rim of the Fertile Crescent" led to a process of diversification and interaction, which by 4000 BC had been objectified in new plant and animal products, inventions often capable of being stored or processed in large quantities. Some of these were new tree crops: the olive, fig and almond in the Levant, the pomegranate and vine in south-eastern Anatolia, and wool-bearing sheep, which seem to have had their origin in the Kermanshah region in western Iran. Two new "micro-domesticates" *Lactobacillus* and *Saccharomyces* made possible the production of cheese, yoghurt, leavened bread and beer. Second, the increasing networking of the Levant and Mesopotamia into a regional interaction zone led to a fundamental transformation in the way of life. The concentration of contacts and traffic into a few principal communication channels along the great rivers, the expansion of irrigated farming and the increasing role of added-value production, basically in the form of textiles gave rise to a contrast between a manufacturing core and a hinterland supplying raw materials which altered the economic and political character of the



***Map 2. The distribution of Late Neolithic and Early Eneolithic clay tokens, cones (●) and cylinders (▲) (after Budja 1992. Karta 2). Overlapping distributions are shaded. Cones: Luka Vrublevetaja, Frumușica-Cetățuia, Hăbășești, Izvoare, Sultana, Ezerovo-Varna, Usoe, Plovdiv-Jasa tepe, Tordos, Porodin-Tumba, Grivac, Hódmezővásárhely-Vata and Moverna vas. Cylinders: Moverna vas, Zorenci, Pusti gradec, Limska gradina, Dietenberg, San Valeriano, Santa Maria, Maliq, Sitagroi, Dikili Tash, Bikovo, Gradec pri Mirni, Vorganska peć, Drulovka, Notranje Gorice, St. Stefan ob Stainz and Arene Candide.***

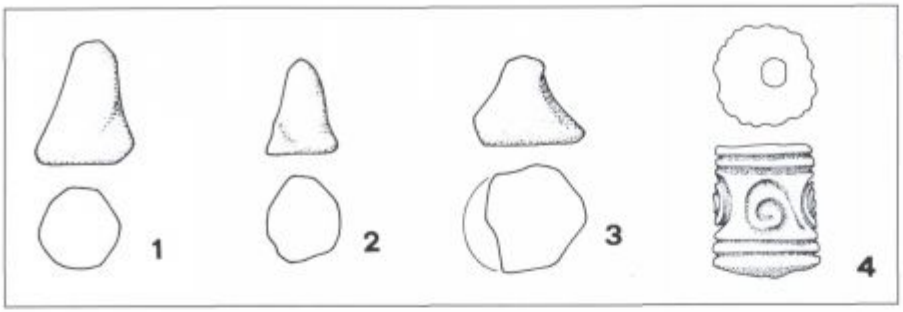



*Fig. 3. Token assemblage from Moverna vas.*

interaction. Within the core area this process produced an intensification of technological and manufacturing activities which, in turn, led to the active establishment of colonial stations to exploit the raw material sources. This expansion also involved the appearance of new agrarian centres, which rapidly developed into independent centres of activity with their own peripheries (*Sherratt 1997a.6–11*). In the secondary products scenario it was in the fourth millennium that the secondary products and secondary consumption patterns reached Europe in the context of a massive extension of the contact-radius on an inter-regional scale. The identified constituent elements of the diffusion to Europe are ox-traction and the plough, wool, milking, and innovations in copper metallurgy (*Barber 1991.93–95, 99–100; Sherratt 1997a.11–15; 1997b.203–210*).

Having thought about the system of counting in fourth millennium BC "spheres, cones, discs and cylinders, which are among the simplest shapes, represented the most common staples and in particular, grain and small stock" and "that these staples were represented by the same token shapes from Syria to Iran" (*Schmandt-Besserat 1985.152*). Since cereals and small stock remained the basis of the economy of the entire region during the Neolithic and Chalcolithic, it is possible that the simplest shapes of tokens retained the same meaning in the token system of counting over the millennia (*O. c. 151–152*).

In the European interpretative contexts the identical cones were identified as "small conical objects" and "small clay cones" embedded within the Late Neolithic typological series, consisting of conical clay stamp seals with flat oval and circular ornamented bases and clay cylinders. Regional distribution of typological series served to prove the discontinuity in the use of seals in the central Balkans and eastern part of the Carpathian Basin. New forms of seals apparently proved their re-expansion in the Late Neolithic in the context of a new cultural impulse from Anatolia (*Makkay 1984.82, 85–98, 100*).

Discontinuity correlates with the geneses of the Vinča and Tisza cultures, while the distribution of new

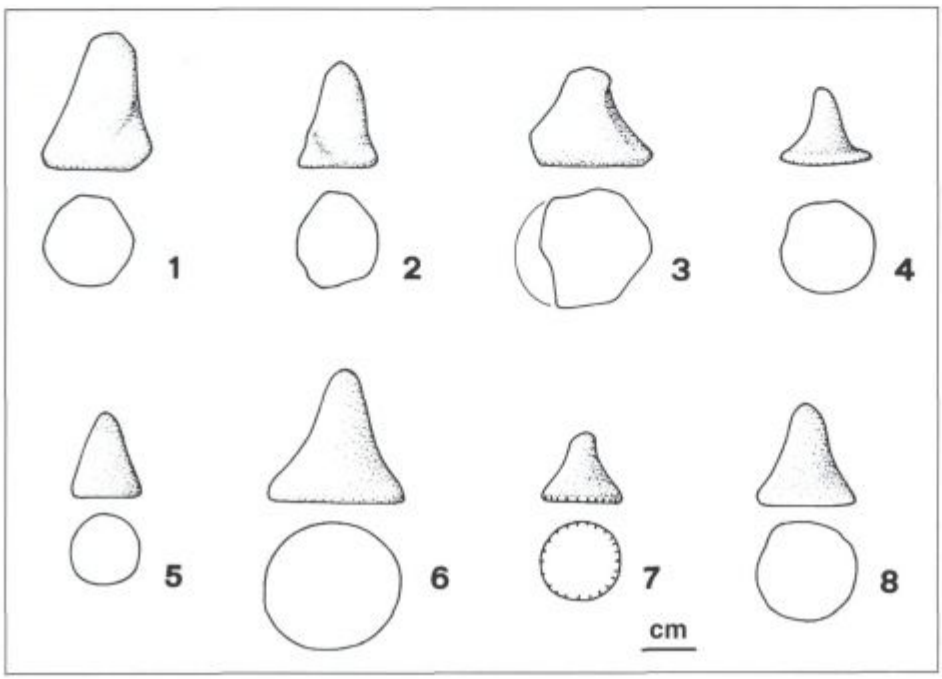



*Fig. 4a. Clay cones. 1–3 Moverna vas, 4 Hódmezővásárhely-Vata, 5 Porodin-Tumba, 6 Plovdiv-Jassa tepe, 7 Izvoare, 8 Ezerovo-Varna (after Budja 1992. Sl. 2).*

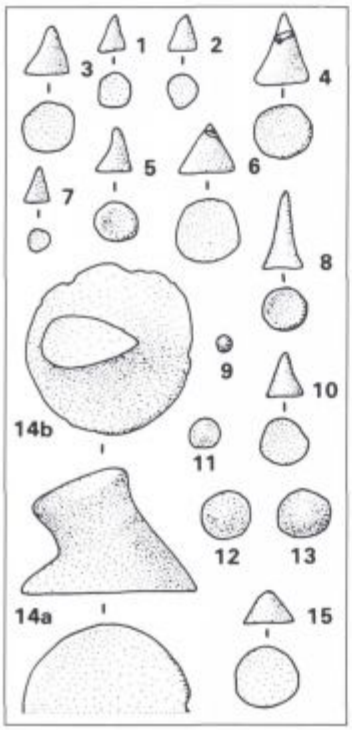



*Fig. 4b. Clay cones. Usoe (after Todorova, Vajsov 1993. Ris. 201).*

types of clay seals in the Late Neolithic is connected with Gumelnița and Cucuteni cultures. Apart from a few exceptions, there are no records of Middle and Late Neolithic seals in the territory of the first two cultures. Considering that an explicit concentration of seals in the Early Neolithic existed in the same area (the Körös-Starčevo cultural complex), the change is obvious. However, only by neglecting the chronological correction already mentioned before relating to the division of the Early and Middle Neolithic (*Budja 1992.98*) can we take this change into account.

On the other hand, Makkay's map shows a new distribution of presumed seals in areas which have no other record of Early Neolithic seals. In the area of the Karanovo III, Gumelnița and Cucuteni cultures (Thrace, the Lower Danube, the Eastern Carpathians, Moldavia and Besarabia) conical clay stamp seals with flat, oval and circular ornamented bases are documented. Presumably these seals are not related to any of the seals from the Early Neolithic in either typological or developmental terms (*Makkay o.c. 1984.84–98,158*). Makkay connects the distribution with a new, second, cultural and developmental impulse from Anatolia, but this time through Thrace, not Thessaly, since here a thesis on discontinuity cannot be proved and "Bulgaria was likely to have been the first recipient of such influences, including stamp seals" (*o. c. 1984.89*).

This series of presumed seals is also distributed through central European cultural complexes in the Late Neolithic and Early Eneolithic (*Ruttkay 1993 (1994).221–238*). At this point Makkay's judgement that neither the Early nor the Middle Neolithic in central Europe have documented seals could be restated. They appear in the Late Neolithic, but only in the areas of painted pottery cultural groups (Lengyel complex). Such the geo-cultural limiting of distribution therefore determined a hypothesis on the transfer of seals from Gumelnița culture through the "eastern group of painted pottery" (Cucuteni-Tripolje) to the "western group of painted pottery" (Lengyel complex) (*Makkay 1984.85–88*).

In the central European series, there are also ornamented clay cylinders (*Budja 1992.99–105, Ruttkay 1993(1994).221–238*). Although special attention has been paid to them in Neolithic studies on long distance cross-cultural connections for quite some time, their significance has always been limited by a hypothesised gradual expansion from Anatolia (*Makkay 1984.93–101*) or through it (*Hood 1973.192–195*) to the Balkans, and from there to the area of the culture of square-mouthed pottery in Liguria and Piemont in Italy. The regions were interpreted as

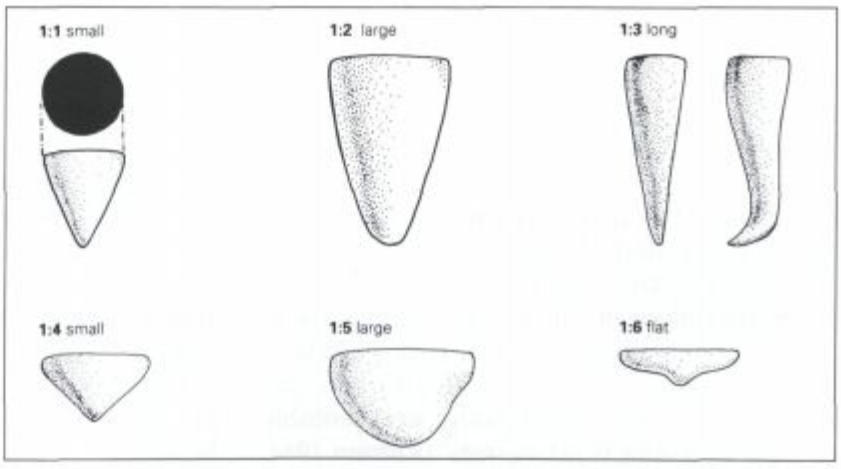



*Fig. 5. Tokens, type 1: cones (after Schmandt-Besserat 1992a.203.1:1–3).*

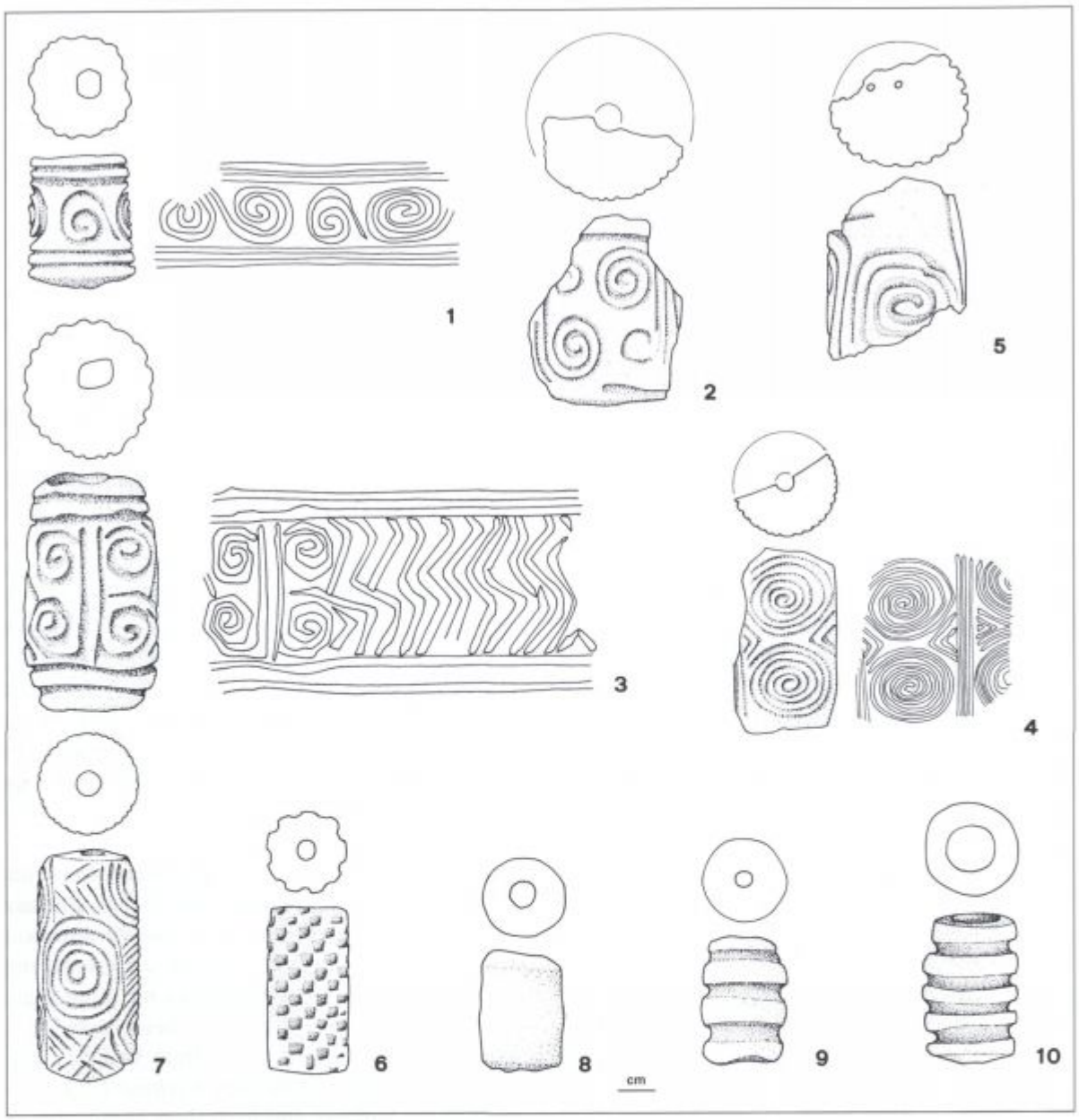



***Fig. 6. Clay cylinders. 1 Moverna vas, 2 Zorenci, 3–4 Pusti gradec, 5–6 Limska gradina, 7 Dietenberg, 8 Gradec pri Mirni, 9–10 Drulovka (after Budja 1992. Sl.3).***

the westernmost geo-cultural area reached by clay cylinders "in the context of Balkan ideological characteristics" in the Late Neolithic (*Barfield 1972.199; Bagolini, Biagi 1985.54–55; Bagolini, Barfield 1991.290*).

In this context we need to face three interpretative snares, two of which are linked to the typology and distribution of clay cylinders within the Early Neolithic Körös culture, the third to their dating. Due to their large dimensions, the perforated artefacts of cylindrical shape have been identified by the primary author as "clay weights which were probably used for the sinking of fishing-nets" (*Kutzian 1944. Pl. 1.10. 45. 9,12–16; 1947. 8; Makkay 1984.93. note 121*). Other authors introduce a typological taphonomic filter and identify them as "clay cylinder seals" (*Hood 1973.194. Pl. 5*), but they overlook the fact that cylindrical weights were four to six times larger than clay cylinders and that 239 of them were discovered only in the Óbessenyő site (*Kutzian 1947.8. note 41*). A chronological snare lurks in the estimate that European clay cylinders were 1500 years older than those in the Near East (*Ruttkay 1993(1994).230–233, 236*). If this were true, there is a certain correspondence between such an interpretation and the claim that "European civilisation between 6500 and 3500 BC was not a provincial

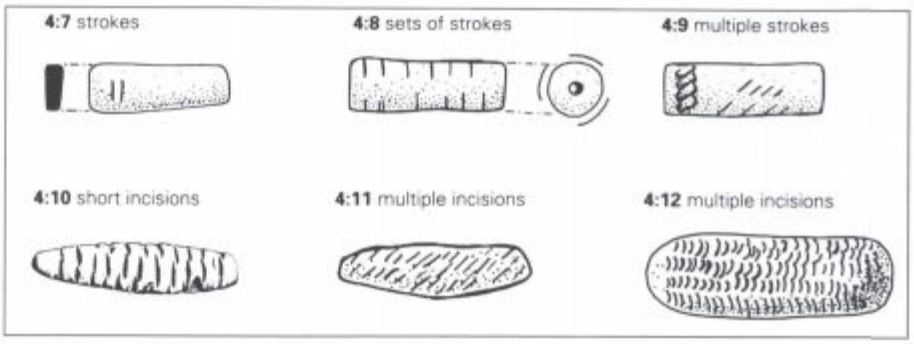



*Fig. 7. Tokens, type 4: cylinders (after Schmandt-Besserat 1992a.212, 4: 8, 10–12).*

reflection of Near Eastern civilisation, absorbing its achievements through diffusion and periodic invasion, but a distinct culture developing a unique identity" (*Gimbutas 1989.13*). The dating is based on cigar-shaped cylinders, which are supposed to be the oldest (ca. 5000 BC), and which apparently appeared both in Aegean Macedonia (Sitagroi) as well as in Italic Liguria (Arene Candide) (*Ruttkay 1993(1994). 236*). We already mentioned that cigar-shaped cylinders, type 4:10–12, in the Middle East form a constituent part of both the plain and complex token assemblages (8000–2000 BC) (*Shmandt-Besserat 1992a.17–29, 33–59*).

What needs to be emphasised at this point is that a group of clay cones was already defined within the European Late Neolithic series of presumed seals, and treated in the context of long-distance cross-cultural contacts (*Budja 1992.98–105. Sl. 2. Karta 2*). The opinion of the catalogue's author can nevertheless be restated, as it says that "these peculiar, small, conical objects cannot be regarded as stamps and probably served some other function" (*Makkay 1984.22, 45, 84–92*).

Clay cones have already been treated together with clay cylinders (Fig. 3), since they were discovered in the same stratigraphic context of the settlement deposit in Moverna vas. We realised that our options for an objective explanation of their distribution were limited, even if the seals and their symbols are understood as a preserved form of continuous recording of behavioural patterns of the Neolithic and Eneolithic communities, defined by Bailey as "linear chrono-types" connected with permanent economic activities and a stable social organisation (*Bailey*

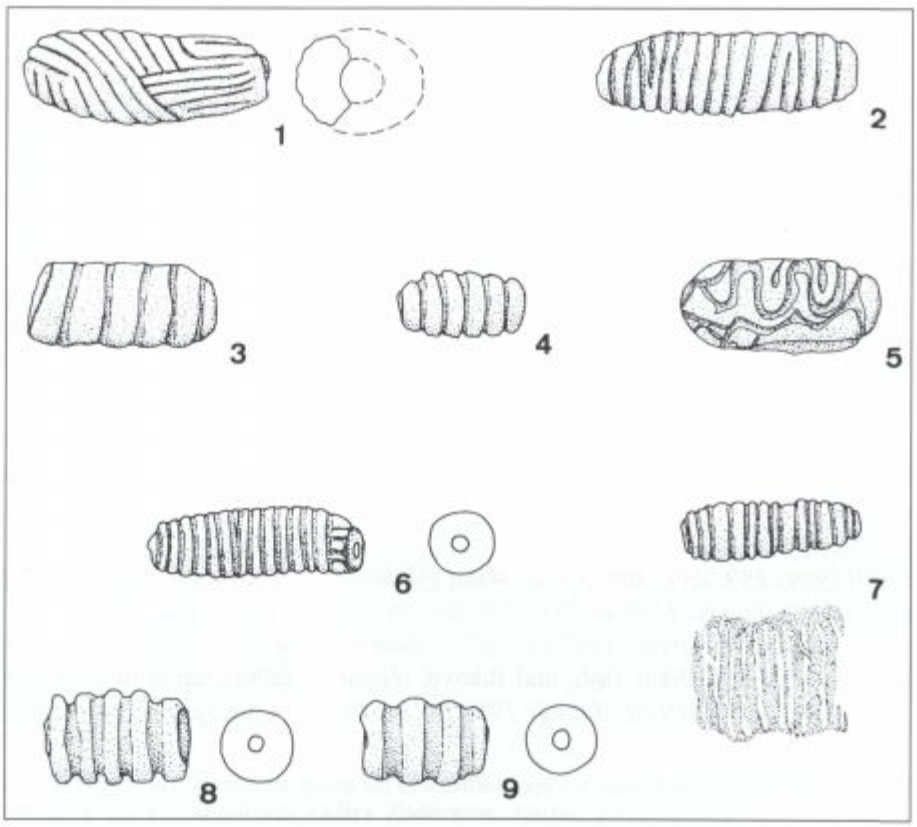



*Fig. 8. "Zigarrenförmige" clay cylinders. 1 St. Stefan ob Stainz, 2–5 Arene Candide, 6. Notranje gorice, 7 Sitagroi, 8–9 Drulovka, (after Ruttkay 1993 (1994). Abb. 4).*

*1993.204–222*). Their distribution was linked to the idea of secondary products and given a special significance in explanations connecting them to the formation of a social élite and the establishment of redistribution centres, the exchange of goods, and trade over long distances or, perhaps, to the expansion of technology of extraction and processing of copper ore (*Budja 1992.99,101–103. Sl.4).*

This time the group of clay cones (Fig. 4a, b) moulded so that the diameter of the bottom surface, which is undecorated, is no larger than the height of the cone, are defined as tokens of cone type 1:1 (isosceles), which were used as counters to keep records of goods (*Shmandt-Besserat 1992a.17–24, 203; 1992b.ix,xxi)* (Fig. 5). The group consists of cones documented in Late Neolithic contexts in Moverna vas, Hódmezővásárhely-Vata, Porodin-Tumba, Grivac, Ezero-Varna, Plovdiv-Jassa Tepe, Usoe, Tordos, Frumuşica-Cetăţuia, Hăbăşeşti, Izvoare, Sultana, Luka Vrublevetskaja (*Budja 1992.99. Sl.2; Makkay 1984. Cat. Nr. 66, 68–75, 84, 85, 99, 103, 187, 191, 255; Todorova, Vajsov 1993.212–213. Sl. 201*). According to the available data, fifteen were found in Usoe, thirteen in Frumuşica-Cetăţuia, seven in Izvoare (one of them marble), three in Moverna vas, and one in each remaining site.

We include clay cylinders in the interpretative context because one of them (Fig. 3. 4; 6. 1) was found in Moverna vas in the same stratigraphic context of the Late Neolithic settlement deposit together with three cones. We believe that this is a token assemblage, dated to between 4360–4033 BC (OxA-4626) *(Budja 1993/94.20. Fig. 5*).

In the group of clay cylinders we include decorated and undecorated cylinders (Fig. 6). According to Shmandt-Besserat (*1992a.17–24, 212–213; 1992b. xi, xxv*) they are comparable to types 4:8, 4:10 and 4:19 and, according to Ruttkay (*1993(1994).230–233, Abb.4: 1–9*) to "Zigarrenförmige Rollstempel". The group consists of ornamented clay cylinders from Moverna vas, Zorenci, Pusti gradec, Limska gradina (*Budja 1992.99–102. Sl.* 3.1–6), Dietenberg, San Valeriano, Santa Maria (*O.c. Sl. 3.7; Ruttkay 1993(1994).230, 234, Abb. 3:1,2*), Maliq (*Makkay 1984.32–34. Fig. 26; Korkuti 1995.220, Taf. 94.22–23*), Sitagroi (*Renfrew 1987.341–374, Makkay 1984.54, Fig. 25*), Dikili Tash, and Bikovo, (*Hood 1973.193–194. Fig. 18,20; Makkay 1984.13–14, 19.*

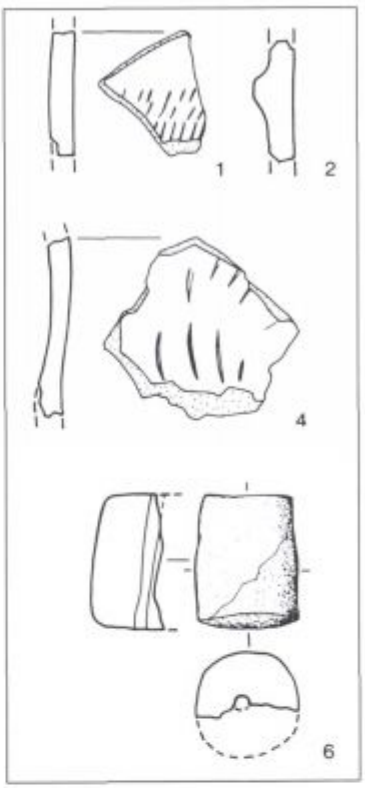



***Fig. 9. Vorganska peć (after Müller 1994. Taf. 52).***

*Fig. 25–26*). Two, from Gradec near Mirna and Vorganska peć are not decorated (*Budja 1992.104. Sl.* 3.8; *Müller 1994.138,313, Taf. 52. 6*). According to Rutkkay, artefacts from Drulovka, Notranje Gorice, St. Stefan near Stainz and Arene Candide, belong in the cigar-shaped clay cylinder group (*Budja 1992. 104, Sl. 3. 9–10; Ruttkay 1993(1994).230. Abb. 4: 1–9*) (Fig. 8)[2].

Chronologically, the clay cylinder assemblage is much less narrowly limited compared to clay cones. The oldest cylinder from Vorganska peć is dated within the Early Neolithic Impresso B level (*Müller 1994.138,313)* (Fig. 9). Among the youngest, Early Eneolithic, are two cylinders from Maliq (*Korkuti 1995.216)* and another from Dietenberg (*Ruttkay 1993(1994).230).*

An analysis of the regional distribution of token assemblages has shown an interesting pattern, similar to that of the Early Neolithic, as discussed at the beginning of this paper. The distributions of cones and cylinders in the major part of their distributive range exclude each other, and overlap only in the areas of the western Dinaric (Bela krajina), Thrace (along the central stream of the Maritza river) and in the Šarsko-Pindos Mountains (Map 2). These are

2 A clay cylinder from Tordos has not been included in the group. Its identity has still not been confirmed (*Makkay 1984.60-61. Fig. 25.6*).

the areas with obvious concentrations in the number of tokens, as well as in individual sites within the region (*Budja 1992.104*). In the eastern Balkans the distribution of cones corresponds with the distribution of zoomorphic figurine assemblages which, compared to anthropomorphic examples, is not very common (*Todorova, Vajsov 1993.211. Ris. 198–200*) (Fig. 10). Although it is suggested that the Neolithic assemblages of zoomorphic figurines in the Near East could be related to magic as was described in the cuneiform text (*Schmandt-Besserat 1997b.48–58*), we believe the concentrations of tokens and zoomorphic figurines along the transhumance routes in Pindos Mountains, Thessaly, Thrace and Rhodope Mountains are not *coincidental (Beuermann 1967. 120–140.162–173*).

## CONCLUSION

Artefacts have been discovered in European Neolithic settlement contexts which, due to a taphonomic filter at different interpretative levels, assumed and retained the significance of marginal objects that in principle could be included neither in an analysis of the "Neolithization of Europe", nor any other cross-cultural relations in Eurasia. If we decide to include them, they can operate only at the level of determining typological links with Anatolia.

A different story emerges when these objects are interpreted as tokens, where certain forms presumably first signified goods (e.g. wheat, sheep, wool bales) and then numbers (one, ten, sixty) (*Schmandt-Besserat 1992a*). What is important here are the hollow clay balls in which clay tokens were kept, since certain figures which corresponded to the shapes on tokens kept in them were sometimes imprinted on their surface. The most important and most recent of them is a bulla found in the city of Nuzi (Iraq). The Nuzi bulla was found to contain 48 small objects, described as "pebbles" in the report. Unfortunately, the shapes of the "pebbles" were not described at all in the archaeological report. Unfortunately, they were later separated from their bulla and now they can no longer be identified. The surface of the bullae do not bear impressions that could be correlated to tokens. The bulla had the unique feature of a lengthy cuneiform surface inscription in Akkadian which referred to the " pebbles" as *abnu*. The translation of the inscription is as follows: *21 ewes that have lambed, 6 female lambs, 8 full-grown rams, 4 male lambs, 6 nanny goats that have kidded, 1 billy goat, 2 female kids. Seal of Ziqarru (the shepherd).*

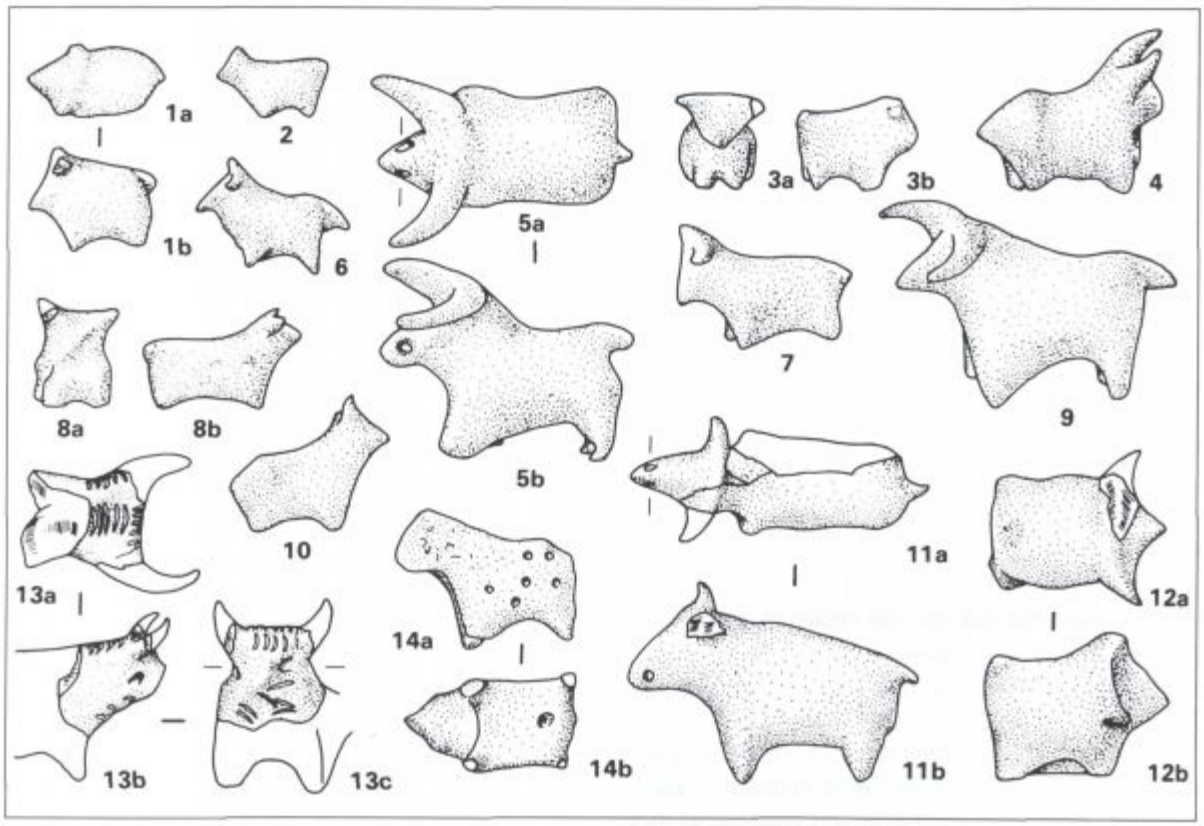



*Fig. 10. Zoomorphic figurines in Usoe assemblage (after Todorova, Vajsov 1993. Ris.189).*

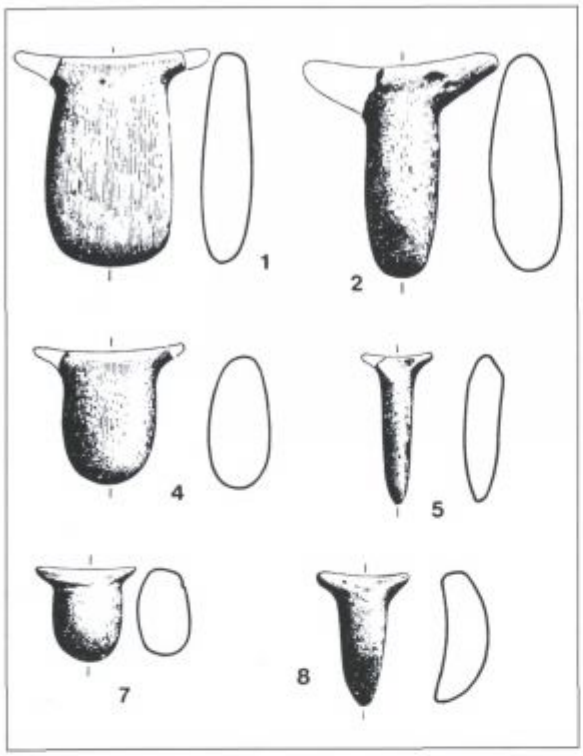



***Fig.11. Token (?) assemblage in Knjepište in the Djerdap region (after Stanković, 1989/90(1991). T.I).***

The total number of animals is 48, and there is no doubt that the *abnu* were counters (tokens) representing the animals of a herd. These texts suggest the existence of a system in Nuzi of keeping herd records by means of small counters. Each animal was represented by a small object or abnu and deposited in a receptacle, such as a pot or bulla, bearing a mention such as lambs, ewes, rams, billy goats, nanny goats, etc. New *abnu* would be deposited when new animals were born or passed into a new category. They would be removed when an animal was traded, or was slaughtered for food or sacrifice. According to Schmandt-Beserat, the bulla could be interpreted as a transfer of *abnu* from one account to another, if the bullae were used in an accounting system employing tokens to record transactions. The producer consigned goods to a middleman with a bulla containing a number of tokens corresponding to the consignment. In later periods the bulla was duly sealed for authentication. By breaking the bulla and counting the tokens, the recipient of the consignment could check the accuracy of the shipment upon arrival (*Schmandt-Besserat 1977.61–66*).

The system of counting and record keeping for goods and trading over long distances demanded considerable standardisation of tokens and symbols, as they needed to be understandable to everyone. With the help of tokens in the form of vessels, clay cones and cylinders, this paper attempts to stress that south-eastern Europe was also included in this system during the Early Neolithic. We also believe that European Neolithic cultures developed their own types of tokens, and these cannot be compared typologically with those from Anatolia and the Middle East. We could perhaps recognise them by their extremely standardised forms (Fig. 11). We should not be disturbed by their being interpreted as zoomorphic clay amulets (*Stanković 1989/90(1991).35–42; Matsanova 1996.108,109. Tab. 9)*. What is important is that they are documented in the Early Neolithic along the Danube, in areas settled by foraging groups before farmers.

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Izdala in založila Filozofska fakulteta, Oddelek za arheologijo. Odgovorni urednik Mihael Budja. Uredniški odbor: dr. Franc Osole, dr. Vida Pohar, dr. Tatjana Bregant in dr. Mihael Budja. Naslov uredništva: Oddelek za arheologijo, Filozofska fakulteta - Univerza v Ljubljani, Sl - 1000 Ljubljana, P. B. 580. Tehnično urejanje in DTP: CAMBIO d.o.o., Ljubljana. Tisk: Tiskarna Novo mesto, Vavpotičeva ul. 19. Naklada: 700 izvodov. Izšlo 1998.