

## Eastern, Central and Western Hungary – variations of Neolithisation models

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**ABSTRACT** – *Until recent times, the Carpathian Basin was regarded as a uniform zone of neolithization. In the last few years it has become clear that at least three different types of transitions can be distinguished in the Eastern Plain (Alföld) region: one in the Jászság area with authentic Mesolithic sites, one in the northern, one in the northeastern fringes of the Körös distribution area, and a further one in the southern part of the Danube–Tisza Interfluvium where the impact of the formative Vinča culture must also be reckoned with. All regions differ from each other, concerning the contacts with Mesolithic population and the phases of neolithisation. Regarding Transdanubia, the picture becomes even more complex. The transition to the Neolithic obviously differed in each region: in the Drava valley where the Starčevo presence was very intensive, in the marshland around Lake Balaton, in the Rába valley lying close to the Alpine foreland, in the northern Transdanubian Danube valley and in the Little Hungarian Plain. Rejecting the simplifying model the assumption of a mosaic-like series of variations in the neolithisation process is offered. The process of Neolithisation is thus far from being unified in the various regions. This short study tries to seek different models of neolithisation behind the differences.*

**IZVLEČEK** – *Do nedavnega so Karpatski bazen smatrali za enotno področje neolitizacije. V zadnjih nekaj letih pa je postalo jasno, da lahko na področju Vzhodne ravnice (Alföld) ločimo vsaj tri različne tipe tranzicije: prvega na področju Jászság, s prvotnimi mezolitskimi najdišči, drugega na severnem in tretjega na severovzhodnem obrobju področja Körös, še enega pa na južnem delu Donavsko-tiškega porečja, kjer je potrebno računati tudi z vplivom kulture Vinča. Regije se v procesu neolitizacije med seboj razlikujejo tudi v odnosih med mezolitskimi in neolitskimi populacijami. V Transdanubiji je ta podoba še bolj kompleksna. Tu je neolitizacije v vsaki regiji potekala drugače: v Dravski dolini, kjer je bila močno navzoča kultura Starčevo, na močvirnatem področju okrog Balatonskega jezera, v dolini Rabe, ki leži blizu alpskega predgorja, v severni Transdanubijski donavski dolini in na Mali madžarski ravnini. V članku zavrnamo poenostavljen model neolitizacije in ponudimo domnevo o mozaični seriji regionalnih procesov neolitizacije.*

**KEY WORDS** – *Carpathian Basin; Neolithic transition; Körös, Starčevo; early and developed LBK groups*

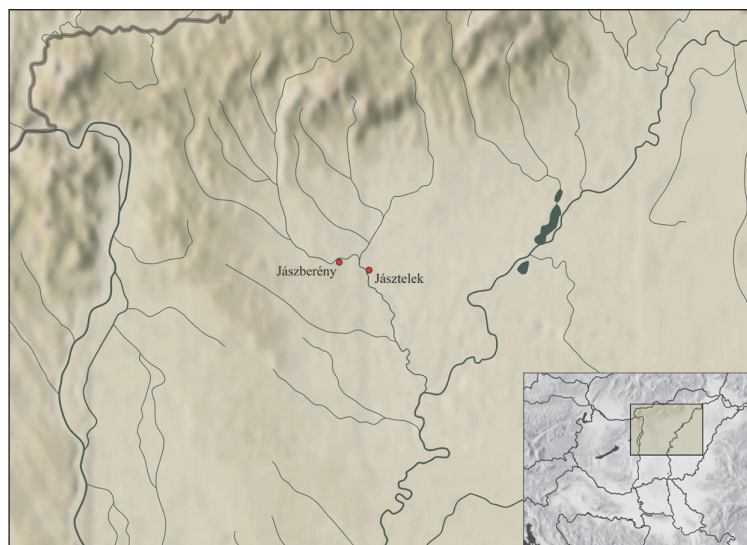
### The Pre-Neolithic period in the Great Hungarian Plain (Alföld)

In Hungary, there is only one region where a settlement niche, a series of authentic Mesolithic sites, has been found, researched and proceeded. This is the Jászság area, east of the Danube (Fig. 1) Here, two phases were distinguished by the excavator, Kertész: besides the older Mesolithic Jászberény phase, a set-

tlement of the latest period was also identified at Jásztelek. (Kertész 1994a; 1994b). The environmental and historical reconstruction of this phase has given basic new information about the phase immediately preceding the Neolithic (Kertész-Sümegei 1999; Sümegei 2003).

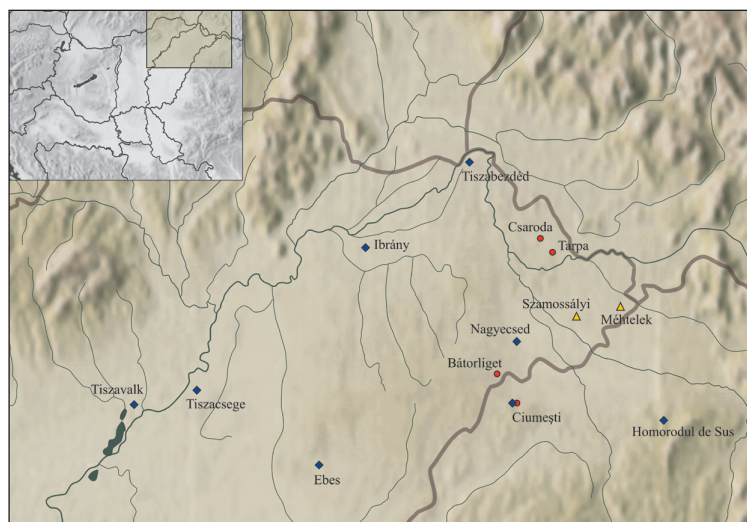
The north-eastern part of the Alföld (Fig. 2) shows a fairly different picture from the mid-northern fringes, at least in the present state of research. The catchments of the rivers Berettyó, Sebes and Fekete Körös form a complex, articulated landscape frequently dotted with marshes and swamps. Although stone artifacts of the Late Mesolithic – preceding the times of permanent settlements – are known from as far as Western Romania, no archaeological evidence of any settlements has been found. The palaeo-environmental analysis, however, was able to show up some evidence for pre-Neolithic clearing and forest burning activity from around 8400 cal BC, paths in the woodland e.g. in the Bátorliget marsh region as well as near the village of Csaroda in a marshy area, the ‘Nyíres láp’ (Sümei 2003.21–22, Fig. 1; Sümei-Gulyás 2004. Ch. 3.8: Pollen and charcoal analysis). Around 8400 cal BC *Tilia* lost its dominance and *Quercus* became more typical (Willis *et al.* 1995), indicating closed forestation due to a milder climate with more precipitation. Dates for the mollusk fauna allow similar inferences (Sümei 2003.21). Given space for sunlight, the growth of berries and especially hazelnut in the bushy-shrubby undergrowth were enhanced. Favorable changes in the landscape were further intensified by small-scale bush clearing, as findings from several European localities have indicated (Gronenborn 1999; Zvelebil 1986; 2000). Pre-Neolithic “Tardenoisien” groups of people may have only temporarily settled in small homesteads, and moved on with the shifts of the seasons accompanied by the migration of wild herds along the constantly shifting riverbeds. Maxim (1999.27–30, 221–222) thus concluded from her examination of the lithics from Transylvania and the Partium area that the river valleys and the upland areas must have been inhabited by a local population before the first farmers reached this region. Paul regarded the indigenous contribution important enough to speak of a “Prăcriș” culture, based on analogies with the Balkans (Paul 1995.62–67).

The north-eastern part of the Alföld underwent significant transformations



**Fig. 1. The Northern part of the Duna-Tisza interfluvium (The Jászság), with sites mentioned.**

at the turn of the 7–6<sup>th</sup> Millennium BC. From this time onwards there was a decrease in the ratio of tree pollen in the profiles. This refers to a drop in woodlands, accompanied by a wide-scale extension of furrow-weeds, signifying human activities in the landscape (Willis *et al.* 1995; Gál-Juhász-Sümei 2006). Besides forest clearings, traces of forming “hunters’ paths” in the woodland, as well as hints of foddering animals with vegetation can also be observed in the region (Sümei 1998; 1999). Quite obviously, and as radiocarbon dates of archaeological finds testify, this was a time when the first immigrants from South-East Europe settled on the waterlogged soils stretching between the rivers Szamos and Berettyó. The flint assemblage from the pre-Neolithic site at Tarpa-Márki Tanya can be considered as



**Fig. 2. The North-Eastern part of the Alföld and the adjacent Érmélték region in Western Romania. a) preneolithic sites; b) Körös-Criș sites; c) Early Alföld LBK (Sztarmár II) sites.**

archaeological evidence completing the scientific results (*Kertész 1994b*).

### The process of Neolithisation in regions of the northern Great Hungarian Plain (Alföld)

Studying the main characteristics of Neolithic distribution in the Balkan area, several archaeological traces point to the inference that the Neolithic infiltration into Moldavia through the Banat, and the Olt valley, and Transylvania took a different path than the variant advancing westward from the Mid-Balkans, via the mouth of the Morava River. It seems that the Alföld region has much in common with the eastern type of Neolithic transition.

In recent decades, contradictory opinions have emerged about the Alföld Neolithisation. First, it was generally accepted that there were no people living in the area in the late Mesolithic; thus the first farmers arrived in a “vacuum” (*Gábori 1981*). In 1982 Makkay came up with an entirely new idea. He ascribed the peculiar northern frontier of the Körös and Starčevo cultures in the Carpathian Basin that contradict any natural geographical obstacles, to the hostile behaviour of a local forager population (*Makkay 1982. 23*). In the late 80's the discovery of a real Mesolithic niche (mentioned above) in the Jászság area between the Danube and the Tisza created the impression that Makkay was generally right in his postulating an indigenous population, although at that time he was not able to bolster his idea with any arguments. It is also possible that this population was not equally distributed in each Alföld region, not to speak of the different activity in contacting the newcomers. Up until now the Jászság is the only region where the presence of this Mesolithic population could be proven.

Concerning the early Neolithic development of Eastern Hungary, research was intensive in the mid-20<sup>th</sup> century, so that the first reports and evaluating studies appeared in 1976 and thereafter (*Kalicz, Makkay 1977; Raczky 1988; Kurucz 1989; Nagy 1998*). Many decades ago, Kalicz and Makkay had already noted that the sites of the old ‘Szatmár group’ in North-Eastern Hungary at Nagyecsed, Tiszabездé, Tiszavalk, Tiszacsege, Ebes, Ibrány and Ciumești (Csomaköz) in the Berettyó and Szamos valley, in the Érmellék area and in the Upper Tisza region can hardly be understood without assuming intensive contacts with Transylvania (*Kalicz, Makkay 1972.*

78; 1977; *Makkay 1982*). At some sites (e.g. Nagyecsed-Péterzug, Tiszabездé-Servápa), Körös elements were more dominant than the Linear Pottery traits in the early Alföld LBK (Szatmár II) assemblages (*Kalicz, Makkay 1977.20*). Based on these features, Kalicz and Makkay assigned these sites to their ‘Szatmár I’ group,<sup>1</sup> together with the easternmost-lying Méhtelek, and close to it, the Romanian Homorodul de Sus (Felsőhomoród) (*Kalicz, Makkay 1972.92; 1977.22*). Following his excavation of the Kőtelek-Huszársarok site, Raczky noted that the assemblages of the Szatmár II group “contained many formal and ornamental elements whose origins could only be explained through the Transylvanian branch of the Körös culture” (i.e. the Criș culture) (*Raczky 1983; 1986.31; 1988.27*). Thus the idea was raised that the Szatmár II group as the earliest phase of the Alföld LBK would go back to the contact between late formations of the early Neolithic: the Körös in the Alföld and the Criș culture arriving from the East.

This hypothesis was then reinforced by analyses of smaller regions, such as Nyírség in North-Eastern Hungary (*Kurucz 1989; Starnini 1994*). Early Alföld Linear Pottery sites are lacking between this area and westwards to Hortobágy. Kurucz noted that the finds from the early sites on the Szatmár plain (up to the Szamossályi site) differed from the assemblages in more westerly areas to the extent that “any genetic relations between the two seem very doubtful” (*Kurucz 1989.15*). The later development in this region definitely confirms this observation. In the Middle Neolithic, this is the sole region occupied by the “Esztár-Szamos region Painted Pottery group”, which is the only painted sub-group of the immense LBK culture.

Between North-western Jászság and the North-Eastern part of the Alföld, in the Upper Tisza region, there is a contact area between the lowland and the Mátra and Bükk Mountains extends. (Fig. 3) Here, the strong genetic relation between the early Alföld LBK settlements and the Körös culture can be seen.

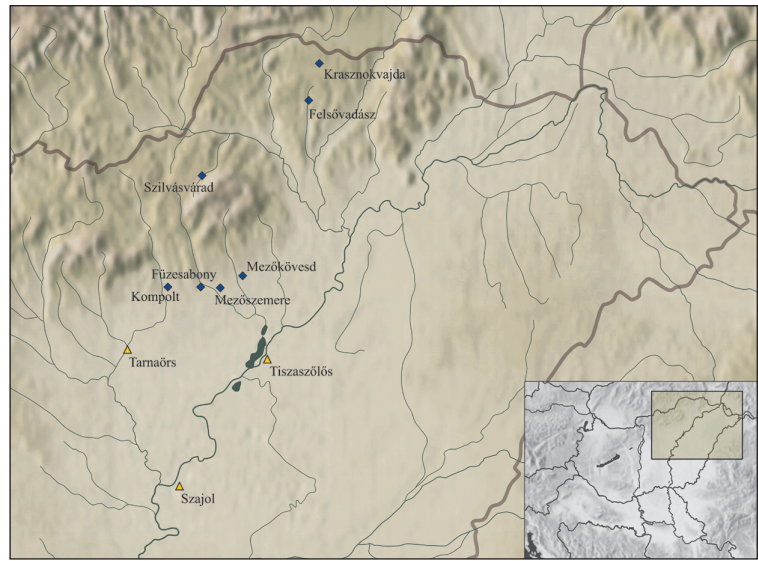
Domboróczki came to the conclusion that the LBK formulation i.e. the Neolithic transition in this area took place with practically no participation of groups other than late Körös (*Domboróczki 2001; 2005*). Domboróczki completed his observations by hypothesising that local forager tribes that might have lived on the edge of the Alföld most probably withdrew to the mountains, and it was only in a later

<sup>1</sup> This nomination is now out of use.



phase of the East Hungarian Neolithic that these groups began to merge with LBK: namely, their traces would be observed in the Tiszadob and Szilmeg groups of the developed LBK (Domboróczki 2003). Again, this inference could be reinforced by the anthropological analysis of some graves belonging to these groups (Zoffmann 2000). In connection with these ideas, it is to be noted that the original northern border of the Körös distribution along the Szolnok – River Berettyó line seems to collapse: new Körös sites are found north of this region, even in the Upper Tisza area; moreover, most recently one site, obviously connected with obsidian mining, was detected at the foot of the Tokaj Mountains.<sup>2</sup> Again, this is data that seem to bolster Domboróczki's postulations.

The later Alföld LBK groups, the Tiszadob, Szilmeg and also the Bükk formations set out from the Northern Mountains. The location of their possible local Mesolithic roots is a highly relevant assumption, which claims good arguments. Before drawing any conclusion on this question, however, some fields should be considered in detail. Such questions are signs of isolated development in pottery types and decoration. Some decorative features seem to be alien to the LBK heritage, while other new features can also be found in southern Alföld groups, like the Szakálhát, thus making their isolated highland origins questionable. Besides the basic studies and report already mentioned (Kalicz, Makkay 1977; Kurucz 1989; Nagy 1998; 2006), the proceedings of some further new sites along the M3 motorway, such as at Füzesabony, Mezőszemere, Mezőkövesd and Kompolt, have yielded some complementary information (Domboróczki 1997; 2003; Kalicz, Koós 1997a; 1997b; 2000; Bánffy, Biró, Vaday 1997; Bánffy 1999). For the earliest and developed LBK phase, however, real highland sites are also known (Csengeri 2003; 2004; Bánffy 2000a). The other relevant point is the exchange system which is seen as the basis for contacts between the Alföld and the assumed highland population. On this question the research work by Bácskay and Biró are essential, shedding new light on the raw material, provenance and the typological features of chipped stone imple-



**Fig. 3. The Northern part of the Alföld with the adjacent Bükk, Mátra mountains. a) Körös sites; b) Early Alföld LBK (Szatmár II) sites.**

ments within the LBK groups. (Bácskay 1976; 1982; Bácskay, Biró 1983; 1987).

A further link with the Körös roots of Alföld LBK in this region is the development of cult objects. In recent excavations of the northern Alföld, plenty of peculiar animal figurines and those depicting fabulous creatures (centaurs) have come to light (Füzesabony: Domboróczki 1996; 1997; Mezőkövesd: Kalicz, Koós 1997a; 1997b). These early LBK finds can be directly traced back to the Körös culture (Domboróczki 2003.39). This view seems to be completed by earlier cross-cultural cultic depictions, such as bull figurines or four-legged altarpieces, that had already been considered to have lived on as Körös influences on the Alföld LBK (Kutzián 1944; Kalicz, Raczkay 1981). The famous flat figurines from Méhtelek also seem to confirm the connections between the south-east European type figurative art and the early Alföld LBK, where flat, close to rectangular figurines also occur. It can be assumed that the survival of cult object types may also involve the survival of certain elements in the ritual tradition and cult life.

Further important indications of characterising different ways within the Alföld development can be found when reviewing architectural traditions. The Early Neolithic houses of South-East Europe were small buildings. They were usually constructed on a square, rather than a rectangular ground plan, and they lacked an internal post structure, thus sugges-

<sup>2</sup> I thank Pál Raczkay's kind oral communication here. János Dani, archaeologist to the Déri Múzeum Debrecen also reported about a northernmost lying Körös site.



ting a light roof. Clay was used more abundantly than wood (Lenneis 1997; 2000). The spaces outside the houses were at least equally important as the undivided intramural interior spaces, which rarely contained a hearth. East of the Tisza River, the Körös communities followed exactly this South-East European tradition in house construction. Although it has been claimed that the Körös houses actually represent the earliest, central section of Linear Pottery houses (Meier-Arendt 1989), I have found no evidence to confirm this. The Szajol-Felsőföld type houses or those from the north (Krasznokvajda) differ both in their form and in their orientation from the north-oriented and heavy wood long houses of the Central European LBK (Raczky 1977; Horváth 1989; Losits 1980).

Besides architecture, pottery, physical anthropological analyses and similarities in cult objects, there is one more set new results which make a direct Körös impact on the formulation of Alföld LBK groups very probable: this is new information on absolute chronology. The new dates for the latest Körös and early Alföld LBK (Sztalmár II) period show a definite overlap (Whittle et al. 2002; Domboróczki 2003), thus making direct contacts possible in this part of East-Hungary.

In sum: on the Northern fringes of the Alföld there are three regions where the phases of the Neolithic transition have been cursorily examined. In the north-western part: at Jászság, there is direct evidence for late Mesolithic groups, but contact with the Körös culture has remained hypothetical as yet. In the Upper Tisza region, where the Alföld meets the Mátra and Bükk Mountains, traces of a dynamic Körös expansion have been observed. According to recent data, no considerable Mesolithic participation formed the early Neolithic in this region. The forager groups may have withdrawn into the highlands, contacting LBK groups only in their developed phases – a working hypothesis which requires further research. On the North-Eastern fringe of the Alföld, the existence of a Mesolithic population could be partly shown by data from the natural sciences (i.e. by anthropogenic impacts), and partly by flint assemblages from different sites. Direct contact with early Neolithic tribes is probable, yet this still lacks direct evidence. In this case, the ear-

liest Neolithic impact consisted much more of the eastern, Criş branch of Körös culture, rather than its Alföld variant. According to recent research, the three areas mentioned here constitute three variants of the Neolithisation process.

### Preneolithic Period in Transdanubia (Figure 4.)

In case the existence of any pre-Neolithic (i.e. late Mesolithic) hunter-gatherer groups are assumed in Transdanubia, then these groups definitely had to face wholly new ecological circumstances in the mid-centuries of the 6<sup>th</sup> Millennium BC. In some periods, Lake Balaton split into two or three smaller lakes, with clear, cold water; when the climate turned warmer and wetter, natural dams were breached and even the northern Tapolca Basin and valleys south of the lake also became part of the lake. During these periods, the lake flooded the north to south valleys, to its south down to the Kapos River, occasionally as far as the Drava valley (Cserny 1999). At these times the Sárret bog, somewhat east of Lake Balaton became a one-meter-deep lake (Juhász, Sümegi, Zatykó 2006, *in press*; Bánffy, Juhász, Sümegi, *in press*). The water level of the lake was fairly low at the end of the Mesolithic, rising significantly around 5500–5400 calBC. The wetter climate and the rise in the water level meant that lake shore inhabitants were forced to move away from the lowest stream shores and river terraces, and to follow the growing water level along the shores of Lake Balaton (see also: Juhász, Sümegi, Zatykó 2006, *in press*). Despite the lack of well researched Mesolithic sites in the region, their presence in Transdanubia is partly reflected by some evidence. Such a hint is the registration of pre-



**Fig. 4. The Balaton region in Transdanubia. a) preneolithic sites; b) Starčevo sites; c) earliest LBK site, d) prehistoric flint mine.**

Neolithic forest burning. Traces of this activity were observed at Szentgyörgyvölgy, near the Pityerdomb site. The soil samples taken from the waterlogged, marshy banks of the Szentgyörgy stream flowing by the site indicated intentional forest burning around 8771 BP (7936–7821 cal BC) (*Cserny, Nagy-Bodor 2006*). The burnt organic matter and the low level of erosion in the area suggest that forest burning was repeated fairly often, about every 15–30 years. This phenomenon is also shown in pollen data (*Medzihradský 2001; Füzes 1989; Zólyomi 1980; Nagy-Bodor 1988; Juhász 2002*). The pollen profiles for the Balaton Basin and the marshland of the Little Balaton region indicate that there was a sudden increase of hazel in the mid-6<sup>th</sup> century BC, and that over one-half, 55 per cent of the ligneous species, was hazel around 5600 calBC, i.e. in the period immediately preceding the LBK (*Juhász 2002*, see also *Juhász, Sümegi, Zatykó 2006, in press*). Botanical analyses have shown that south-western Transdanubia was a hazel refugium during the last glaciation, and that it spread to other parts of the Carpathian Basin from this area. Still, the sudden, large-scale expansion of the species can hardly be explained without assuming active human manipulation of the environment (*Bánffy, Juhász, Sümegi in press*). It seems likely that the growth of hazel was encouraged by forest clearance, by the creation of small clearings where this warmth-loving species yielding storable fruit with a high nutritional value could thrive. A comparison of the frequencies of hazel and cereals in the pollen diagrams is most instructive: the two are inversely proportional. The increase of cereal pollens is accompanied by a decline of hazel in the sediments. As a further hint of a Mesolithic presence, there was a pre-Neolithic boat find near Keszthely, which was no doubt used when the shoreline ran in that area, presumably still in the Mesolithic (*Bakay, Kalicz, Sági 1966. 76*). As evidence closer to archaeology, microlithic trapezes and other types of the late Mesolithic tool-kit, collected during field surveys, have long been known from Transdanubia. Their dating, based on their typological traits, has never been challenged (*Mészáros 1948; Pusztai 1957; Dobosi 1972; Biró 1991*). Most recently, a thorough excavation was begun at the Regöly Mesolithic site, south of Lake Balaton. The preliminary results have yielded a great amount of stratified lithic instruments, although intact settlement features have not been found yet (*Eichmann, Kertész, Marton, in press*). The Kapos valley and the Vázsony basin, lying

north of Lake Balaton near the Szentgál mine, are especially rich in finds of this type. The stone tools examined to date were almost all made from red radiolarite from the Bakony Mountains. Most recently, a new project has the task of investigating some especially promising sites south of Lake Balaton, and to clarify the late Mesolithic-Starčevo interaction and LBK cultural development by excavation.<sup>3</sup>

### The process of Neolithisation in Western Transdanubia

Recent research into the Neolithic of Western Transdanubia and the findings of three micro-regional research projects made it more than probable that western Transdanubia and the Balaton region were part of a frontier zone in the mid-6<sup>th</sup> millennium BC, the setting of the long interaction between indigenous hunter-gatherer groups and immigrant Starčevo communities from the south.

The probably already existing late Mesolithic horticulture (see above) was expanded with the cultivation of domestic plants after contact with Starčevo groups (*Berzsényi, Dálnoki 2006*), and indigenous people also began to copy the immigrants' vessels. The result of the interaction between the two groups was the emergence of a genetically mixed population that soon colonized northern Transdanubia along the Marcal, Rába and Danube valleys, and later migrated farther along the Danube to eastern Austria, south-western Slovakia, southern Moravia and the heartland of Central Europe, where they played an active role in the transplantation of a sedentary, food-producing lifestyle.

Adaptation to the changed circumstances was both an option and a bitter necessity for each. The adaptation to the cool and wet Alpine-Atlantic climate of Transdanubia, with its heavy snows in winter, must have posed a serious challenge to the Balkan immigrants. Pityerdomb, Andrásida, and perhaps Brunn II near Vienna, finds from which are rooted in the Starčevo tradition, indicate that they were capable of adapting (*Bánffy 2004; Simon 2002; Stadler 2005*). On the other hand, a few Starčevo groups also settled in the marshland around Lake Balaton and on islets in the marshland, in an environment that meant a similar challenge for farmers of southern origin. The settlements at Gellénháza, Vörs-Máriaasszonysziget, Balatonlelle, and Tihany-Ápáti re-

3 The Kapos and Koppány valleys in southern Transdanubia are the primary targeted areas. Participants in the program (2006–2009): E. Bánffy, T. Marton, K. Oross, R. Kustár.



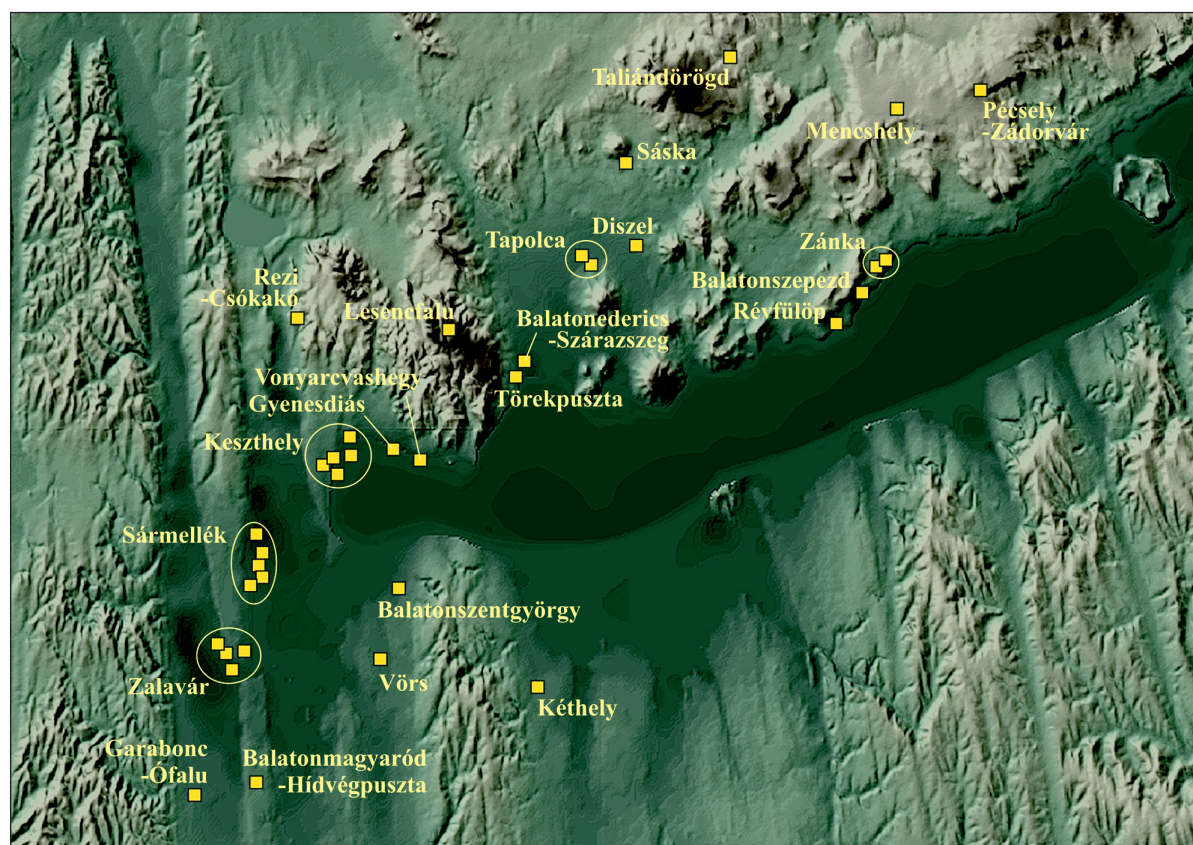
flect this different type of adaptation (*Simon 1994; 1996; Kalicz, Virág, Biró 1998; Kalicz, Biró, Virág 2002; Regenye 2006, in press; Biró 2006*).

It follows from the rise of the Balaton water level that the one-time late Mesolithic settlements along the lakeshore are now all submerged. A closer look at the location of the plentiful early Neolithic sites around the lake reveals that they lie directly along the changed shoreline of the period, when the water level was higher than the present one, in the marshland or on islets in the marshland (Fig. 5). This settlement pattern broadly corresponds to the Mesolithic one. These settlements all lay in close proximity to the water, in areas that were unsuited to agriculture. It is therefore possible that the majority of the settlements lying directly on the shore in the marshland had in fact been occupied by adapting Mesolithic hunter-fisher communities and those smaller groups of Balkan immigrants chose to settle in this area under their influence. If this was the case, it also implies that relations between the Starčevo groups and the indigenous population were essentially peaceful.

In spite of the fact that the settlements lay in an environment that was unsuited to cultivation, macro-

botanical finds from the earliest phase indicate a surprising variety of species. As to the samples from Pityerdomb, the number of remains was low for each species, never exceeding twenty specimens (*Berzsényi, Dálnoki 2006*). The surprising variety (einkorn, spelt, common wheat, barley and edible goosefoot), but low number of cereal grains would suggest that the extent of cultivation in western Transdanubia and the Balaton region did not exceed that of Mesolithic horticulture – the range of plants cultivated and tended in the open areas between the houses and in the narrow zone along the shore was simply broadened with the species adopted from the Starčevo communities, together with the art of cultivation. Thus, in the formative Neolithic phase, domesticated plants may not yet have become the basis of subsistence; instead, they seem to have been a complementary source.

Mesolithic impact may well be assumed in early architecture. In the northern and western Starčevo distribution, new features appear which already form a link to LBK buildings. In spite of the lack of houses on the Starčevo sites in Transdanubia, the presence of burnt daub fragments suggest that these communities lived in small- or medium-size houses (*Kalicz 1993.87*).



**Fig. 5.** The Western Balaton region (satellite photo) indicating the ancient shorelines and the earliest LBK sites along.



In the earliest phase, early Central European LBK houses were single roomed, with a southern and northern part added at some later date. Extramural activities were performed in pits, many of which had some sort of protective roofing, especially in the northern part. These phenomena can primarily be explained by the climate, with cultural traditions playing a secondary role only. It would appear that the central section of the Central European Linear Pottery houses evolved first. Timber played an increasingly important role in the construction of these buildings. The size of the two houses excavated at Szentgyörgyvölgy-Pityerdomb (Bánffy 2000b; 2004), the combined use of timber and clay, and the northern orientation appear to have been adopted from the pre-Linear Pottery period. The long pits flanking the longitudinal walls are first documented at this site. We may therefore assume that both Mesolithic and Starčevo influences played a role in the emergence of Linear Pottery houses, as did the environment and climate.

Contacts can also be analysed by examining early pottery in Transdanubia. Significant differences can be noted between the pottery assemblages from the late Starčevo settlements in western Transdanubia and the Balaton region, and those from southern Transdanubian and more southerly sites. This difference, reflected in the finds from Szentgyörgyvölgy-Pityerdomb and a number of other settlements, can most likely be attributed to the cultural impact of indigenous hunter-gatherer groups (Simon 1996; 2002; Bánffy 2004).

The examination and interpretation of cult finds leads to a similar conclusion (Bánffy 2005). The appearance of the cult objects of the South-East European Neolithic in transitional assemblages, such as the one from Pityerdomb, and, later, of their copies, again indicates some form of interaction between the two populations. There was no trace of the rich diversity of the Early Neolithic statuary of the Balkans either at Pityerdomb. This would suggest that some of the cult paraphernalia were adopted and used by the formative Linear Pottery communities, while others were discarded. Neither can we reject the possibility that certain elements of the cult inventory were adopted or copied for prestige reasons, as in the case of other Neolithic innovations, perhaps as the reflection of an incipient social ranking in these indigenous communities. It is my belief that the local copies of cult objects and the drastic decline in statuary can be explained by the cultural impact of indigenous hunter-gatherer groups in the mixed po-

pulation forming the early Linear Pottery communities.

The survival of the Mesolithic lifestyle in the transitional period can also be traced in the chipped stone inventory. The rich lithic assemblage found near Vöröstó and Mencshely, two Linear Pottery sites in the Vázsony basin by the northern shore of Lake Balaton, is in the late Mesolithic Tardenoisien microlithic tradition. A closer examination of the stone artefacts reveal traces of sickle gloss on a few samples. There are two possible explanations: the sickle gloss can be attributed to their use in Mesolithic horticulture, or the lithics came from an early Linear Pottery settlement preceding the occupation in the classical phase (Biró 2001; 2002b). An interesting observation is that the disappearance of this tool-kit coincided with changes in settlement patterns and subsistence at the beginning of the developed Transdanubian LBK, the Keszthely phase – the very period when the occupants of the Transdanubian settlements began to use the more simple range of tools generally characterizing Linear Pottery cultures, restricted to sickle blades and a few other types (Biró 1991; 2001; 2002a; 2002b).

The indigenous Mesolithic groups were clearly part of the mobile hunter-fisher-gatherer population whose stone tools and other remains have been found in the Vázsony basin in the Balaton Uplands, in the Little Balaton region, and in the Szentgyörgyvölgy area. The interaction between the two populations probably meant that the two distinct lifestyles and sets of values acted as a stimulus, while their mutual reliance on each other no doubt contributed to minimizing conflicts, promoting peaceful co-existence, or even the joint occupation of settlements.

This long-running process of gradual change suggests that the statement that the so-called "Neolithic revolution" i.e. the radical change in subsistence did not happen in the initial phases of the West Transdanubian Neolithic, but one phase later. In Transdanubia the major change in lifestyles and subsistence patterns occurred not at the beginning of the Neolithic, as earlier believed, but some three or four generations later.

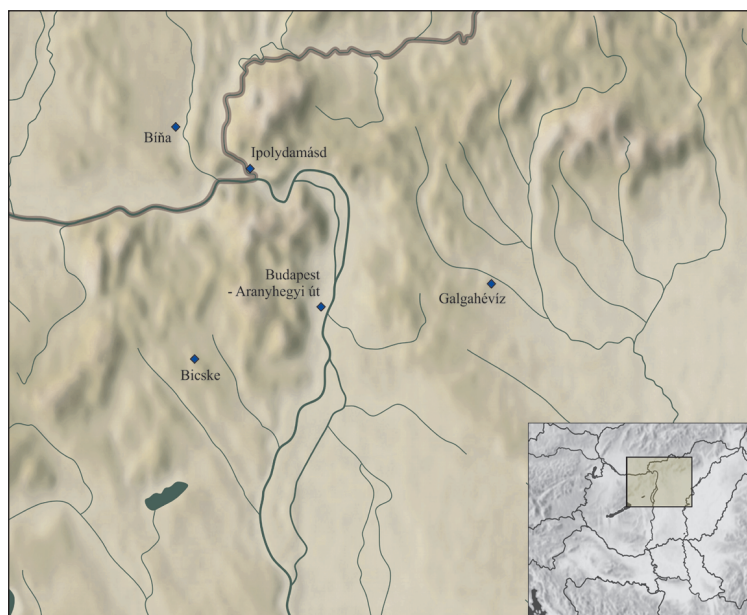
### **The problems of Neolithisation in Eastern and Northern Transdanubia (Figure 6)**

Among the fairly intensive LBK sites from County Fejér, North-Eastern Transdanubia (Makkay 1970; 1978), the fairly intensive presence of only the deve-

loped phases can be confirmed. Among these, the Bicske site is the only exception dated to the older phase. It was named as the eponymous site for the older Transdanubian LBK by Makkay. However, it seems that it may not represent the initial, oldest phase of the culture (*Bánffy, Oross in press*). There are several regions in Transdanubia where both the oldest, Sármellék-Pityerdomb typed pottery, and also the slightly later Bicske typed pottery, are present. First, the possibility had to be maintained that this phenomenon may well be treated as a geographical difference, since there has not been abundant data for assuming the opposite. In north-eastern Transdanubia, for decades the Bicske typed material had been the only representative of the old LBK, before a new site was excavated in by Kalicz-Schreiber and Kalicz (*Kalicz-Schreiber, Kalicz 1992; Kalicz, Kalicz-Schreiber 2002*). Budapest-Aranyhegyi Road, lying in the marshy plain of the Danube bank in Aquincum, northern Buda. It was dated to the older LBK phase. Interestingly enough, older LBK sites did not grow with time and increasing research intensity. The topographic description of the region of Esztergom and Dorog (north-west of Budapest) contains no hints of LBK sherds that could be dated to the older phase (*Horváth, Kelemen, Torma 1979*). As we shall see, along the northern banks of the river i.e. in South-western Slovakia, the situation is the same. Pavúk himself was unable to present sites of this type either along the Danube, or in the Csalókőz area on his most recent, 1994 map (*Pavúk 1994.147*). The reason for this hiatus remains enigmatic. The contacts of the Linear Pottery sites in the Burgenland and Lower Austria with Transdanubia suggest that the main route of migration led through the Danube valley. It is to be hoped that future investigations will resolve this issue.

In connection with these observations, Pavúk's hypothesis of Neolithisation in South-western Slovakia is worth mentioning. These views, essentially unchanged for long decades,<sup>4</sup> can be rejected on the basis of the following arguments. While accepting J. Lichardus' earlier "proto-Linienbandkeramik" theory (*Lichardus 1972*), Pavúk made two claims (*Pavúk 1962; 1972; 1980a; 1980b; 1994*). The first of these was that Linear Pot-

tery society and lifestyle developed in south-eastern Slovakia. The other, the more bizarre aspect of his thesis, concerned the date of the emergence of Linear Pottery. Pavúk dissociated Linear Pottery development from the cultural and ethnic influence of the Balkans, both in the Great Hungarian Plain and in Transdanubia, the latter being the more interesting of the two areas, owing to its proximity to Slovakia. In his opinion, the transition and the first use of pottery were not only entirely independent of the Körös-Starčevo culture and its possible effects on the Nitra Basin, but actually began much earlier than the generally accepted late Starčevo period, namely, in the period corresponding to the early/classic Starčevo phase. Pavúk attributed the undeniable similarities between late Starčevo and Linear Pottery to the later, southern expansion of groups from the Nitra Basin, during the course of which the Linear Pottery groups interacted with the Starčevo communities of the Spiraloid B phase in Transdanubia. He distinguished four sub-phases in the early Linear Pottery phase of western Slovakia – the Nitra, the Hurbánovo, the Bňa and the Milanovce phases – in order to demonstrate the complexity and long duration of the process (*Pavúk 1980a.40–47*). This categorization is uncertain and controversial, to say the least, since it is based exclusively on the manufacturing technique and the (rather rare) ornamental motifs of the pottery. Only at Bňa were fine, biconical wares found; the pottery from the other sites is dominated by thick-walled household pottery.



**Fig. 6.** North-Eastern Transdanubia with the adjacent Gödöllő hills and Jászság region to the east with early LBK sites mentioned.

<sup>4</sup> Most recently in Zvelebil M., Lukes A. (eds.), *LBK dialogues*. Oxford 2004.



It is very difficult, if not downright impossible to set up a finer typological classification and to distinguish chronological horizons on the basis of coarse pottery, a handful of mostly surface finds.<sup>5</sup> Most of the pottery in question was admittedly recovered from smaller soundings and a handful of pits uncovered during small-scale excavations; very few represent closed assemblages and the “Hurbanovo phase” is exclusively based on a few surface finds. The Nitra type pottery can best be linked to the early Linear Pottery in the Balaton region; indeed: the absence fine wares and ornamentation can also be observed in assemblages of the type found in several sites, e.g. Sármellék, Révfülöp, Balatonszepezd, Tapolca-Plébániakert (Bánffy 2004.334–344). The Nitra Basin groups were unlikely to have invented pottery making on their own; a more likely possibility is that they adopted this innovation together with other elements of the Neolithic package from groups on the fringes of the Starčevo distribution, or rather from those groups born from the (intermarriage) mixing of southern immigrants and indigenous groups. It would seem that as a result of the cultural influences affecting Transdanubia, the indigenous groups inhabiting the northern part of the Little Hungarian Plain, too, tried their hand at pottery making.

In a recent study, Petrasch (2001) examined the problem of the Linear Pottery ‘homeland’ from a demographically. According to his estimates, northern Transdanubia, south-west Slovakia, the Burgenland and Lower Austria, could at the most have had a population of five thousand at the dawn of the Neolithic. Petrasch concluded that this region was more probably the first stop in the Linear Pottery expansion, rather than its point of departure. He also noted that Linear Pottery probably evolved in the Zala and Bakony region and the southern part of the area around Lake Fertő, i.e. western Transdanubia (Petrasch 2001.17).

Most recently, it occurred also east of the Danube that assemblages very similar to those from Budapest-Aranyhegyi Road have been found. Apart from very dense settlement in the developed LBK phases, the site at Galgahévíz contained pottery fragments of the oldest LBK phase (Kalicz, Kalicz-Schreiber 2002.29–30). Similarly, the oldest LBK vessel profile comes from Ipolydamásd, unfortunately a surface find (Torma 1993.111, site 9/4 and Pl. 1). Even with

the help of these scattered finds it is not possible to answer questions about Neolithisation in north-east Transdanubia. These data, on the contrary, raise some new questions about the hypothetical contacts of Transdanubian LBK and the Late Mesolithic/Early Neolithic of the Jászság area, and also possible connections to the Szatmár II group, i.e. the earliest LBK in the Mátra-Bükk fringes of the Alföld.

When contrasting this peculiar phenomenon to the intensive Körös occupation of the Southern part of the Duna-Tisza heartland, which suddenly stopped south of the Jászság, a very new model of various Neolithisation types start to form. Certainly, much more data will be necessary even to make the questions more adequate, not to speak of the answers.

### The possible causes of the differences

The first and most adequate answer for the different modes of Neolithic transition, in other words, Neolithisation models within a rather small geographical area, could be found in the different ratios and communication with local tribes (Fig. 7). There are two regions, the Drava Valley and the fringes of the Alföld at the Bükk-Mátra Mountains, where intensive Southern immigration dominated over the possible indigenous population, whose participation in the Neolithic package was weak. The Jászság area represents the other pole, according to our present knowledge. Here the indigenous groups are clearly present, but it seems that the real Körös sites, as well as transitional settlements that could represent contacts between the groups of different subsistence, are scarcely present. We found two regions: Western Transdanubia, including Lake Balaton and the north-eastern edge of the Alföld (the Nyírség), where it is highly probable that indigenous foragers came into contact with Starčevo groups in the first case, and Criş groups, in the second case. There are no real ideas as yet about the Neolithisation process in the north-eastern Transdanubian and the Budapest area, including the problem that the sporadic earliest Transdanubian (Central European) LBK sites are geographically very close to the Jászság, but this only compounds the problem. The second type of answer should be sought in the ecological barrier hypothesis (Sümegei, Kertész 2001, Sümegei, Kertész, Hertelendi 2002). In spite of the total misunderstanding valuations of this idea (Makkay 2003.34–37), this hy-

<sup>5</sup> In contrast to the few dozen sherds categorized by Pavúk, Ottó Trogmayer examined tens of thousands of pottery fragments and was still unable to establish the internal chronology of the Körös culture (Trogmayer 1968). The lack of an internal chronology for the Körös culture is one of the great debts of Hungarian prehistoric research. M. Cladders’ analyses of Linear Pottery wares yielded a similar result: in her opinion the differences can be traced to regional, rather than chronological differences (Cladders 1995).

pothesis about a Central European Agro-Ecological Barrier (CEB AEB) is not a frontier dividing the two groups of different subsistence modes from each other. On the contrary, this barrier means that the climatic situation would make the migration of Balkan farmers increasingly slower, until reaching an area in which for some species of the Neolithic package, including floral and faunal elements, it became hard or impossible to survive. Such species could be e.g. caprinae (sheep and goat) in the Western Transdanubian Atlantic climate, where in the wet winters, with high and long-lasting snow; short-legged animals would sink into the snow, dying before the spring of pneumonia and other disease. This all means that people who migrated from the South would have had to stop or move north or west much more slowly than earlier. This is the negative impulse. The ecological barrier also has a positive impact on the Neolithisation process. This lies in the longer time spent in one area, thus making it possible for small indigenous to come into closer personal, cultural and exchange contacts with the newcomers. A typical area for this longer-lasting process is the Balaton region, where co-existence is shown by several direct and indirect archeological and other evidence (Bánffy 2000b; 2004; 2005).

A further, significant difference in the Neolithic transition can be observed between the two major regions, the Transdanubian and the East Hungarian, Alföld area. This difference can be more easily observed when examining their persistence in the Middle Neolithic, which was caused by divergent modes of Neolithisation. During the whole life of the LBK, the distribution area remained roughly the same in

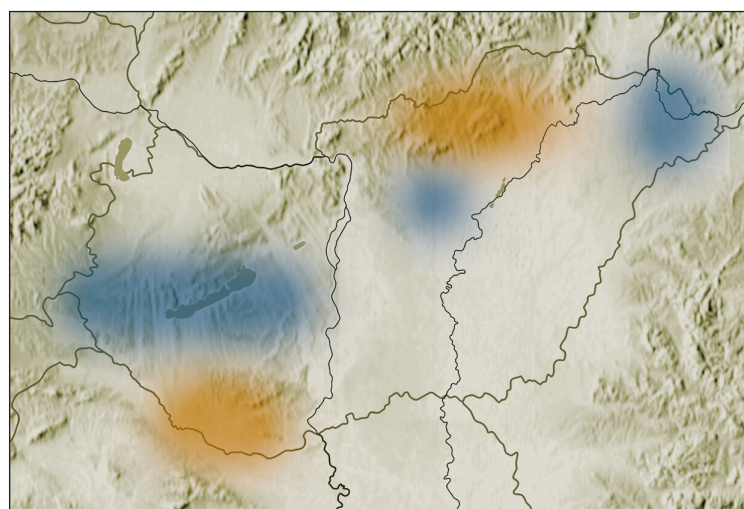
the East, with no extension during the developed phases: from the Tisza to the Körös River regions and the Partium. The process in Transdanubia was just the opposite. Within a few generations, 80–120 years, the Transdanubian early LBK groups, i.e. a genetic and cultural mixture of indigenous foragers and Balkan farmers, had occupied a vast area covering a major part of Europe between the Paris Basin and south-east Poland. There must be diverse strategies hidden behind these major differences.

The eastern group chose an increasingly intense settlement pattern, and agriculture that led to the formations of real tell settlements. This process must have happened together with an intensifying social stratification, hereditary social ranking, the intensive development of symbols and ritual life, and practically with the formation of a pre-urban society very similar to the Near Eastern model. Not unimportantly, it shows considerably more complexity than the economy of the previous periods. Agriculture, stock breeding played the main role, and, according to the social rank that must have been formulated by the Late Neolithic, all these activities must have been organised to a formerly unknown level.

The Alföld Linear pottery groups had every opportunity to exploit their rich soils and they were also in a position to develop intensive exchange relationships with their eastern neighbours. In other words, they were able to keep their settlements flourishing without migrations. This could be a prime reason for intensive internal expansion and social development without any changes in the Alföld distribution area. Thus, the Alföld region may have had the function of

a “central site” from the Middle to the Late Neolithic. Nevertheless, this process seems to have had an end in its gestation stage (Bánffy 2002). The uppermost layers on numerous tell settlements show clearly how the mounds were abandoned at the dawn of the Copper Age (roughly around 4400 BC).

In Transdanubia, the keys to finding a reason behind the rapid distribution of the Western LBK are probably long-distance exchange and cultural contact. The causes behind the expansion and the survival of the contact networks may have been based on similar reasons, but the position of Transdanubia was determined by the lack of the Alföld conditions on the one



**Fig. 7. Key areas of studying the neolithic transition within Hungary. Regions marked in yellow: stronger Körös/Starčevo impact; regions marked in blue: stronger Pre-Neolithic impact.**

hand, some pressing contingencies and waves of migration on the other.

The expansion into the heartland of Central Europe was so rapid that it left no typological differences in the archaeological record (*Quitta 1960; 1971*), nor can the successive phases be pinpointed with radiocarbon dates (*Gläser 1991; Lenneis, Stadler, Windl 1996; Bánffy, Oross in press*). One obvious explanation was to invoke rapid population growth for this swift expansion, based on the examples from the ancient Near East. In his quoted study on the demographic data for the Early Neolithic, Petrasch shattered any illusions about this theory, arguing that early LBK population growth could have been no more than 0.1 per cent (*Petrasch 2001.18*).

Another probable explanation is offered by Anthony, when he writes of some positive triggers for migration, such as low population density, fertile soil, proximity to water, good climate etc. (*Anthony 1992. 898*). 'Push' forces, such as over-population or climatic deterioration, can be rejected in the case of the LBK expansion. In contrast, there is evidence for each of the "pull" forces. If exchange relations can also be created and maintained, an area of this type usually attracts settlers. "Migration is a social strategy" (*Anthony 1997.22*). Justifying this idea, the evidence for communication and contact networks between Transdanubia and the regions to its northwest can be reflected e.g. in the presence of Szentgál radiolarite in Moravia, and in Germany, being only modest indications of these networks in the archaeological records. Since there had to be a mutual interest forming the basis of these contact relations, the prehistorian would search for something the early Transdanubian farmers could be in need of, since north of Bosnia there is no source of salt in the whole region (*Tasić 2000.39*). This is not to say that the commodity in return may not have been salt. This idea occurs when examining the Bad Nauheim-Niedermörlen settlement north of Frankfurt/Main (*Schade-Lindig 2002a; 2002b*). The finds from this site reflected surprisingly strong ties with Transdanubia. Bad Nauheim lies in an area rich in salt. Saile argues for the early Neolithic exploitation of salt mines in Westphalia and Lower Saxony (*Saile 2001. 150–151*). It is therefore possible that this easily transportable and valuable commodity, essential to diet, for food preservation, and for animal husbandry, was exchanged for various articles from the Danube valley.

One could certainly object that the rich salt area at Hallstatt near Salzburg in the Upper Austrian region

lies much closer. However, the distribution of Early Neolithic sites indicates that the migration route led along the northern Danube bank, through the Munich basin to southwest Germany. In this way, the salt mines in Hallstatt were unknown and can thus be rejected as a possible source. LBK communities of Transdanubia sought to acquire salt from regions with which they were familiar, in part as a result of their pre-Neolithic contacts, and in part from the knowledge acquired during their primary migrations – in other words, from the northwest. This probably enhanced the importance of the Wetterau and Aldenhoven region.

In spite of the many differences, some similarity can also be noted between Neolithization in Transdanubia and the Upper Tisza region. It has been repeatedly noted that riverside settlements in the area between the Great Hungarian Plain and the mountainous region to its north acted as a kind of 'market-place' for the interaction: the possible co-existence and mixing of groups with different lifestyles during different periods of the Neolithic and the Copper Age in Hungary (*Kalicz 1994; Raczky et al. 1994; Bánffy 1999*). In this respect the northern Alföld fringes resemble western Transdanubia and the Balaton region, where interaction between different groups was stimulated by the trade in Szentgál radiolarite. In the Northern Mountain Range, the most valuable raw materials were limnoquartzite from the Mátra Mountains and obsidian from Tokaj. The stone tools found on early Alföld Linear Pottery sites and also on Körös sites were predominantly manufactured from these two rocks (*Kalicz-Makkay 1976.23; Starinini 1994; 2000; 2001; Biró 2001; 2002b; Maxim 1999*). If we accept the Mesolithic presence in the mountains, it is not to exclude the possibility that these precious raw material sources were controlled by these groups both in Transdanubia and in the Northern Mountain Range, and that the main cause and incentive for the interaction was the trade in these lithics. The indigenous groups presumably received Neolithic technologies in exchange for the lithic raw material in the Great Hungarian Plain, too, similarly to the situation assumed for Transdanubia.

In this sketch of the Mesolithic-Neolithic transition and early Neolithic formations, which appeared so differently in small regions within Eastern and Western Hungary, it seems that working hypotheses with question marks are more numerous than answers. Nevertheless, beforehand there were hardly any questions put. This stage is, in my opinion, a step forward that reflects the present state of research.



## REFERENCES

- ANTHONY D. W. 1992. Migration in archaeology: the baby and the bathwater. *American Anthropologist* 92/4: 895–914.
1997. Prehistoric migration as social process. In J. Chapman, H. Hamerow (eds), *Migrations and Invasions in Archaeological Explanation*. British Archaeological Reports S664. Oxford: 21–32.
- BÁCSKAY E. 1976. *Early Neolithic Chipped Stone Implements in Hungary*. Dissertationes Archaeologicae 4. Budapest.
1982. A magyar holocénstratigráfia régészeti dokumentációs pontjai a Dunántúlon. (Archaeological documentary sites of Hungarian holocene stratigraphy in Transdanubia). *A Magyar Állami Földtani Intézet jelentése az évről (Annual Report of the Geological Institute for the year) 1980: 543–552*.
- BÁCSKAY E., BIRÓ K. 1983. Kőtelek-Huszársarok 8. gödör kőszköz-anyaga (Questions on the transition between the early and middle neolithic in the Middle and Upper Tisza region. Appendix. The lithic material). *Archaeologiai értesítő* 110: 192.
- BAKAY K., KALICZ N., SÁGI K. 1966. *Magyarország régészeti topográfiája (Archaeological Topography of Hungary) 1. A keszthelyi és a tapolcai járás. (The Keszthely and the Tapolca district)*. Budapest.
- BÁNFFY E., BIRÓ K., VADAY A. 1997. Újkőkori és rézkori telepnyomok Kompolt 15. sz. lelőhelyen (Neolithic and Chalcolithic finds from Kompolt, site Nr. 15). *Agria* 23: 19–57.
- BÁNFFY E. 1999. Újkőkori, rézkor (Neolithic and Chalcolithic). In Vaday A., Bánffy E., Bartosiewicz L., Biró K., Góglán F., Horváth F., Nagy A. (eds.), *Kompolt-Kistérség: újkőkori telep. Újkőkori, bronzkori, szarmata és avar lelőhely. Leletmentő ásatás az M3 nyomvonalán (A Neolithic, Bronze age, Sarmatian and Avar site. Rescue excavation at the M3 motorway)*. Eger: 13–170.
- 2000a. Szilvásvárad-Töröksánc. A Bükk-kultúra leletei (Szilvásvárad-Töröksánc. Finds of the Bükk culture). *Agria* 35: 85–92.
- 2000b. The late Starčevo and the earliest Linear Pottery groups in Western Transdanubia. In M. Budja (ed.), *7th Neolithic Studies. Documenta Praehistorica* 27: 173–185.
2002. A stuck process: urbanisation in the Carpathian Basin. In K. Jones-Bley, D. G. Zdanovich (eds.), *Complex Societies of Central Eurasia from the 3rd to the 1st Millennium BC. Regional specifics in light of global models*. JIES monograph 45. Washington D.C.: 492–503.
2004. *The 6th Millennium BC boundary in Western Transdanubia and its role in the Central European transition (The Szentgyörgyvölgy-Pityerdomb settlement)*. *Varia Archaeologica Hungarica* 15.
2005. Mesolithic – neolithic contacts, as reflected in ritual finds. In M. Budja (ed.), *12th Neolithic Studies. Documenta Praehistorica* 32: 77–86.
- BÁNFFY E., OROSS K. in press. *The “oldest” and the “older” phase of the LBK in Transdanubia*. Römische-Germanischen Zentralmuseums Mainz Tagungen, Band 2. Mainz.
- BÁNFFY E., JUHÁSZ I., SÜMEGI P. in press. A prelude to the Neolithic in the Balaton region – new results to an old problem. In *Atti della Società per la Preistoria e Proto-storia della Regione Friuli-Venezia Giulia, XVI*.
- BERZSÉNYI B., DÁLNOKI O. 2006. Archaeobotanikai vizsgálatok – a Szentgyörgyvölgy-Pityerdomb (Zala megye) neolitikus lelőhely földmintáinak elemzése (Archaeobotanical investigations of the soil samples from the neolithic site Szentgyörgyvölgy-Pityerdomb, County Zala). In E. Bánffy (ed.), *Archaeology and Settlement History in the Kerka Valley, South-West Hungary. Antaeus* 28: 261–270.
- BIRÓ K. 1991. Mencshely-Murvagödrök kőanyaga (The lithic assemblage from Mencshely-Murvagödrök). *Tapolca VMK* 2: 51–60.
2001. Lithic materials from the Early Neolithic in Hungary. In R. Kertész and J. Makkay (eds.), *From the Mesolithic to the Neolithic. Proceedings of the International Archaeological Conference held in Szolnok 1996. Archaeolingua* 11: 89–100.
- 2002a. Balatonalmádi-Vörösberény – Lithic material in the Transdanubian LBC site. In E. Bánffy (ed.), *Prehistoric Studies. In memoriam I. Bognár-Kutzián. Antaeus* 25: 119–168.
- 2002b. Advances in the study of early neolithic lithic materials in Hungary. In E. Bánffy (ed.), *Prehistoric Studies. In memoriam I. Bognár-Kutzián. Antaeus* 25: 237–241.
- 2006, in press. Újabb adatok a Starčevo-kultúra kőanyagához: Tihany-Apáti. New data to the lithic material of the Starčevo culture: Tihany-Apáti. *Ősrégészeti Levelek – Prehistoric Newsletter* 7.
- DOBOSI V. 1972. Mesolithische Fundorte in Ungarn – Mesolithikus lelőhelyek Magyarországon. In J. Fitz (ed.), *Ak-*

*tueller Fragen der Bandkeramik*. Akten der Pannonia Konferenzen 1: 39–60.

CLADDERS M. 1995. *Die Tonware der ältesten Bandkeramik. Untersuchung zur zeitlichen und räumlichen Gliederung*. PhD dissertation, University of Frankfurt/Main 1995.

CSENGERI P. 2003 (2001). Adatok a Bükki-kultúra kerámiaművességének ismeretéhez. A Felsővadász-várdombi település leletanyaga (Data to the pottery of the Bükk culture archaeological finds from the settlement at Felsővadász-Várdomb). *Hermann Ottó Múzeum Évkönyve* 40: 73–105.

2004. Adatok a Cserehát őskori településtörténetéhez (Data to the prehistoric settlements of the Cserehát). In E. Nagy, J. Dani and Zs. Hajdú (eds.), *MŰMOS II*. Debrecen: 43–59.

CSENYI T. 1999. Environmental geological investigations of Lake Balaton (Hungary). A Magyar Állami Földtani Intézet jelentése az évről. *Annual Report of the Geological Institute for the year 1992–93*: 131–137.

CSENYI T., NAGY-BODOR E. 2006. Geological-palynological research at the foothills of Alps. In E. Bánffy (ed.), *Archaeology and Settlement History in the Kerka Valley, South-West Hungary*. *Antaeus* 28: 155–174.

DOMBORÓCZKI L. 1996. The excavation at Füzesabony-Gubakút. Preliminary report. In R. Kertész, J. Makkay (eds.), *From the Mesolithic to the Neolithic*. Proceedings of the International Archaeological Conference held in the Damjanich Museum of Szolnok, Sept. 22–27, 1996. *Arheolingua* 11. Budapest: 193–214.

1997. Füzesabony–Gubakút. Újkőkori falu a Kr. e. VI. évezredből (Neolithic village from the 6<sup>th</sup> Millennium B.C.) In P. Raczky, T. Kovács, A. Anders (eds.), *Utak a múltba. Az M3-as autópálya régészeti leletmentései. Paths into the Past. Rescue excavations on the M3 Motorway*. Budapest: 19–25.

2001. Településszerkezeti sajátosságok a középső neolitikum időszakából, Heves megye területéről (Characteristics of settlement patterns in the middle phase of the New Stone Age from the area of Heves County). In *MŰMOS I*. Debrecen: 67–94.

2003. The radiocarbon data from Neolithic archaeological sites in Heves County (North-Eastern Hungary). *Agria* 39: 5–76.

2005. A Körös-kultúra északi elterjedési határának problematikája a Tiszaszőlős-Domaháza-pusztán végzett ásatás eredményeinek fényében (The problem of the Northern extension of the Körös culture in the light of the excavation results from Tiszaszőlős-Domaháza. Ar-

chaeometry Workshop, e-journal published by the Hungarian National Museum 2005(2). On-line [www.ace.hu](http://www.ace.hu)

EICHMANN W. J., KERTÉSZ R., MARTON T. in press. Mesolithic in the LBK heartland of Western Hungary. *Römische-Germanischen Zentralmuseums Mainz Tagungen, Band 2*. Mainz.

FÜZES M. 1989. A földművelés kezdeti szakaszának (neolitikum és rézkor) növényleletei Magyarországon. (Archeobotanikai vázlat) Die Pflanzenfunden in Ungarn der anfänglichen Entwicklungsphase des Ackerbaues (Neolithikum und Kupferzeit) Archäobotanische Skizze. *Tapolca VMK 1*: 139–238.

GÁBORI M. 1981. Az ősember korának kutatása Magyarországon (1969–1980) (Researching the period of Ancient Man in Hungary). *Papers from the II. class of the HASc.*: 99–109.

GÁL E., JUHÁSZ I., SÜMEGI P. (eds.) 2006. *Environmental Archaeology in North-Eastern Hungary*. *Varia Archaeologica Hungarica* 19.

GLÄSER R. 1991. Bemerkungen zur absoluten Datierung des Beginns der westlichen Linienbandkeramik. *Banatica* 11: 53–64.

GRONENBORN D. 1999. A variation on a basic theme: The transition to farming in Southern Central Europe. *Journal of World Prehistory* 13(2): 123–210.

HORVÁTH F. 1989. A survey on the development of neolithic settlement pattern and house types in the Tisza region. In S. Bökönyi (ed.), *Neolithic of Southeastern Europe and its Near Eastern Connections*. *Varia Archaeologica Hungarica* 2: 85–101.

HORVÁTH I., KELEMEN M., TORMA I. 1979. *Magyarország régészeti topográfiája (Archaeological Topography of Hungary)* 5. Esztergom és a Dorogi Járás. Budapest.

JUHÁSZ I. 2002. *The palynographic reconstruction of the Late Glacial and the Holocene periods of County Zala, South West Hungary (Reconstruction palynographique de Tardiglaciaire et de l'Holocène de la région de Zala, Sudouest de la Hongrie)*. PhD dissertation, Universities of Marseille–Pécs.

2006, in press. The pollen sequence from Balatonederics. Palaeoenvironmental studies in the Balaton Uplands. In I. Juhász, P. Sümegi and C. Zatykó (eds.), *Environmental Archaeology in Transdanubia*. *Varia Archaeologica Hungarica* 20.

JUHÁSZ I., SÜMEGI P., ZATYKÓ C. (eds.) 2006, in press. *Environmental Archaeology in Transdanubia*. *Varia Archaeologica Hungarica* 20.

KALICZ N. 1993. The early phases of the neolithic in Western Hungary (Transdanubia). *Poročilo o raziskovanju paleolitika neolitika in eneolitika v Sloveniji* 21: 85–135.

1994. Wenden des Spätneolithikums im Oberen Theißgebiet. *Józsa András Múzeum Évkönyve, Nyíregyháza* 36: 263–290.

KALICZ N., KALICZ-SCHREIBER R. 2002. Die Verbreitungsgrenze der frühneolithischen Kulturen in Transdanubien (Westungarn). *Preistoria Alpina* 37: 25–44.

KALICZ N., KOÓS J. 1997a. Mezőkövesd–Mocsolyás. Újkőkori telep és temetkezések a Kr. e. VI. évezredből (Neolithic settlement and graves from the 6<sup>th</sup> Millennium B.C.). In P. Raczky, T. Kovács, A. Anders (eds.), *Utak a múltba. Az M3-as autópálya régészeti leletmentései = Paths into the Past. Rescue excavations on the M3 Motorway*. Budapest: 28–33.

1997b. Eine Siedlung mit ältestneolithischen Hausresten und Gräbern in Nordostungarn. In M. Lazić (ed.), *Antidoron. Completis LXV annis Dragoslavo Srejić ab amicis collegis discipulis oblatum*. Centre for Archaeological Research/University of Belgrade, Faculty of Philosophy 17: 125–135.

KALICZ N., S. KOÓS J. 2000. Település a legkorábbi újkőkori sírokkal Északkelet-Magyarországról (Eine Siedlung mit ältestneolithischen Gräbern in Nordostungarn). *Herman Ottó Múzeum Évkönyve* 39: 45–76.

KALICZ N., MAKKAY J. 1972. Probleme des frühen Neolithikums der nördlichen Tiefebene. *Alba Regia* 12: 77–92.

1976. Frühneolithische Siedlung in Méhtelek-Nádas. *Mitteilungen des Deutschen Archäologischen Instituts* 6: 13–24.

1977. *Die Linienbandkeramik in der Großen Ungarischen Tiefebene. Studia Archaeologica VII.*

KALICZ N., M. VIRÁG ZS., BIRÓ K. 1998. The northern periphery of the early neolithic Starčevo culture in south-western Hungary: a case study of an excavation at Lake Balaton. In M. Budja (ed.), *5<sup>th</sup> Neolithic Studies. Documenta Praehistorica* 25: 151–187.

KALICZ N., RACZKY P. 1981. The precursors to the “horns of consecration” in the Southeast European Neolithic. *Acta Archaeologica Hungarica* 33: 5–20.

KALICZ-SCHREIBER R., KALICZ N. 1992. Die erste frühneolithische Fundstelle in Budapest. In M. Garašanin, D. Srejić (eds.), *Hommage à Nikola Tasić. Balcanica* 23: 47–76.

KALICZ N., T. BIRÓ K., M. VIRÁG ZS., 2002. Vörs, Máriasszony-sziget. In Z. Bencze et al. (eds.), *Régészeti kutat-*

*ások Magyarországon 1999 (Archaeological investigations in Hungary 1999)*. Budapest: 15–26.

KERTÉSZ R. 1994a (1996). The Mesolithic in the Great Hungarian Plain: A survey of the evidence. In R. Kertész and J. Makkay (eds.), *At the Fringes of Three Worlds. Hunter-gatherers in the Middle Tisza valley*. Szolnok: 5–39.

1994b. Late Mesolithic chipped stone industry from the site Jásztelek I (Hungary). In G. Lőrinczy (ed.), *A kőkortól a középkorig. Von der Steinzeit bis zum Mittelalter. Studien zum 60. Geburtstag von Ottó Trogmayer*. Szeged: 23–44.

KERTÉSZ R., SÜMEGI P. 1999. Teóriák, kritika és egy modell: miért állt meg a Körös-Starčevo kultúra terjedése a Kárpát-medence centrumában? (Theories, critiques and a model: why did the expansion of the Körös-Starčevo culture stop in the centre of the Carpathian Basin?). *Tisicum* 11: 9–23.

KURUCZ K. 1989. *A Nyíri Mezőség neolitikuma [The Neolithic of the Mezőség, Nyírség region]*. Nyíregyháza 1989.

KUTZIÁN I. 1944. *A Körös-kultúra (The Körös Culture)*. *Dissertationes Pannoniae* II/23. Budapest.

LENNEIS E. 1997. Houseforms of the Central European Linear Pottery culture and the Balkan early neolithic – a comparison. *Poročilo o raziskovanju paleolitika neolitika in eneolitika v Sloveniji* 24: 143–149.

2000. Hausformen der mitteleuropäischen Linearbandkeramik und des balkanischen Frühneolithikums im Vergleich. In St. Hiller, V. Nikolov (eds.), *Karanovo III: Beiträge zum Neolithikum in Südosteuropa*. Wien: 383–388.

LENNEIS E., STADLER P., WINDL H. 1996. Neue <sup>14</sup>C-Daten zum Frühneolithikum in Österreich. *Préhistoire Européenne* 8: 97–116.

LICHARDUS J. 1972. Zur Entstehung der Linearbandkeramik. *Germania* 50: 1–15.

LOSITS F. 1980. Neolithische Siedlung in Krasznokvajda. *Folia Archaeologica* 31: 7–34.

MAKKAY J. 1970. *A kőkor és a rézkor Fejér megyében. (The stone age and the copper age in County Fejér.) Fejér megye története I./1.* Székesfehérvár.

1978. Excavations at Bicske. I. The Early Neolithic – The earliest Linear band Ceramic. *Alba Regia* 16: 9–60.

1982. *A magyarországi neolitikum rendszere és fejlődésének főbb vonásai (The system of the Hunga-*



- rian Neolithic and the main features of its development). Akadémiai Kiadó, Budapest
2003. Ősrégészeti kutatások magyarországon – az újkőkor és a rézkor (Prehistoric archaeology in Hungary in recent years. The Neolithic and the Copper Age). *Jósa András Múzeum Évkönyve, Nyíregyháza* 45: 27–60.
- MAXIM Z. 1999. *Neo-Eneoliticul din Transilvania*. Ministerul Culturii Muzeul Național de Istorie Transilvaniei. *Bibliotheca Musei Napocensis* 19.
- MEDZIHRADESKY 2001. The holocene sequence of Keszthely-Úszátómajor, Hungary. *Annales Historico-Naturales Musei Nationalis Hungarici* 93: 5–12.
- MEIER-ARENDT W. 1989. Überlegungen zur Herkunft der linienbandkeramischen Langhauses. In S. Bökönyi (ed.), *Neolithic of Southeastern Europe and its Near Eastern Connections*. International Conference Szolnok-Szeged 1987. *Varia Archaeologica Hungarica* 2: 183–189.
- MÉSZÁROS Gy. 1948. *A Vázsonyi-medence mezolitik és neolitikori települései (The mesolithic and neolithic settlements in the Vázsony Basin)*. Veszprém.
- NAGY E. Gy. 1998 (1995–96). Az Alföldi Vonaldiszes kerámia kultúrájának kialakulása (Die Herausbildung der Alföldi Linearbandkeramik I–II). *Déri Múzeum Évkönyve*: 53–150.
2005. *Adatok az alföldi vonaldiszes kerámia kultúrájának településtörténeti képehez a Felső-Tisza-vidéken [Data to the settlement history of the Alföld LBK in the Upper Tisza region]*. PhD thesis, Budapest, ELTE, Institute of Archaeology.
- NAGY-BODOR E. 1988. A Balaton pannóniai és holocén képződményeinek palynológiai vizsgálata (Palynological study of Pannonian and holocene deposits from Lake Balaton). *A Magyar Állami Földtani Intézet jelentése az évről (Annual Report of the Geological Institute for the year) 1986*: 535–568.
- PAUL I. 1995. Aspekte des Karpatisch-Balkanisch-Donauländischen Neolithikum (Die Präcriș-Kultur). In Vorgeschichtliche Untersuchungen in Siebenbürgen. *Alba Iulia*: 28–68.
- PAVÚK J. 1962. Gliederung der Volutenkeramik in der Slowakei. *Študijné zvesti* 9: 5–20.
1972. Neolithisches Gräberfeld in Nitra. *Slovenská Archeologia* 20: 5–105.
- 1980a. Ältere Linearkeramik in der Slowakei. *Slovenská Archeologia* 28: 7–90.
- 1980b. Problem der Genese der Kultur mit Linearkeramik im Lichte ihrer Beziehungen zur Starčevo-Criș Kultur. In J. Kozłowski and J. Machnik (eds.), *Problèmes de la néolithisation dans certaines régions de l'Europe*. Actes du colloque international Kraków-Mogilany 1979. Wrocław: 163–174.
1994. Zur relativen Chronologie der älteren Linearkeramik. *Nyíregyházi Józsa András Múzeum Évkönyve* 36: 135–149.
- PETRASCH J. 2001. “Seid fruchtbar und mehret euch und füllet die Erde und machet sie euch untertan”: Überlegungen zur demographischen Situation der bandkeramischen Landnahme. *Archäologisches Korrespondenzblatt* 31: 13–25.
- PUSZTAI R. 1957. Mezolitikus leletek Somogyból (Mesolithic finds in the Komitat Somogy). *A Janus Pannonius Múzeum évkönyve*: 95–105.
- QUITTA H. 1960. Zur Frage der ältesten Bandkeramik in Mitteleuropa. *Praehistorische Zeitschrift* 38: 1–38; 153–188.
1971. Der Balkan als Mittler zwischen Vorderem Orient und Europa. In F. Schlette (ed.), *Evolution und Revolution im Alten Orient und im Europa. Das Neolithikum als historische Erscheinung*. Berlin: 38–63.
- RACZKY P. 1977. Szajol-Felsőföld (ásatási jelentés). *Archaeologiai Értesítő* 104: 263.
1983. A korai neolitikumból a középső neolitikumba való átmenet kérdései a Közép- és Felső-Tisza-vidéken (Questions of transition between the Early and Middle Neolithic in the Middle and Upper Tisza region). *Archaeologiai Értesítő* 110: 161–194.
1986. Megjegyzések az “alföldi vonaldiszes kerámia” kialakulásának kérdéséhez [Remarks on the question of the formulation of the “Alföld Linear Pottery” culture]. In Németh Péter (ed.), *Régészeti tanulmányok Kelet-Magyarországról*. Folklor és Etnográfia 24. Debrecen: 45–59.
1988. *A Tiszavidék kulturális és kronológiai kapcsolatai a Balkánnal és az Égeikummal a neolitikum, rézkor időszakában. Újabb kutatási eredmények és problémák [The cultural and chronological connections of the Tisza region with the Balkan and Aegean at the time of the Neolithic and Chalcolithic. Recent research results and problems]*. Szolnok.
- RACZKY P., MEIER-ARENDT W., KURUCZ K., HAJDÚ ZS., SZIKORA Á. 1994. A late neolithic settlement in the Upper Tisza region and its cultural connections (Preliminary re-

port). Józsa András Múzeum Évkönyve, Nyíregyháza 36: 231–240.

REGENYE J. 2006, in press. A Starčevo-kultúra települése a Tihanyi-félszigeten (A Starčevo culture settlement on the Tihany peninsula – Lake Balaton, Western Hungary). *Ősrégészeti Levelek – Prehistoric Newsletter* 7.

SAILE TH. 2001. Salz im Ur- und frühgeschichtlichen Mitteleuropa – Eine Bestandaufnahme. *Bericht der Römisch-Germanischen Kommission* 81: 129–234.

SCHADE-LINDIG S. 2002a. Idole und sonderbar verfüllte Gruben aus der bandkeramischen Siedlung “Hempler” in Bad Nauheim–Niedermörlen. In H.-J. Beier (ed.), *Varia Neolithica II: Beiträge zur Ur- und Frühgeschichte Mitteleuropas* 32: 99–115.

2002b. Idol- und Sonderfunde der bandkeramischen Siedlung von Bad Nauheim–Niedermörlen “Auf dem Hempler” (Wetteraukreis). *Germania* 80: 47–114.

SIMON K. 1994. Frühneolithische Kultgegenstände bei Gellénháza, Kom. Zala. In G. Lőrinczy (ed.), *A kőkortól a középkorig. Von der Steinzeit bis zum Mittelalter. Studien zum Geburtstag von O. Trogmayer*. Szeged: 53–65.

1996. Ein neuer Fundort der Starčevo-Kultur bei Gellénháza (Kom. Zala, Ungarn) und seine südliche Beziehungen. In F. Drasovean (ed.), *The Vinča culture, its role and cultural connections*. Museum Banaticum Temesiense, Timisoara: 59–92.

2002. Das Fundmaterial der frühesten Phase der Transdanubischen Linienbandkeramik auf dem Fundort Zalaegerszeg–Andráshida, Gébárti-tó, Arbeitsplatz III. In E. Bánffy (ed.), *Prehistoric Studies in memoriam I. Bognár-Kutzián. Antaeus* 25: 189–203.

STADLER P. 2005. Settlement of the Early Linear Ceramics Culture at Brunn am Gebirge, Wolfholz site. In M. Budja (ed.), *12th Neolithic Studies. Documenta Praehistorica* 32: 269–278.

STARNINI E. 1994. Typological and technological analysis of the Körös culture stone assemblages of Méhtelek–Nádas and Tiszacsege (North East Hungary). A preliminary report. Józsa András Múzeum Évkönyve, Nyíregyháza 36: 101–110.

2000. Stone industries of the early neolithic cultures in Hungary and their relationships with the mesolithic background. Quaderno. *Società Preistoria Protoistoria Friuli-Venezia Giulia* 8: 207–219.

2001. The Mesolithic/Neolithic transition in Hungary: the lithic perspective. In R. Kertész and J. Makkay (eds.), *From the Mesolithic to the Neolithic. Proceedings of the International Archaeological Conference*

held in Szolnok 1996. *Archaeolingua* 11: 395–404.

SÜMEGI P. 1998. Az utolsó 15000 év környezeti változásai és hatásuk az emberi kultúrára Magyarországon (Environmental changes in the last 15000 years and their impact to human cultures in Hungary). In G. Ilon (ed.), *A régésztechnikusok kézikönyve*. Szombathely: 367–397.

1999. Reconstruction of flora, soil and landscape evolution, and human impact on the Bereg plain from late glacial up to the present, based on palaeoecological analysis. In J. Hamar and A. Sárkány-Kiss (eds.), *The Upper Tisza Valley*. Tiscia Monograph Series, Szeged: 173–204.

2003. Preneolitizáció – egy Kárpát-medencei, késő mezolitikum során bekövetkezett életmódbeli változás környezetrégészeti rekonstrukciója (Pre-neolitization – the environmental historical reconstruction of a change in lifestyle occurring during the late Mesolithic in the Carpathian Basin). In E. Nagy, J. Dani and Zs. Hajdú (eds.), *MŰMOS II*. Debrecen: 21–32.

SÜMEGI P., GULYÁS S. (eds.) 2004. *The Geohistory of Bátorliget Marshland. An Example for the Reconstruction of Late Quaternary Environmental Changes and Past Human Impact from the Northeastern Part of the Carpathian Basin*. *Archaeolingua* 16: 2004.

SÜMEGI P., KERTÉSZ R. 2001. Palaeogeographic characteristics of the Carpathian Basin – an ecological trap during the Early Neolithic? In R. Kertész and J. Makkay (eds.), *From the Mesolithic to the Neolithic*. Proceedings of the International Archaeological Conference held in Szolnok 1996. Budapest: 405–415.

SÜMEGI P., KERTÉSZ R., HERTELENDI E. 2001. Environmental change and human adaptation in the Carpathian basin at the Late Glacial/Postglacial transition. In E. Jerem, K. T. Biró (eds.), *Archaeometry* 98. proceedings of the 31st symposium Budapest, April 26 – May 3. 1998. *Archaeolingua Central European Series* 1 – British Archaeological reports IS 1043. Oxford: 171–177.

TASIĆ N. 2000. Salt use in the Early and Middle Neolithic of the Balkan Peninsula. In L. Nikolova (ed.), *Technology, Style and Society. Contributions to the innovations between the Alps and the Black Sea in prehistory*. British Archaeological reports IS 854. Oxford: 35–40.

TORMA I. (ed.) 1993. *Magyarország régészeti topográfiája (Archaeological Topography of Hungary)* 9. A Szobi és a Váci Járás. Budapest.

TROGMAYER O. 1968. A Körös-csoport barbotin kerámiajáról (The “barbotine” pottery of the Körös group). *Archaeologiai Értesítő* 95: 6–12.

WHITTLE A., BARTOSIEWICZ L., BORIC D., PETTIT P., RICHARDS M. 2002. In the beginning: New radiocarbon dates for the early neolithic in Northern Serbia and South East Hungary. In E. Bánffy (ed.), *Prehistoric Studies. In memoriam Ida Bognár-Kutzián*. *Antaeus* 25: 63–117.

WILLIS K. J., SÜMEGI P., BRAUN M., TÓTH A. 1995. The late Quaternary environmental history of Bátorliget, N-E Hungary. *Palaeogeography, Paleoclimatology, Palaeoecology* 118: 25–47.

ZOFFMANN Zs. 2000: Az Alföldi Vonaldíszes Kerámia Felsővadász-Várdomb lelőhelyén feltárt kettős temetkezésé-

nek embertani leletei. *Herman Ottó Múzeum Évk* 39: 103–115.

ZÓLYOMI B. 1980. Landwirtschaftliche Kultur und Wandlung der Vegetation. *Phytocoenologia* 7: 121–126.

ZVELEBIL M. 1986. Mesolithic prelude and neolithic revolution. In M. Zvelebil (ed.): *Hunters in Transition*. Cambridge University Press. Cambridge 1986: 5–15.

2000. The social context of the agricultural transition in Europe. In C. Renfrew and K. Boyle (eds.), *Archaeogenetics: DNA and the population of Europe*. McDonald Institute monographs. Cambridge: 57–79.