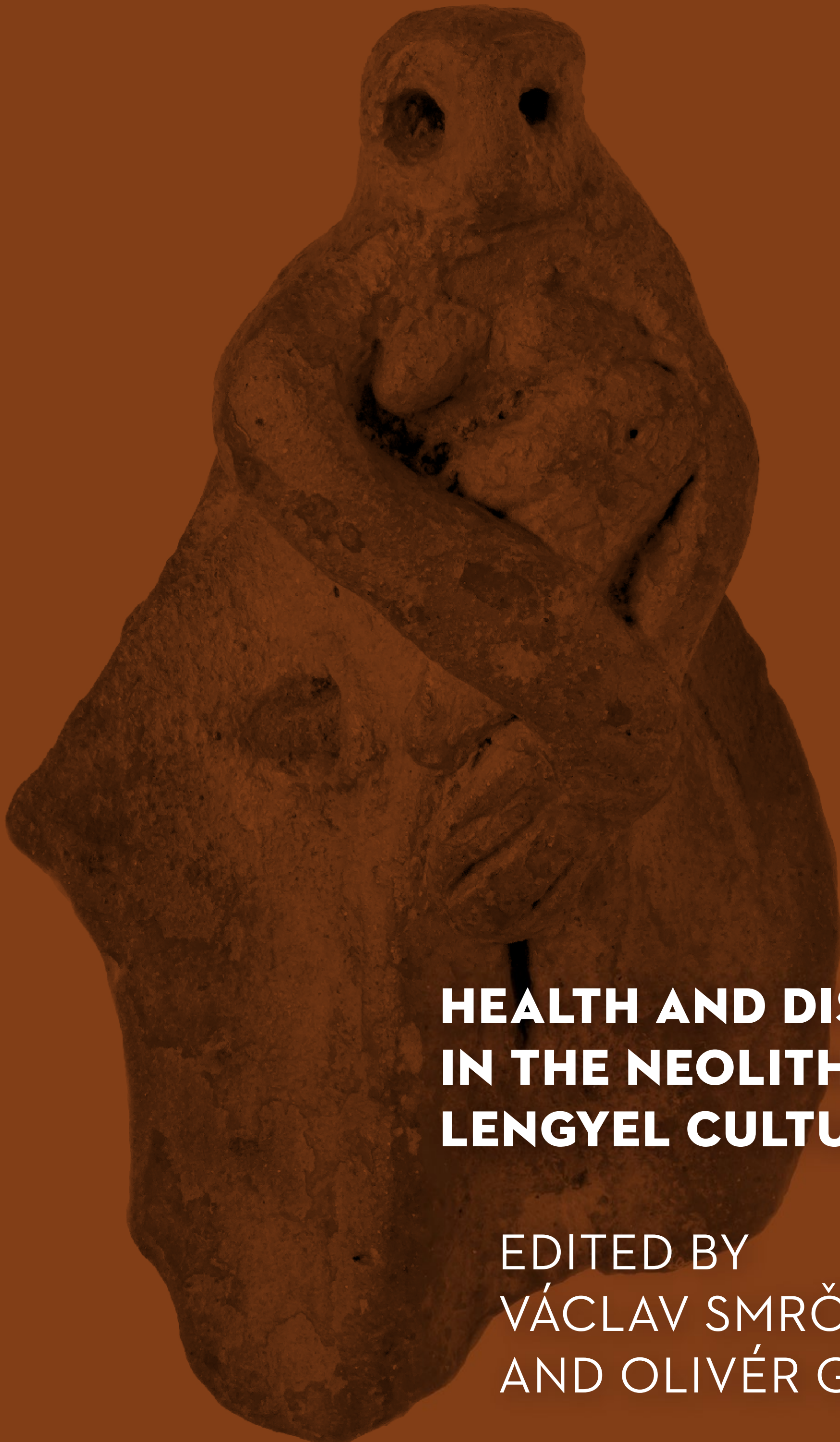

HEALTH AND DISEASE IN THE NEOLITHIC LENGYEL CULTURE

EDITED BY
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Health and Disease
in the Neolithic Lengyel Culture

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1. INTRODUCTION

VÁCLAV SMRČKA

1.1 DEFINITION OF THE NEOLITHIC DEMOGRAPHIC TRANSITION

The discovery of a ceramic gradient from the Middle East to Europe was referred to as the "Neolithic Revolution" by Childe (1925). A significant change from the former lifestyle of foragers led to a substantial increase in human numbers. This was termed "transition" by demographers (Lazaridis et al. 2016; Price 2000a, b, c; Price and Feinman 2001; Bocquet-Appel and Bar-Yosef 2008; Ames 2010 ; Kristiansen et al. 2017; Furholt 2021) and was the basis of this phenomenon.

1.2 ADOPTION OF FARMING: INSECT PATTERNS, THE ORIGIN OF COMPLEX SOCIETY

In both insect and human populations, societies can only start to form after the incorporation of plants into their way of life i.e. after the emergence of agricultural practices (Smrčka and Žďárek 2002; Smrčka et al. 2019; Hayden 2014). The most complex societies cannot develop until their network of social relations becomes sufficiently "dense" as a result of population growth. The development of agriculture and this incorporation of plants caused the growth of the human population and facilitated advances in communication between members of groups. This stage began when man started cultivating grasses for their seeds as nourishment. Similarly, the evolution of insect species that were able to form vast colonies with highly sophisticated, division of labour based on complex communication, was enabled by the development of special "agricultural" practices. This includes and is not limited to the employment of symbiotic bacteria, fungi and protozoa for the processing of cellulose as food (termites), and the cultivation of fungi (leaf-cutting ants) on plant material and faeces. The co-evolution with angiosperm plants and exploitation of flower products (nectar and pollen) facilitated the evolution of a complex societies in bees. An adoption of agricultural practices supposes a non-nomadic way of life. Members of social groups construct special dwellings: country-type common houses near fields in man, complex nests in bees, ants and termites. Dwellings have the biological function of protection, but also as an exchange places for obtaining other sources of food. The model of dwelling organisation can change from culture to culture, tribe to tribe, but it seems to remain fixed within a group. The location of a dwelling within the settlement reflects social relations among the families; those more closely related have closer contact between their dwellings while families of different clans are more separated. This organisation within settlement was such that higher-ranking groups were those that had inhabited the area first (Flannery and Marcus 2012). The distance between the dwellings of each culture seems to be standard (Gron 1997). After this amplification of agriculture, and establishment of a dependence on a vegetal diet, biological changes occurred in man, as well as in ants and termites. There is a significant decline in stature in Upper Palaeolithic populations through the Neolithic, and is best demonstrated in females (Meiklejohn et al. 1984). The shift from meat to vegetal food was demonstrated using analysis of trace elements (Zn, Fe) in human bones from the Neolithic to the early Middle Ages (Smrčka and Jambor 2000). This Neolithic gracilisation is directly linked with the concentration of Zn and other elements essential for growth (Cu, Fe) (Smrčka et al. 1989, 1998). Similarily, this difference in stature between the hunter and the farmer in the human population is seen in the hymenopteric world; the largest ant individuals can be found among the primitive predatory Ponerids, whose colonies are generally small, while ants that are primarily dependent on a vegetal diet (e.g. seed-eaters, leaf-cutters) form huge colonies of relatively small individuals with a strongly morphologically distinct worker casts. In humans, at least in the early stages, hierarchy was also based on aggression (Watts et al. 2016). Since the Neolithic Age, this societal stratification (Bentley et al. 2012) has meant those with the greatest individual power were also those that controlled the wealth (Gronenborn 2016; Heath 2017; Feinman 2016).

The history of the human species exhibits cyclical changes in its social network. Empires rise and fall. Therefore, it seems that history is repeated in the course of the development of states (Carmack 2015). Control over a certain territory by a group of aggressive individuals is the driving force behind the rise of the majority of founding states (Hrnčíř and Květina 2016). Aggression was the means by which order and social hierarchy, and subsequently the distribution of food, were maintained, before being replaced by rules, and finally formal laws (Smrčka and Žďárek 2002). Distribution of food in advanced eusocial insects is such that all sterile members of the society (the worker cast) receive an equal share of the colony wealth (social stomach) through mutual exchange of liquid food (trophalaxis). Only the reproductive females are preferentially fed, often with more nutritious food, in order to maximise the outcome of their reproductive potential. However, that is not the case in the human society; while the privileged social classes are also preferentially supplied, but their effect on overall reproduction within the population is negligible. Whitehouse et al. (2019) confirmed the association between moralizing gods and social complexity. Duration of eusocial insect communities may have seasonal or perennial character. Parallels between human and insect populations in factors surrounding population nutrition, which aided societal expansion, were observed. Such populations could form only after the process of the adoption of farming practices. This insect pattern shows that the Neolithic revolution was not a revolution, but a social phase of human evolution: the origin of complex society.

1.3 ARCHAEOLOGICAL EVIDENCE OF THE NEOLITHIC DIET

The earliest LBK agricultural crops included einkorn and emmer wheat, barley, millet, peas, lentil, and linseed (Kreuz 1990 in Jochim 2000). The wild ancestors of these plants are not native to Central Europe; therefore, their domesticated forms must have been introduced from elsewhere. Along with these, at least twelve different non-native weed species have been identified in the earliest LBK sites. Furthermore, domesticated animals at these sites include sheep, goats, cattle and pigs, with only the latter two have wild ancestors native to Central Europe. This impressive array of non-native foods suggests to many that they were imported as part of a functioning economy of immigrants, rather than as items of exchange (Jochim 2000). Settlements were located on gently sloping hillsides. These were often exposed to the east, and thus houses, mostly oriented NNW–SSE, were built parallel to the slope. Villages were built close to water courses (Gronenborn 1999). The focus on grain production gave rise to the manufacture of pottery (Schier 2015; Salisbury 2016), in which cereal meals and beverages could be prepared and stored. Close contact with animals is evidenced in small ceramic sculptures of animals.

1.4 BIOLOGICAL EVIDENCE OF THE NEOLITHIC DIET

Neolithic diets are remarkably uniform and based on terrestrial food sources. Neolithic burials from caves in Portugal generally show that Mesolithic diets had a strong marine component, and by the middle Neolithic there was a significant shift to mainly terrestrial foods. In the United Kingdom, the scarcity of Mesolithic human remains problematic, but a few studies do show the importance of marine foods in the diets of Late Mesolithic coastal peoples from the site of Oronsay (Richards and Mellars 1998). There is, however, a substantial amount of isotope data on Early and Middle Neolithic humans indicating a completely terrestrial diet (Richards et al. 2003). Samples from the Central European Neolithic period from the Vedrovice settlement (Buchvaldek et al. 2007), show collagen $\delta^{15}N$ values ranging from +8.8 to +12 per mil and $\delta^{13}C$, values of bone collagen fall between –20.5 and –21.9 per mil (Smrčka et al. 2008). In south-eastern and eastern European inland, there is stable isotope evidence of an aquatic-based diet (likely fresh-water fish) along the Danube (Bonsall et al. 1997) and the Dneiper (Lillie and Richards 2000) that continued to be important in Neolithic times.

1.4.1 TRACE ELEMENT ANALYSES

Concentrations of Zn in the skeletons of the first farmers of Central Europe (Linear Pottery Culture at Těšetice) are the lowest of all researched places (Smrčka and Jambor 2000). Meiklejohn et al. (1984) found that there is a significant stature decline from the Upper Palaeolithic through the Neolithic. The trend appears to manifest more strongly in the female sample than in the male. However, none of the subsamples show significant decrease from the Upper Palaeolithic to the Mesolithic. There is a significant decrease from the Mesolithic to the Neolithic in the female samples, and overall.

1.4.2 ISOTOPIC ANALYSES—DISTINGUISHING NEOLITHIC MIGRATORY POPULATIONS

Linear Pottery Culture (Linearbandkeramik—LBK) is traditionally used to describe the first farmers of Central Europe, named after the pottery they introduced approximately 7,500 years ago. Radiocarbon dating for LBK suggests it rapidly spread into Central Europe from its place of origin in the Hungarian Plain (Gronenborn 1999; Price et al. 2002). Bentley et al. (2002) identified Neolithic migrants who moved between geologic regions, the area uplands ($^{87}Sr / ^{86}Sr > 0{,}715$) and regional lowlands ($^{87}Sr / ^{86}Sr < 0{,}710$) near the Dillingen site. Strontium isotopic signatures make their way faithfully from local geologic materials and ultimately into the human skeleton. Comparing the isotope signature in adult teeth, which is incorporated into the teeth between four and twelve years of age, with that in bones, with characteristic turnover times varying between 6 and 20 years for different bones of the body. Ericson (1985) and Grupe et al. (1997) identified 11 out of 17 (65%) of the remains from Dillingen as nonclocal. Nonlocals in this LBK cemetery (and also in others—Flomborn and Schwetzingen) had social identities different from the locals. Nonlocal females were common. At Dillingen, all 5 (100%) females were above the local range compared with the 6/12 of the males being nonlocal (5 above the local range, 1 below). $^{87}Sr / ^{86}Sr$ may correlate with burial orientation. 80% of west-facing burials were immigrants at Floborn. At Schwetzingen, 30% (7/23 burials) with head directions ranging from north to east are nonlocals. Many nonlocals are buried without a shoe-last adze. At Dillingen, burials with shoe-last adzes are significantly more likely than those without. Among the 11 burials without a shoe-last adze at Dillingen, 9 (82%) are nonlocals, with tooth values above the local range. Of the 6 Dillingen burials with a shoe last adze, 2 (33%) are nonlocals and only 1 of whom was above the local range. The presence of nonlocal males without adzes confirms that the correlation is not merely between shoe-last adzes and males who happen to be locals. Nonlocal ^{87}Sr / ^{86} Sr values are mostly above the local range for their place of burial. Of the 27 immigrants from the three sites, 23 tooth values are above the local range for the site and only 4 below it. The last pattern is suggestive of the source of the nonlocal's diet in the younger part of their lives. The ^{87}Sr / ^{86}Sr values for the nonlocals are not high enough, however, to be "from" the granitic uplands, where water samples are generally above 0,720 The best interpretation at this point may be that the higher ^{87}Sr / ^{86}Sr values reflect a significant proportion of the diet from the regional uplands (Bentley et al. 2002).

1.5 AGRICULTURE, THE PROBABLE REASON FOR BONE PATHOLOGY

Throughout the entirety of the Neolithic period in Europe, gathering continued to be a supplementary part of the economy. Gathering and agriculture were not mutually exclusive, but they supplemented each other according to local natural conditions (Bickle and Whittle 2013). The change in diet, based on grains, triggered a population explosion which resulted in the formation of new socials contacts. However, from a biological point of view, humans were unable to adapt completely to these new conditions even though there are hints of partial genetic adaptation e.g. lactose tolerance in adults (Allentoft et al. 2015). In the period of agricultural development, the proportion of vegetal foods in the diet increased and meat consumption decreased. However, at the same time, the population became more slender and shorter. Angel (1984) and Schoeninger (1981) compared the average size of individuals in populations of Palaeolithic hunters and Neolithic agriculturalists. They concluded that the European *Homo sapiens sapiens*, who consumed animal albumin to the maximum extent in the Late Palaeolithic 30,000 years ago was 30 cm taller than his successor in the period of agricultural development. A meat diet contains zinc, which is necessary for both the development of the foetus and for the pregnant female. This element, as well as many other essential elements, can get caught up in the intestine on the fibrous material of grain husks, and can cause premature osteoporosis. This was identified in the populations which intensified their agriculture and consumed unleavened bread (Smrčka et al. 1998). Gluten from wheat flour or, more exactly, prolamin gliadin, can have a toxic effect and give rise to coeliac disease as demonstrated by Dicke and his colleagues (1953) in the Netherlands. The Greek doctor Aretaeus described this disease in the 2nd century A.D. (Adams 1856 in Simoons 1981). However, it was Gee (1888 in Simoons 1981) who presented the first clinical description: "A kind of chronic ingestion that can appear at any age, but more commonly in children 1–5 years old. Diarrhoea, vomiting, loss of appetite and weight loss, or failure to gain weight, are the symptoms." Gee concluded that the condition is brought about by errors in diet and that "if the patient can be cured at all it must be by means of diet." Gee noted that "death is common" and the disease, which had a 15% overall mortality rate in the 544 celiac patients included in articles published in Europe and the United States from 1909 to 1939. Moreover, those early patients who recovered tended to have stunted growth (Hardwick 1939). Falchuk et al. (1972) found a highly significant correlation between the disease and the HLA-B8 antigen: 88% of adult celiac patients in the United States and the United Kingdom had the HLA-B8 antigen, compared with 22–30% of the controls. Concentrations of Zn in the skeletons of the first farmers at Těšetice (Smrčka and Jambor 2000), in the Central-European territory (Linear Ceramics), are the lowest of any researched location. It was not until the arrival of Corded Ware and Bell Beaker cultures, with different diet types, that gracilization of the skeleton "stopped" in Europe. We suppose that "the Neolithic gracilization, which is the background of the wealth of agricultural populations and the increase of population," is directly linked with the concentration of Zn and various other elements of growth (Smrčka et al. 1998). In developing countries, where the chief nutrients are cereal grains and where the diet lacks animal protein, there is a prevalent nutritional Zn deficiency. Zinc deficiency interferes with the mechanisms necessary for mediating long-term memory (Wauben and Wainwright 1999). Those most vulnerable to zinc deficiency include (1) infants, (2) adolescents during rapid growth phases, and (3) women during pregnancy and lactation. A study of food samples from Iranian villages and from Nubia (Smrčka et al. 1998) indicated that zinc concentrations in the diet were suboptimal.

1.5.1 MANIFESTATION OF SHORTAGE AND DISEASE

In the Neolithic, periods of famine were probably repeated in cycles. This, including associated diseases with vitamin C deficiency (*scurvy*) and mineral deficiencies were indicated by interrupted enamel growth, *enamel hypoplasy*, or discontinued bone growth, *Harris lines* and *porotic hyperostosis* (Arnott 2005). In this context, parasitic infestations should not be omitted as it was one of the causes of *anaemias*.

1.6 AGRICULTURE AND ZOONOSES

Bone pathology was not only affected by the transition to a cereal grain-based diet, but also by the domestication and breeding of animals. Close contact with animals and milk utilization since the 7^{th} millennium B.C. (Evershed et al. 2008) lead to a rise in diseases transmissible to humans—zoonoses. Due to transmission from cattle, *tuberculosis* occurred in various regions of the Neolithic world (Kohler 2012, 2013, 2014), and at the same time, due to the goat population exchange, sporadic *brucellosis* infections would occur.

1.7 THE AIM OF THIS PUBLICATION

The aim of this publication is to clarify the hitherto unknown or little explained facts regarding the daily life of individuals of the Lengyel Culture (LgC), Neolithic farmers who emerged from the Balkans to replaced the original early agricultural population of Central Europe of Linear Pottery Culture (LBK or LPC) and the successive Stroked Pottery Culture (SPC). This Neolithic culture lived in village communities with grain cultivation and in close contact with domesticated animal. The settlement organization, with its hierarchy and emerging individual specialisation (Řídký et al. 2018), was exposed to plant and animal lives in the agricultural cycle. The Lengyel culture differed from early Neolithic cultures by the introduction of metal, copper, its regional distribution, the distribution of volcanic glass and an increase in hunting proven by archaeozoologic research (Dufek et al. 2016).

This culture was presented to the world by the pastor of Szecvárd, Mór Wosinsky and the notary in the Moravian town of Znojmo, Jaroslav Palliardi, at the turn of the 20^{th} century.

The eponymous type site was at Lengyel in Tolna County, Hungary, even though later settlements of this culture were also discovered in Vojvodina, Serbia, and in Croatia. This Neolithic culture migrated beyond Moravia, further west to parts of today's Austria and Poland.

The first amateur archaeologists, just like the succeeding professionals, were enthralled by the beautiful painted pottery, statuettes of animals and humans, as well as everyday objects.

An idea about the everyday life of the people in this population of the Middle and Late Neolithic started to form. Since the 1950s, following the discovery and analysis of rondels, the spiritual life and the religious ideas of these humans have started to emerge (Řídký et al. 2018).

In the first third of the 21st century, it might seem that all archaeological questions had been answered, yet more questions arise (Kristiansen and

Earle 2015; Řídký et al. 2015; Renfrew 2018). How was this population affected by the introduction of metal? Why was the need for hunting increased? What was the health and morbidity of the Lengyel Culture population before its migration from today's Hungary to the Moravian region of the Czech Republic, where it flourished unprecedentedly? Which diseases mostly troubled the inhabitants of Lengyel settlements? In what ways was the lifestyle during the expansion of this Neolithic culture different from those of the preceding Linear and Stroked Pottery Cultures? These questions will be addressed in the following chapters.

1.8 SUMMARY OF INDIVIDUAL CHAPTERS

CHAPTER 2

In this chapter, the rudimentary features of the Lengyel Culture in Hungary with special attention given to the Baranya and Tolna regions, where the eponymous site is located, are presented. It is conceived from the archaeological point of view with a brief overview of the analysed burials at the, now already classic, burial sites of Zenkövárkóny and Villánykővesd.

CHAPTER 3

In this chapter, the paleopathologic analyses of the sites Zenkövárkóny, Villánykővesd, Belvárgyula, Borjád and Alsónyék-Bátaszék are interpreted. An archaeological gender study of the Zenkövárkóny burial site introduced new findings about textile, hide, and metal processing at the site. These were also verified through bone material analysis. Pathological changes, exceptional from the medical aspect, were examined from the point of view of several scientific disciplines.

CHAPTER 4

In this chapter the dietary trends from the Zenkövárkóny and Villánykővesd burial sites are examined using stable nitrogen and carbon isotopes.

CHAPTER 5

Migration analysis using stable strontium isotopes conducted at the Zenkövárkóny, Villánykővesd, Belvárgyula and Borjád sites.

CHAPTER 6

In this chapter, the health of the Neolithic population members of the Zenkövárkóny, Villánykővesd and Belvárgyula sites is addressed through the use of multi-element analysis of trace elements in bones and tooth enamel.

CHAPTER 7
The archaeological characteristics of the Lengyel Culture (Moravian Painted Ware Culture) in Moravia are presented in this chapter, including the history of research.

CHAPTER 8
The population of the Moravian Painted Ware Culture (LgC) is compared with the preceding Linear Pottery Culture (LPC) and the Stroked Pottery Culture (SPC) from an anthropological viewpoint.

CHAPTER 9
In this chapter, the Neolithic cultures of Moravia (LPC, SPC, LgC and Moravian Painted Ware Culture) are compared from the perspective of paleopathological analysis of bone diseases.

CHAPTER 10
Dietary trends in Neolithic cultures of Moravia (LPC, SPC, LgC and Moravian Painted Ware Cultures) are compared based on stable nitrogen and carbon isotope analysis.

CHAPTER 11
The Neolithic cultures of Moravia (LPC, SPC, LgC and Moravian Painted Ware Cultures) are compared from the aspect of the population's mobility using stable strontium isotope analysis.

CHAPTER 12
Bone health in individual periods of the Neolithic cultures of Moravia (LPC, SPC, LgC and Moravian Painted Ware Cultures) is examined through multielement analysis of trace elements.

CHAPTER 13
Conclusion on the health and morbidity of the Lengyel Culture populations including their paleopathological profile and reference to the importance of scientific examination of Neolithic bone material.

2. THE LENGYEL CULTURE IN HUNGARY

OLIVÉR GÁBOR

2.1 TIME AND TERRITORIAL BOUNDARIES

In Europe, the change from the hunter gathering lifestyle to the settled lifestyle took place during the 7–6 Millenium B.C. (Childe 1925; Lüning 1988; Andel and Runnels 1995; Fernández-Domínguez and Reynolds 2017). The most important innovations were settling in one place for a long time, deliberate food production, making polished stone tools, and the birth of pottery craft. A permanent settlement established near the cultivated area, and the larger area unit was covered by a settlement network. At that time was evolved the well known Dumbar's number (a measurement of the cognitive limit to the number of individuals with whom any one person can maintain stable relationships—Dunbar 2010). Neolith revolution: producing farming (agriculture, animal housbandry), an active attitude towards the environment (both creative and devastating) (Childe 1936; Bíró 2003a, 99; Barker 2009). At the beginning the stone tools used as chock and axe spread while the areas under newly cultivated land were cleansed (Bíró 2003a, 99). Constant shaped containers made of clay (inorganic material). The larger clay pots were used to store the crop more safely, the smaller ones mimicked the shape of bowls made of pumkins. The first artifical material in the history was the burnished clay. The farming population grew due to the food production, and caused the spread of the new population and its lifestyle to the detriment of the mesolithic people. The enrichment caused by the food production, created social differenties, which are reflected in the excavated graves.

The Lengyel culture was born in the late Neolithic age (around B.C. 4800) in Hungary (Bíró 2003b, 103), as a genetic offspring of the earlier Linear Pottery Culture (Zalai 2003, 110), but not directly. The last time limit of this culture was the early copper age (till B.C. 4000), because it saw the appearence of the first copper beads. This period was the beginning of the Secondary Products Revolution during the copper age (Greenfield 2010; Szeverényi 2013, 58): milk, dairy products, wool use, inventing alcoholic products beverages (Gábor 2008, 77; Gábor 2009, 188).

In the Neolithic era was the late Neolithic the flower. This is also the richest period in archaeological finds: sophisticated craft products, long distance obsidian trade and large central sites. According to the highest density of contemporary settlements, the center of the late Neolithic Lengyel culture was in Southwest-Hungary.

2.1.1 AREA

The Lengyel culture was a part of a greater late Neolithic Central-European cultural-unity, which includes territories of West-Hungary, Austria, West-Slovakia, South-Moravia and South-Poland (Bíró 2003b, 102). But this unity was determined only in modern age (20th century), based on the similarity of archaeological finds—mainly the painted ceramics. That is why we do not know if this material similarity in that era also meant real ethnical and cultural unity or not. However we can figure an inner boundary, by help of Neolithic balkanian traditions, which reached to Hungary but not further north.

2.1.2 ORIGIN, SPREAD, DATING AND PERIODS OF THE CULTURE

In the territory of Slovenia and Croatia a new late Neolithic culture was born, which is called Sopot culture (Dimitrijević 1968; Kramberger 2014). The settlements of the 2nd phase of this culture appeared in South West Hungary, and later in North West Hungary (Regenye 2002). The material culture also changed, and cultural unification began. The base of the new Lengyel culture came from the remains of the middle Neolithic population. This late Neolithic culture was probably built on local foundations with the help of powerful South East European influence (Simon 2003, 102; Bíró 2003b, 102–103).

The time periods and phases of Lengyel culture were calculated using synchronology (e.g. ceramic typology and absolute chronology (Lichardus and Vladár 2003; Barna 2011, 243–246). The Lengyel culture was born about 4800 B.C. (Barna 2011). The tradition of ceramic painting was inherited from the previous Sopot culture (Kalicz and Makkay 1972) and not directly from the Linear Pottery Culture. The dishes were the finest in the most colourful (red, white, black and yellow) in the first period. Later fewer colours were used. In the latest period the colours were replaced by plastic ornaments (cams). The extent of the Lengyel culture was the South West Hungarian group (Baranya county and Tolna county), the North Hungarian, and the South Slowakian Aszód-Csabdi-Svodín group from the late period.

- 1st phase: lots of painted ceramics (mainly red), scrached ornaments, small knobs with horizontal opening, pedestaled bowls, mushroom vessels.
- 2nd phase: continousity of the earlier vessel-forms, red-white painted ceramics, schrached meander.
- 3rd phase: the surveillance of the culture reached to copper age, but only in West-Hungary (copper beads). The life of the settlements and usage of

circular ditch systems was unbroken. White coloured ceramics and big knobs (Raczky 1974).

- The existence of phase 4 is questionable (Pavúk 2004).

2.2 SITES

For a long time, the sites of South West Hungary were the most known. Today more than 300 sites of the Lengyel culture are known in Hungary. The best-known sites were: the eponymous site Lengyel-Sánc, excavated by Wosinsky Mór (Wosinsky 1885), and the settlement and cemetery of Zengővárkony, excavated by János Dombay in the 1930's and 1940's (Dombay 1960a). The Aszód site, excavated later by Nándor Kalicz (Kalicz 1985), showed the northernmost part of the culture in Hungary. The most important obsidian mines were in Tokaj, out of Lengyel cultres' territory. There were close connections to the east Hungarian late Neolithic groups. The tell of Tiszapolgár-Csőszhalom lies in the corridor between the Lengyel and the Tisza-Herpály cultures, as a common point (Raczky 2002).

2.2.1 SETTLEMENTS

After Werner Buttler (excavated the Neolithic settlement of Köln-Lindenthal: Buttler and Habarey 1936, tabs. 22–26) János Dombay believed, that the clay pits were the sites of the homes (Dombay 1960a, 181–192). Today we know that the rows of postholes show the location of the long late Neolithic Houses (Lüning 1979; Sherratt 1982; Mausch and Ziessow 1985). These large family houses continued the Central European Neolithic traditions. In the early period of the culture, people sometimes were buried in the settlements, but most of the cemeteries became an area entirely separate from the settlements. At that early time the type of cemeteries with great numbers of graves were formed. The great settlements played significant role in the long-distance trade of copper, sea shells and obsidian. The polished stone axes and bone tools were local products. (Bíró 2003b, 102–103) Firstly they were farmers, secondly craftsmen (craft settlements: Zengővárkony, Aszód), and miners expanding to the mountainous regions (Kalicz 1985). They lived in large family houses with pile structures (it was a Central-European Neolithic tradition). In Zengővárkony was a central settlement with farming, polished stonetool-making local mine (Szamárhegy et al. 2000, 9), and it was obsidian distance trading center. Here were found the earliest copper beads of Hungary.

2.2.2 CEMETERIES

The number of cemeteries is remarkably small compared to the great number of settlements (Zalai 2003, 110). The richest cemeteries were in Southwest-Hungary: Zengővárkony (368 graves in 24 grave groups), Lengyel-Sánc (2 grave groups), Mórágy-Tűzkődomb (109 graves Zalai-Gaál 2001, 2002; Zoffmann 2004), Alsónyék-Bátaszék (2400 graves!), Villánykővesd (28 graves), Pécsvárad-Aranyhegy (8? graves), Szekszárd-Ágoston-puszta (20 graves).

The cemeteries are mostly known in parts close to the Danube. Most of the known cemeteries were found in the abandoned parts of the settlements, because it was exactly the time period of history, when the settlement and the cemetery were separated from each other. The graves were usually sorted into rows (30–35 graves belonged to a group), but there were lots of graves outside the cemetery (eg. in the pits and ditches of the settlements).

Placing the corpses in flexed positions was a regular habit (Zalai 2003, 110). The most common grave goods were ceramics (with food and drink for the dead) interred by the mourners. The other type of grave findings were the personal objects owned earlier by the dead such as clothing items or tools. Typical grave findings found in the graves of men were wild boar tusks and pig jaws.

Orientation of the graves (Zoffmann 1965): The most common custom was: East-West and West-East, lying on the right or left side. The South-North orientation was rare (eg. Eastern cemetery group in Lengyel).

Special burial rites were cremation[1], burying little children in vessels (Mórágy), skull grave, grave without skulls[2], trepaned skull in a grave (Lengyel: Zalai 2003, 110), limb mutilation[3], graves containing several bodies[4], cenotaph with grave goods[5].

2.2.3 ZENGŐVÁRKONY (SETTLEMENT AND BURIAL SITE)

The Lengyel culture was named after the eponymous type site, the enclosed settlement of Lengyel in Hungary, right of the Danube. To the South of Lengyel, the site of Zengővárkony was discovered in 1933. The history

1 The cremation was a middle Neolithic local tradition. Györe: 9 cremations of 16 graves in a separated group (Zalai 2003, 110, 112).

2 Zengővárkony: 15 graves layed next to each other without skulls. Hard slaughtering of cadaver occured mainly in graves of male or boys. At the same time these were sometimes rich graves (Bándi, Petres, and Maráz 1979, 25).

3 Limb mutilation after death? It occured continously during the prehistoric age, as the sign of reburial or the fear from the dead (Zalai 2003, 110).

4 It is rare, mainly mother with her child—Zalai 2003, 110.

5 The cenopahs were relatively common. Bothros in the cemetery (eg. Mórágy): it is not known, if it was a cenotaph or bothros.

of archaeological research at the settlement and burial site was described by János Dombay in the introduction to his book, *Settlement and burial site Zengővárkony* (Dombay 1960a): "Most of the finds came from the minor excavations in 1936 and 1937, which had to be protected as they were endangered by agricultural activities. The observations showed that Zengővárkony was an important settlement. The clues were the traces of settlements near to burial sites as well as groups of graves rather far from other groups. In one such group of graves, as it seemed, blood relatives may have been buried, or families living together. One conspicuous feature was the quantity of artefacts in the settlement. This was proved not only by rich funerary equipment but also by the great quantity of untreated silex fragments, flint tools produced by the chipping technique, polished instruments of various kinds of stone and tools of bone, fragments of pottery and a large quantity of animal bones. This suggested that there was a centre of production of silex tools and painted pottery.

In the summer and autumn of 1938, 147 graves were excavated at various sites within the settlement, and another 77 in the autumn of 1939. We had to be satisfied with saving the endangered graves, situated on small hillocks. In such places, the graves are endangered even nowadays by soil washed away after heavy rains or by agricultural activities. We first attempted exploration of the settlements in 1941. In 1944 we found another 15 graves while exploring the settlement. The excavations and explorations fully confirmed our previous observations. We estimated the number of as of yet unearthed graves at about 1,500 and that of the as of yet unexplored groups of graves at 50–60. We supposed it would be possible to find more homes of square ground plan which had been built above the ground level and perhaps that some remnants of buildings would be discovered that served economical purposes.

In 1947 we performed the first major research at the settlement. At that time, we had the first chance to observe the phenomena of the everyday life that cannot be judged by the material from graves and we widened the scope of research to the type of the settlement, economic and social life to such an extent that we might arrive at a complete picture. The goal of the systematic unearthing of the whole settlement was explanation of the most important issues of the type of economic life, the connection between the settlement and the graves, the structure of the family and social relations as much as needed to prove that the complexes of pits were remnants of earth-houses and associated farm buildings. We could only try to collect enough material to show the everyday life of the inhabitants and provide the best reconstruction of life in those times.

We tried to achieve these goals through the excavations in 1948. As, considering the experience of 1947, the partial and particular excavations did not prove the anticipated result, we started to explore whole respective areas in order to see a larger complex of pits and, at the same time, study the details in their interconnections."

The burial site of Zengővárkony originally included 368 graves arranged in 14 grave groups, but only 64 graves, i.e. barely 18%, have been excavated.

2.3 POTTERY

The pottery of the Lengyel culture is exceedingly rich and varied (Kalicz 1998; Barna 2011, 168–181). Its description is important, as it suggests, at least vaguely, the food the people consumed. The typical ceramic forms of the Lengyel culture (figs. 1, 2, 3) are the follows: thin-walled cups, with a small bottom; small double-cone shaped vessels; big round flat dishes; indented deep dishes; high dishes on a stem, with a shallow dish part and a stem which is narrow at the top but with a funnel-shaped widening downwards; and big jugs with a high neck. On comparison of the decorations of the pottery of


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Fig. 1. Zengővárkony, grave no. 14. Photo: Sinkó Anikó.

Fig. 2. Zengővárkony, grave no. 176. Photo: Sinkó Anikó.

Fig. 3. Zengővárkony, N11–55. Photo: Sinkó Anikó.

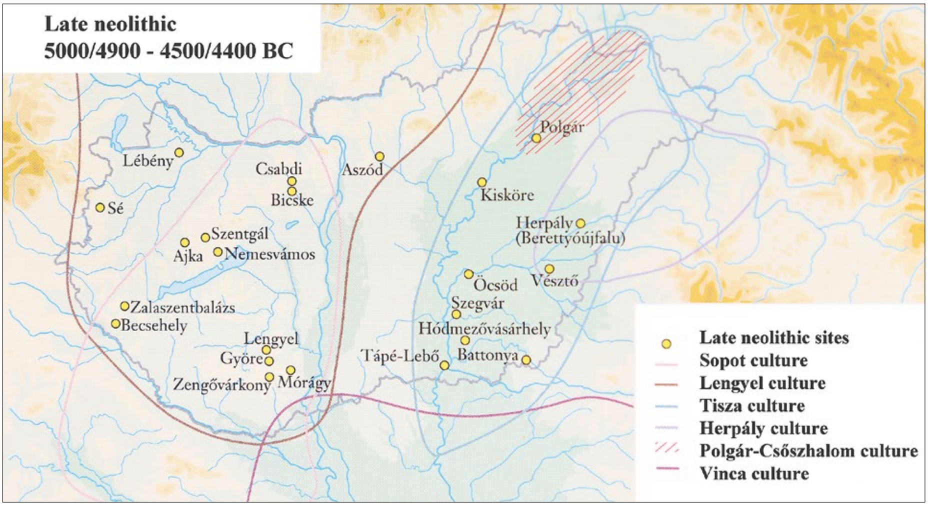

Fig. 4. Late Neolithic age in Hungary (Visy 2003, 98).

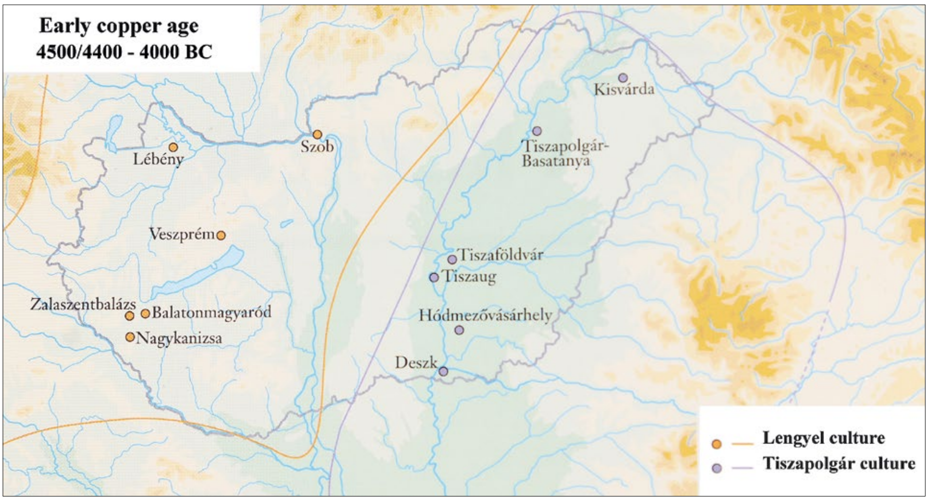

Fig. 5. Early copper age in Hungary (Visy 2003, 124).

the Tisza culture and of the Lengyel culture, it is obvious that in the Tisza culture the spiral pattern on the vessels is not as important as in the Lengyel culture. In case of the meander pattern, it is the other way round. In artefacts of the Tisza culture, combinations of spirals and meanders, so conspicuous in the Lengyel culture and in Zengővárkony in particular, do not occur (figs. 4, 5).

2.4 METALLURGY

In the areas of the Lengyel culture and the Tiszapolgár culture, copper jewelleries were found.

The earliest worked copper pieces appeared already during the late copper age. They were collected from the surface the malachite, azurite, and natural ore, and were used for jewellery beads, needles, rings and bracelets. From the first half of 5th millennium B.C. the number of copper findings increases in sites. Besides working/shaping objects using hammers, the first signs of copper extrusion appeared in Zengővárkony, in the middle of the 5th millennium B.C. Prosperous South Eastern European metalwork was created (Virág 2003, 129–130).

2.5 EVERYDAY LIFE UTENSILS AND CRAFTSMENS' TOOLS

Axes were found in men's graves. Only in exceptional cases do the cutting edges show signs of use. The edges were mostly sharpened only from below, on one side, and with a bulge just above the edge, which interfered with the use of the instruments as an axe. Also, rather narrow specimens with a rounded neck exist, but these are rare. Their shape is different, and so is the stone material they were made of. They were obtained through barter.

Knives for skinning were first roughly shaped, then ground to the required shape on a grindstone and eventually the cutting edge was sharpened. Often they were re-sharpened.

Tools resembling the *chisel* (like that used by sculptors) are smaller, narrow and rather long, like incisor teeth, but they also resemble the edges of a shoemaker's last. They are polished. The arch-shaped cutting edge was ground and sharpened from below but sometimes from the above as well.

The *club head* was cylindrical. It was polished into the round shape after the hole for the handle was drilled.

The number of grindstones and grinding boards testifies that most stone tools were manufactured on the spot, in the settlement. *Small grindstones* were 8–10 cm long. Their bottom sides are smooth and robust. The back sides are arched. They are light and convenient, easy to hold on one hand. They were moved during sharpening rather than being ground against passively. Beyond doubt, their primary use was working wood. The heavy *grindstones* could have been used as a plane, as the grip part was held in the right hand while the left hand was holding the narrow back of the grindstone. *Smooth stone plates* were used to rub pigments into powder with grindstones. Ferric red ochre was first milled and then the chips were ground to fine powder.

In *lumps* of clay from the huts, impressions of wooden parts, square in shape, were found. This suggests that construction timber was squared off first. For this purpose, heavy grindstones, 55 cm in length, may have been used. Their bottom side is 12 cm wide, smooth and worn, the top side is narrow. The back part is narrow and ends with a grip part, facing the left.

2.6 ARCHAEOZOOLOGICAL EVIDENCE OF CHANGES IN ABUNDANCE OF ANIMALS IN LATE NEOLITHIC AND ENEOLITHIC (CHALCOLITHIC) PERIOD

Animal farming in migrating populations that came to the Carpathian Basin from the South-East became part of the Tiszapolgár culture in the early Chalcolithic period, in the northern part of the region between the Danube and Tisza, as well as in the Lengyel culture in the Transdanubian region. The Neolithic type of animal farming and hunting survived to the Eneolithic period but acquired some new forms.

Considering the proofs of composition of the fauna, the first part of the Chalcolithic period in these cultures was different. In the Lengyel culture the animal farming and hunting survived and stayed similar to that of the Neolithic period.

Domestic animals did not include the horse. Cattle were the most frequent animal, followed in number by pigs, sheep, goats and dogs. The composition of the domestic fauna was very similar to that of the Tisza and Herpály cultures.

The population of wild animals was not typically Neolithic. Aurochs and red deer occurred approximately in the same quantities, which suggested some recession of Neolithic hunting activities. The occurrence of auroch bones, however, was still high—at the same level as in the Tisza culture. A high number of transient forms between aurochs and cattle occurred, but not as many as in the Herpály culture.

At all Lengyel culture settlements, the composition of the fauna was very similar, although the distances between them were big. Between the two settlements with the richest specimens of fauna, Zengővárkony and Aszód, the distance was 200 kilometres. In Aszód, the hilly countryside of the northern Hungary, finds of the boar were the most common in game animal remnants (Bökönyi 1974, 21–33).

2.7 BELIEFS AND CIRCULAR DITCH SYSTEMS

The clay idols (usually women) were present throughout the Stone Age in Hungary. Almost all of them were found in settlements. A cult corner can be deduced in the dwelling houses (Bánffy and Goldmann 2003, 112–113), that is, that part of faith was a family matter, in accordance with the Neolithic Balkan traditions. The number of idols declined in Late Neolithic.

The circular ditch systems were of Central-European origin, located mainly in Western-Hungary. They were created outside the settlements and composed of "V" shaped concentric ditches, which were not made for defense purposes, rather as sacred community facilities. The circular ditch systems had some entrances (oriented to the cardinal points), but there were no setllements within. Little archaeological material was found in them, among which the idols indicate a sacral function (Szeverényi 2013, 51).

2.8 SOCIETY, ETHNICITY

The grave goods of cremated graves are similar to the inhumated graves. There may be two separated ethnical groups represented (Zalai 2003, 112)? Likewise, different types of grave orientations can also show differences in origins of the groups. At the same time, the decapitation in a separate cemetery group can also show a cultural togetherness (Bándi, Petres, and Maráz 1979, 25, 27). Copper beads, which occur as grave goods only in certain groups (but not necessarily as a sign of wealth) may be as a sign of cultural differences (Bándi, Petres, and Maráz 1979, 27).

The richest graves belong to men. The finds from the graves were: polished stone axes, chipped stone tools, a couple of pendants made of wild boar tusks, and bone pricker. The dog skeleton or antler axe in a grave also show the high rank of the burried man. Based on the rich child-graves, social rank was inheritable. The poorest graves did not have any grave goods (about one-third of all graves).

2.9 ANALYZED GRAVES

2.9.1 ZENGŐVÁRKONY

Grave no. 5: Male, flexed on right side, E–W. Pedestaled bowl, 11 shell beads (Dombay 1939, 7) (fig. 6).

Grave no. 7: Male, flexed on right side, E–W. Polished stone axe, 2 vessels, pedestaled bowl, mushroom vessel (Dombay 1939, 8, JPM Fotótár: 231) (fig. 7).

Grave no. 13: Male, flexed on left side, E–W. Polished stone axe, chipped jaspis scraper, animal dent, pedetaled bowl, bone tool, mushroom vessel, 8 chipped stone blades, 2 obsidian fragments (Dombay 1939, 11–12) (figs. 8–9).

Fig. 6. Zengővárkony, grave no. 5.
Photo: Sinkó Anikó.

Fig. 7. Zengővárkony, grave no. 7.
Photo: Sinkó Anikó.

Fig. 8. Zengővárkony, grave no. 13.
Photo: Sinkó Anikó.

Fig. 9. Zengővárkony, grave no. 13. Photo: Sinkó Anikó.

Grave no. 14: ?, flexed on right side, E–W. Bowl, pedestaled bowl, 2 vessels, mushroom vessel. (Dombay 1939, 12, VI/3) (figs. 10–13).

Fig. 10–12. Zengővárkony, grave no. 14. Photo: Sinkó Anikó.


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Fig. 13. Zengővárkony, grave no. 14.
Photo: Sinkó Anikó.

Fig. 14: Zengővárkony, grave no. 34.
Photo: Sinkó Anikó.

Grave no. 34: Male, flexed on back, SW–NE. 2 bowls, 2 vessels (Dombay 1939, 16–17, X/1) (fig. 14).

Grave no. 43: ?, flexed on left side, W–E. Vessel (Dombay 1939, 19).

Grave no. 84: Male, flexed on left side, O–W. Pedestaled bowl, 2 bowls, mug, stone axe. (Dombay 1960a, 75–76, XXXV/11) (figs. 15–16).

Fig. 15–16. Zengővárkony, grave no. 84.
Photo: Sinkó Anikó.

Fig. 17. Zengővárkony, grave no. 87.
Photo: Sinkó Anikó.

Grave no. 87: Female flexed on left side, O–W. 2 pedestaled bowls, 2 bowls, copper beads. (Dombay 1960a, 77) (fig. 17).

Grave no. 88a: Female, flexes on left side, NE–SW. 3 pedestaled bowls, 2 bowls, bone pricker. (Dombay 1960a, 77, XXXVI/5—JPM Fotótár: 237) (figs. 18–21).

Grave no. 88b: Baby? (Dombay 1960a, 77).

Fig. 18–19. Zengővárkony, Grave no. 88. Photo: Sinkó Anikó.

Fig. 20–21. Zengővárkony, Grave no. 88. Photo: Sinkó Anikó.

Grave no. 90: Male, flexed on left side, E–W. Pedestaled bowl, vessel, bowls, silex knife. (Dombay 1960a, 78, XXXVI/8a—JPM Fotótár: 238) (figs. 22–23).

Grave no. 91: Female, flexed on left side, E–W. Bowls, bone needle, copper beads, animal bones, shell (Dombay 1960a, 78, XXXVI/8b—JPM Fotótár: 238) (figs. 24–26).

Fig. 22–23. Zengővárkony, grave no. 90.
Photo: Sinkó Anikó.

Fig. 24–26. Zengővárkony, grave no. 91.
Photo: Sinkó Anikó.

Fig. 27–29. Zengővárkony, grave no. 93.
Photo: Sinkó Anikó.

Grave no. 93: Male flexed on left side NE–SW. 4 bowls, pedestaled bowl, vessel, 2 stones, stone axe (Dombay 1960a, 79, XXXVI/12—JPM Fotótár: 200) (figs. 27–29).

Grave no. 99: Male, flexed on left side E–W. 3 pedestaled bowls, 3 bowls, vessel, animal bones, nucleus stone (Dombay 1960a, 80–81) (figs. 30–31).

Fig. 30. Zengővárkony, grave no. 99. Photo: Sinkó Anikó.

Fig. 31. Zengővárkony, grave no. 99. Photo: Sinkó Anikó.

Fig. 32. Zengővárkony, grave no. 101. Photo: Sinkó Anikó.

Grave no. 101: Female (and child) flexed on left side NE–SW. Pedestaled bow, bowls, vessel, cup (Dombay 1960a, 81—JPM Fotótár: 202) (fig. 32).

Grave no. 102: Male, flexed on left side E–W. 2 pedestaled bowls, 2 polished stone axes, chipped stone blade, clay cone (Dombay 1960a, 81–82) (fig. 33).

Fig. 33. Zengővárkony, grave no. 102. Photo: Sinkó Anikó.

Fig. 34. Zengővárkony, grave no. 104. Photo: Sinkó Anikó.

Grave no. 104: Male, flexed on left side E–W. 2 bowls, 2 polished stone axes, 2 pedestaled bowls, vessel (Dombay 1960a, 82, XXXVIII/1—JPM Fotótár: 204) (figs. 34–35).

Grave no. 125: Male, flexed on left side E–W. Obsidian blade, stone knife, flat axe, pedestaled bowl, 5 silex chipped stone tools (Dombay 1960a, 90–91—JPM Fotótár: 213) (fig. 36).

Fig. 35. Zengővárkony, grave no. 104. Photo: Sinkó Anikó.

Fig. 36. Zengővárkony, grave no. 125. Photo: Sinkó Anikó.

Grave no. 135: Female, flexed on left side E–W. 3 bowls, vessel, pedestaled bowl (Dombay 1960a, 94) (fig. 37).

Grave no. 137: Male, flexed on left side NE–SW. 8 bowls, pedestaled bowl, animal bones, wild boar tusk, polished stone axes, chipped jaspis knife (Dombay 1960a, 94–95, XLIII/4) (figs. 38–39).

Fig. 37. Zengővárkony, grave no. 135. Photo: Sinkó Anikó.

Fig. 38. Zengővárkony, grave no. 137. Photo: Sinkó Anikó.

Fig. 39. Zengővárkony, grave no. 137. Photo: Sinkó Anikó.

Grave no. 238: Male, flexed on left side, E–W. Jaspis knife, polished axes, 2 pedestaled bowls, 2 bowls, 2 vessels, stone (Dombay 1960a, 125–126) (figs. 40–41).

Fig. 40–41. Zengővárkony, grave no. 238. Photo: Sinkó Anikó.

Grave no. 272: Male, flexed on left side, E-W. Pedestaled bowl, bowl, 2 vessels, 2 polished stone axes, 4 chipped stone tools (Dombay 1960a, 133) (figs. 42–43).

Grave no. 281: Female, flexed on left side E–W + child skull. Bowl, polished stone axe (Dombay 1960a, 135) (fig. 44).

Fig. 42. Zengővárkony, grave no. 272. Photo: Sinkó Anikó.