

Three successive waves of Neolithisation: LBK development in Transdanubia

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ABSTRACT – *Due to the latest research, the LBK formation in Transdanubia must have involved an essentially Mesolithic subsistence, complemented by certain elements of the Neolithic package brought here by migrant late Starčevo groups. Many small sites were located in marshy areas, unsuitable for food production as a basis of livelihood. The currently available evidence suggests that there was a 4–5 generations long period, when it was not self-evident that the sedentary way of life would be fully accepted and adopted. During the ensuing earlier LBK period, the culture spread across the entire area of Transdanubia and a few settlements were even established on the left Danube bank, still, no substantial changes can be noted in the density of the settlement network and the layout of the settlements. In sharp contrast to the preceding period, the Keszthely and Notenkopf phases saw the settlement of larger communities on arable loess plateaus and the adoption an economy based exclusively on farming. New evidence from 53rd century BC sites such as Balatonszárszó-Kis-erdei-dűlő reflects fundamental changes in the size and layout of settlements, as well as in subsistence strategies.*

IZVLEČEK – *Zadnje raziskave so pokazale, da je morala biti pri nastanku LTK v Transdanubiji vključena močna mezolitska gospodarska osnova z elementi neolitskega paketa, ki je prispel s selitvijo Starčevo skupine. Mnogo malih najdišč se nahaja na močvirnih področjih, neprimernih za kmetovanje. Podatki kažejo, da se je sedentarni način življenja uveljavil v času 4–5 generacij. V času zgodnje LTK se je kultura razširila na celotnem področju Transdanubije. Nekaj naselij je bilo postavljenih celo na levem bregu Donave. V tem času ni opaznih bistvenih sprememb v poselitvenem vzorcu in obliki naselbin. Očitna sprememba nastopi v fazi 'Keszthely' in fazi 'ornamenta v obliki not', ko naselja postanejo večja in so postavljena na terasah orne puhlice. Gospodarstvo temelji izključno na kmetovanju. Najdišča Balatonszárszó-Kis-erdei-dűlő iz 53. stoletja BC dokazujejo temeljne spremembe v velikosti in obliki naselja ter gospodarskih strategijah.*

KEY WORDS – *Transdanubia; neolithisation; LBK periods and phases; settlement patterns*

Earlier models of the neolithisation of Europe hypothesising a single wave of colonisation and a single-event scenario have in recent years been supplanted by more complex ones offering a fresh perspective on this process, which is now seen as involving interaction and reciprocal cultural impacts, with a focus on the gradual transformation of subsistence strategies. New approaches have been developed for the study of settlement patterns, the archaeological heritage, social organization and, also, ideology.

While studies written from an 'indigenist' or, conversely, a 'migrationist' perspective both have much to

contribute to a better understanding of neolithisation, there can be little doubt that the transition to the Neolithic in the Carpathian Basin can best be described by scenarios combining the two, by an 'integrationist' approach. It is not mere chance that studies arguing for both immigrant and indigenous contributions to the process offer the most fruitful ideas, even if elaborated for geographic regions other than the one discussed here (*Zvelebil 1986; 2000; 2001; Gronenborn 1994; 1999*). The gradual nature of the transition has been documented in more distant regions, too: for example, Catherine Perlès has convincingly argued that the neolithisation of the Balkans

should probably not be conceived of as a direct diffusion from Anatolia (Perles 2005), but more likely as the outcome of two geographically and chronologically distinct population movements, one a maritime migration from the Levant and the southern Turkish coast, the other an overland migration towards Bulgaria (Özdoğan 1997; 1999; 2000). In neither case, however, was the full Neolithic package adopted. According to Perles, the cultural elements which were not introduced to the newly colonised areas were in part deliberately rejected and in part suppressed by local traditions. These examples offer good parallels to other regions such as the Carpathian Basin: following the transition to the Neolithic in the Balkans, the Early Neolithic, which can be conceptualised as phases of dynamic innovation alternating with more tranquil periods of settlement, proceeded at varying rates in various regions, including the southern frontiers of Transdanubia.

In this sense, Transdanubia (lying in the western part of the Carpathian Basin) shares certain similarities with the Balkans, in that the transition was a complex process. It became clear from the 1990s that the single most decisive impact stimulating the transition came from the late phase of the Starčevo culture, an immigrant group from the Central Balkans, which advanced as far as the Balaton region (Kalicz 1990; 1993). This model has only been challenged by a few prehistorians (Pavúk 1994; 2004). Postulating the significance of late Starčevo groups, but assuming also the participation of indigenous foragers in the process, an integrationist model was presented for Transdanubia, and it was furthermore suggested that this region played a key role in the neolithisation of the Danube Valley and, on a broader scale, of the greater part of Central Europe (Bánffy 2004). The new model of neolithisation was based on both the archaeological record and the findings of palaeo-environmental and micro-regional research projects (Bánffy 2006a; Zatykó et al. 2007), as well as new material recovered during the large-scale salvage excavations preceding motorway construction. In the light of more recent research and

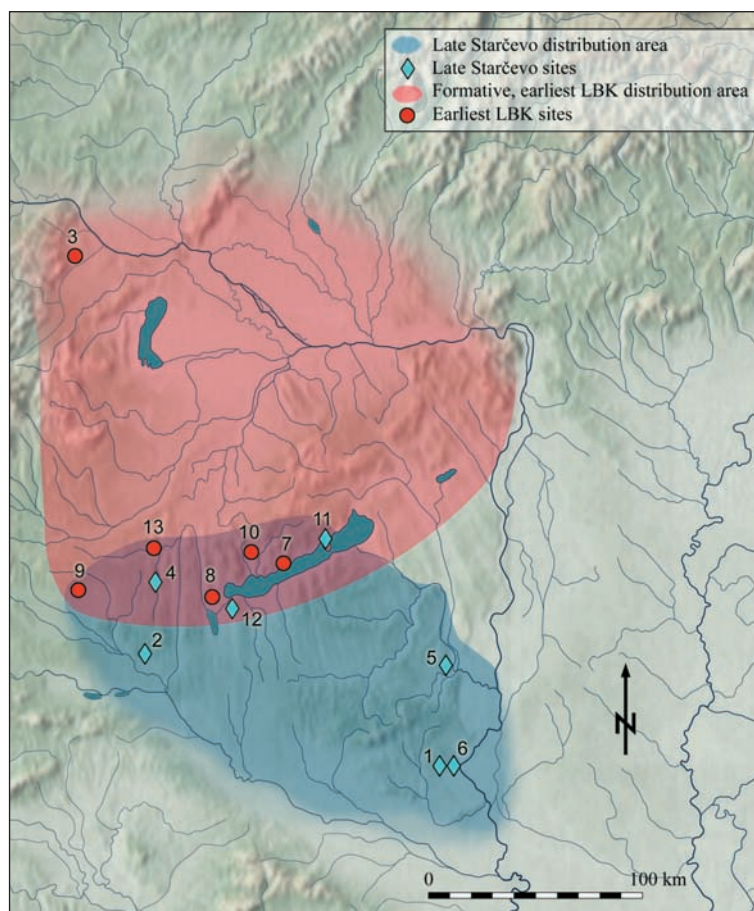


Fig. 1. The late Starčevo and formative, earliest LBK distribution in Transdanubia with some important sites: 1. Babarc; 2. Becsehely I-Bükkaljai-dűlő; 3. Brunn am Gebirge; 4. Gellénháza-Városrét; 5. Harc-Nyanyapuszta; 6. Medina; 7. Révfülöp; 8. Sármellék; 9. Szentgyörgyvölgy-Pityerdomb; 10. Tapolca-Plébániakert; 11. Tihany-Ápáti; 12. Vörs-Máriaasszonysziget; 13. Zalaegerszeg-Andráshida-Gébárti-tó.

the growing body of evidence, a model of multi-phase neolithisation can now be constructed. The earliest wave was the appearance of the Starčevo culture in southern Transdanubia, which will not be discussed here. The early LBK in Transdanubia can be divided into an earliest, formative phase, and an earlier phase (Bánffy and Oross *in press*), differing from the late LBK period in terms of settlement density and settlement layout, material culture, cultural connections with the Balkan Neolithic and subsistence strategies. Discussed in the following will be the revised LBK sequence for Transdanubia.

The research projects mentioned above yielded a wealth of new information, as well as a considerably more detailed picture of the emergence and development of the LBK. The dynamic changes from the beginning to the end of the LBK sequence are presented in a chronological and spatial model (Tab. 1). This model describes the entire LBK sequence as a



Fig. 2. Reconstruction of the two timber-framed buildings of the formative LBK settlement at Szentgyörgyvölgy-Pityerdomb.

series of transitional phases and the formation of new structures according to a certain rhythm in time. This rhythmic change can be noted both in time and space, and seems to have survived and to have had an impact during the centuries following the LBK period, *i.e.* in the Late Neolithic of Transdanubia, as reflected by the distribution of the Sopot culture of southern origin and, later, the Lengyel period, extending into the Early Copper Age and occupying a larger territory than the LBK. One point that clearly emerges from this sequence is that the fully sedentary, food producing Neolithic life-style cannot have evolved earlier than the late LBK period, corresponding to the Notenkopf and early Keszthely phases respectively, during the 53rd century BC.

The earliest, formative LBK

Aside from the already known fact that the Starčevo culture played a key role in the transition to the Neolithic, very little was known about the actual nature of the culture’s impact, not to speak of the scanty information about the culture’s distribution in Transdanubia and its settlement patterns, and especially about the mode(s) of contact and interaction with indigenous groups. It was earlier assumed that Transdanubia was devoid of Mesolithic foragers

and that the LBK emerged from a peripheral branch of the Starčevo population (*Kalicz 1993*). Recent research has furnished data enabling a reconstruction of the peopling of central Transdanubia, with evidence for the presence of both Starčevo and indigenous forager groups (*Bánffy 2000; 2004; Bánffy et al. 2007*). A number of new Mesolithic sites have been identified, of which the Regöly site has been excavated (*Eichmann et al. in press*). The late Mesolithic settlements and their occupants appear to have played a major role in the transformation of the terminal Starčevo culture. The blending of diverse traditions can be noted in both the archaeological and palaeo-ecological

record. Transdanubia can be divided into two main geographic regions during this period, with Lake Balaton in the centre (Fig. 1). This division was very probably a reflection of two distinct palaeo-ecological zones, separated by what has been termed the Central European-Balkan Agro-Ecological Barrier (CEB AEB) by Pál Sümegi and Róbert Kertész (*Sümegi and Kertész 2001*).

We now also have a better understanding of settlement patterns and settlement layouts. The generally small settlements formed smaller clusters, reflecting a loose system of farmsteads sited relatively close to each other. These sites shared one important feature, namely that they lay in areas unsuited to agriculture as a secure source of livelihood. The soil types and the hydrological conditions would have enabled no more than a form of horticulture combined with a few domesticated plants. At the same time, the marshland areas were excellent for hunting and fishing, as well as for gathering wild plants and fruit. Most sites were located directly by Lake Balaton or on islets in the region’s marshland.

Our knowledge of the period’s architecture is restricted to the two house plans from the Szentgyörgyvölgy-Pityerdomb settlement (Fig. 2). Uncovered at

Period/Phase	Northern Transdanubia	Central Transdanubia	Southern Transdanubia	Absolute Chronology	
Early LBK	Earliest LBK	Mesolithic and LBK	Formative LBK	Starčevo culture	5600/5500–5350 calBC
	Earlier LBK	Bicske-Bíňa phase Milanovce phase			5450–5300/5250 calBC
Late LBK	Notenkopf		Keszthely		5300/5250– 5000/4900 calBC
	Zseliz	Zseliz and Keszthely	Keszthely		

Tab. 1. Chronology and regional distribution of the LBK in Transdanubia.

this site were long pits (Längsgrube) flanking the houses and a substantial amount of burnt daub fragments, enabling the reconstruction of rectangular, timber-framed above-ground houses of the type current in the Central European distribution of the early LBK (Bánffy 2004.35–47; Bánffy and Réti 2008). However, the archaeological features noted at Szentgyörgyvölgy were insufficient to identify possible divergences from the internal timber structure of the early LBK houses in regions west of the Carpathian Basin. Given that not one single building has yet been found in the Hungarian Starčevo distribution, the possible Early Neolithic antecedents of the two buildings of the formative LBK phase can only be surmised from the few house remains excavated in the Great Hungarian Plain. While the Körös buildings unearthed at Tiszajenő-Szárazérpart (Selmeczi 1969; Raczky 1976. Figs. 1–2) and Szajol-Felsőföld (Raczky 2006.381–383, Fig. 2a–c) allow the reconstruction of above-ground houses, these can hardly be regarded as direct architectural antecedents of the Central European LBK. The Brunn II site in Austria is crucial to our understanding of the architecture of the formative LBK phase, and the detailed publication of the house remains from this site will no doubt shed light on several as yet little understood issues (Lenneis et al. 1996. Abb. 3; Stadler 1999; 2005). What is quite certain is that the residential buildings of the period were above-ground constructions and that pit-houses were not used as human dwellings.

Another category of evidence is provided by pottery finds. The late Starčevo ceramics from the north-western fringes of the culture's distribution, *i.e.* from the Balaton region, can be assigned to a special and rather peripheral sub-type, which has much in common with the pottery of the formative LBK. The first evidence in this respect came from the Szentgyörgyvölgy-Pityerdomb site, which yielded a rich assemblage of some fifteen thousand pottery fragments. After identifying the main features of this pottery, a search for similar assemblages revealed that the few sites with a comparable ceramic inventory all lay around the lake and in the adjacent western Transdanubian region (Bánffy 2006b.130–132, Fig. 5), suggesting that while the earliest LBK pottery was undoubtedly produced in this region, the 'know-how' of pottery manufacture most certainly origina-



Fig. 3. Vessel of the formative, earliest LBK from Szentgyörgyvölgy-Pityerdomb.

ted from the Balkans. Vessels were fired to a bright red colour at a low temperature; the fine wares often have a red slipped and polished surface and are occasionally decorated with lightly polished lines (Fig. 3). Vessel pedestals are often no higher than a foot-ring. Both sharply and more gently carinated forms occur among bowls with a concave upper part. The pottery shows strong affinities with the late Starčevo assemblages from the Balaton region and bespeaks an intensive connection between Balkanic immigrants and the formative LBK communities.

The single most striking feature of the lithic assemblage is the astonishing diversity of types. According to Katalin T. Biró, the many tool types are a reflection of a wide range of activities, such as hunting, fishing, gathering and, also, food production (Biró 2001; 2002; 2006). The raw material used almost exclusively for the manufacture of stone tools in the earliest LBK assemblages was red radiolarite from the Bakony Mountains, preferred not only by the Transdanubian Starčevo communities, but also by the early LBK migrants advancing along the Danube Valley. The presence of Szentgál radiolarite has been documented on Austrian and Moravian LBK sites, although in a decreasing proportion (Mateiciucová 2001; 2002), and even as far away as central Germany (Gronenborn 1994; 1997; Zimmermann 1995).

Taken together, the above suggest a transitional phase between Late Mesolithic and Early Neolithic subsistence strategies. The Mesolithic lithic tradition has much common with LBK manufacturing techniques: the similarities in tool-making technology can probably be interpreted as reflecting similarities in

subsistence strategies (Mateiciucová 2003; 2004). The plants earlier tended as part of Late Mesolithic garden cultivation were most probably cultivated in small Early Neolithic fields (Gronenborn 1999; Jeunesse 2003; Gehlen and Schön 2003) and complemented with cereals. Domestic animals, such as sheep, goat and cattle, were brought to this region from the northern Balkans (Halstead 1996), enabling the diet to be enriched without a break in overall subsistence patterns. The first phase can thus be conceptualised as a slow transformation rather than a sweeping change.

The radiocarbon series for Szentgyörgyvölgy-Pityerdomb, based on ten measurements, indicated a uniform date of 5480–5340 calBC for the settlement's occupation (Bánffy 2004.299–309). These dates and the ones quoted in the following conform to a 1 σ confidence probability. The beginning of the Brunn am Gebirge site is put at 5620 calBC in some publications (Stadler 1999.8), while the date of Brunn

Ila, the earliest site, has recently been defined as 5540–5210 calBC (Stadler 2005.270). The beginning of the radiocarbon ranges for the formative LBK phase cluster around two possible dates, 5600 calBC and 5480 calBC. Some calibration programmes also allow the beginning of calibrated ranges falling between 5560 and 5510 calBC. In the light of the available evidence, the emergence of the LBK in Transdanubia can be put between 5600 and 5500 calBC (Bánffy and Oross *in press*). The formative phase spanned a roughly 150–200 year period between 5600/5500 and 5400/5350 calBC. The absolute chronological dates also indicate contemporaneity with the latest Körös and Starčevo phases (Oross 2007. 575–582, Tab. 27.18, Tab. 27.20).

The earlier LBK period

The sites and assemblages discussed in the following were regarded as the earliest LBK period in the western half of the Carpathian Basin (Kalicz 1978–79a)

before the discovery of the settlements at Szentgyörgyvölgy-Pityerdomb (Bánffy 2000; 2004) and Brunn II (Stadler 1999; 2005), which represent the culture's formative phase. The sites westwards of the Carpathian Basin, where no formative LBK assemblages have been found to date, are usually still designated as the earliest LBK (älteste LBK). Begun in the 1970s (Kalicz and Makkay 1972), research on the early LBK phases in Hungary received a new impetus with the excavations at Bicske-Galagonyás (Makkay 1975; 1978) and Becsehely (Kalicz 1978–79a, 15, Taf. 2–7, 14; 1978–79b). The first overview of this period, written by Nándor Kalicz, discussed the distinctive traits of the period's pottery and its chronology based on finds from fourteen sites (Kalicz 1978–79a). His study appeared at the same time as Juraj Pavúk's work on the early LBK period in Slovakia, which he divided into four phases (Nitra, Hurbanovo, Bíňa and Milanovce; Pavúk 1980).

LBK research soon established that the culture was distributed across all of Transdanubia (Fig. 4). The initially identified distribution territory

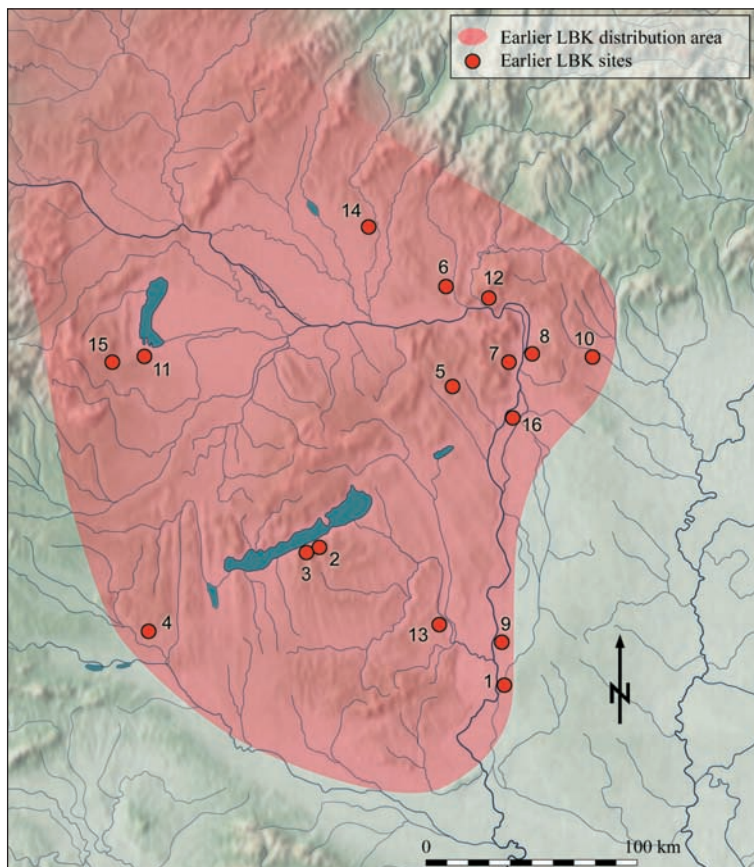


Fig. 4. The earlier LBK distribution in Transdanubia, with some important sites: 1. Baja-Bajaszentistván-Szlatina; 2. Balatonszárszó-Kis-erdei-dűlő; 3. Balatonszemes-Bagódomb; 4. Becsehely II-Homokos; 5. Bicske-Galagonyás; 6. Bíňa; 7. Budapest-Aranyhegyi út; 8. Dunakeszi-Székesdűlő; 9. Fajsz-Garadomb; 10. Galgahévíz; 11. Hidegség; 12. Ipolydamásd; 13. Medina; 14. Milanovce; 15. Neckenmarkt; 16. Szigetszentmiklós.

was later expanded to include sites in the wider Budapest area, such as Budapest-Aranyhegyi út (Kalicz-Schreiber and Kalicz 1992), Szigetszentmiklós (Virág 1992) and Dunakeszi-Székesdűlő (Horváth 2002a; 2002b). LBK settlements have also been identified in the narrow zone along the Danube's left bank along the river's southern Hungarian course, for example at Fajsz-Garadomb and Baja-Bajaszentistván-Szlatina, where the earlier occupants were communities of the Körös and not the Starčevo culture (Kalicz 1994. 71–72, *Abb. 1–5*; 1995.26, 29, 55–56, *Abb. 8, 12–14*). The extent of the LBK distribution in Hungary became complete with the sites discovered due east of the Danube, along the Zagyva, Tápió and Galga rivers (e.g. at Galgahévíz; Kalicz and Kalicz-Schreiber 2001. 27, *Abb. 1–3*). The period's Transdanubian sites are rather uniform, with no trace of the south-north division characterising the formative phase, when the terminal Starčevo sites in southern Transdanubia were still occupied. It should at this point be recalled that the LBK spread over large areas of Central Europe exactly during this period, and that its settlements in southern and central Germany, such as those at Eitzum (Schwarz-Mackensen 1983; 1985), Eilsleben (Kaufmann 1982), Niedermörlen (Schade-Lindig 2002) and Schwanfeld (Lüning and Modderman 1981), became firmly established at this time.

In spite of the large-scale excavations conducted over the past two decades, many final details regarding the layout of the settlements and the settlement network are still unclear. Settlement features of the LBK, including house plans, burials and the section of an enclosure, have been uncovered over an area of 10 ha at Balatonszárszó-Kis-erdei-dűlő, a site investigated between 2000 and 2006 as part of the salvage excavations preceding the construction of the M7 Motorway connecting Budapest with Slovenia and Croatia (Oross 2004a; 2004b). The finds from three house plans and their associated features uncovered in the extensive Neolithic settlement's north-eastern part can be dated to the Bicske-Bíňa phase of the earlier LBK. Another house plan can be assigned to the later, Milanovce phase of this period (Marton 2004.84–85, *Fig. 3*; 2008.202–203, *Figs 1–3*; Marton and Oross *in press*). The layout resembled the one observed at Szentgyörgyvölgy-Pityerdomb,



Fig. 5. Vessel of the Bicske-Bíňa phase from Balatonszárszó-Kis-erdei-dűlő.

with the buildings sited relatively far from each other. At the same time, the two house plans excavated at the Dunakeszi-Székesdűlő site, dating from the same Milanovce phase of the earlier LBK, lay directly beside each other; however, there was nothing to indicate they were contemporaneous (Horváth 2002a.6. *kép 4*; 2002b. *Abb. 6. 4*; 2004. *Abb. 1*). The currently available evidence would suggest that no fundamental changes occurred either in settlement layout or in the density of the settlement network compared to the earliest, formative LBK phase.

The early LBK settlements of Central Europe which can be correlated with the Bicske-Bíňa and the Milanovce phases, such as those at Mohelnice (Stäuble 2005. *Taf. 85–87, 89*; Tichý 1962), Schwanfeld (Stäuble 2005. *Taf. 147–148*) and Nieder-Eschbach (Stäuble 2005. *Taf. 112*), are characterised by buildings with at least five rows of posts. The house structure of five rows of posts combined with outer bedding trenches (Außengraben) can be seen as a distinctive trait of early LBK buildings (Lüning 1988; Stäuble 2005.167–178). The presence of outer bedding trenches has not been documented in the culture's Hungarian distribution. The buildings from the earlier LBK period are among the most poorly preserved house plans of the Balatonszárszó settlement and thus their internal structure cannot be studied in detail. The two houses excavated at Dunakeszi-Székesdűlő were interpreted as atypical buildings, with three rows of posts (Horváth 2002b.24–28; 2004), even though they could equally well be reconstructed as buildings with five rows of upright timbers. In fact,



Fig. 6. Vessel of the Milanovce phase from Balatonszárszó-Kis-erdei-dűlő.

house plans with an axis aligned parallel to the long pits can only be gained with a reconstruction of five rows of posts (Oross 2008). The architectural evidence from Dunakeszi indicates that the standard LBK house with five longitudinal rows of posts had probably evolved by the earlier LBK period, or during this period at the latest in Transdanubia.

The legacy of the Starčevo culture in pottery forms and vessel decoration can easily be distinguished in the ceramic material. These include biconical vessels with an out-turned neck and incurving upper part. Other surviving forms are low and medium high hollow pedestals, pannier vessels and amphorae. A variety of pinched decoration and nail impressions, small grooves, sprinkled and channelled barbotine, as well as stroke burnished patterns, too, can be regarded as a heritage of the Starčevo culture (Kalicz 1994.68; 1995.29). A previously unencountered variant of deep biconical bowls with strongly profiled neck and a sharp carination dividing the vessel into two equal halves can be regarded as the period's hallmark. The deeply incised linear designs adorning these vessels often include a bundle of three horizontal lines and two or three curved lines. These two motifs are generally repeated three times in an alternating design. The knobs set on the carination are also arranged in a triple symmetry. Vessels of this type have been found at Bicske-Galagonyás (Makkay 1978.Pl. VI, 1-4) and Bíňa in Slovakia (Pavúk 1980.Abb. 5, 1-4), as well as at Balatonszárszó (Fig. 5). Pedestals of both the high hollow and massive solid variety make an appearance during this period. Deeply incised linear motifs, vessels fired to a grey or black colour with polished surface, pattern

burnishing and spherical vessels decorated with a row of impressions under the rim enjoyed widespread popularity (Kalicz 1994.69; 1995.41, 49).

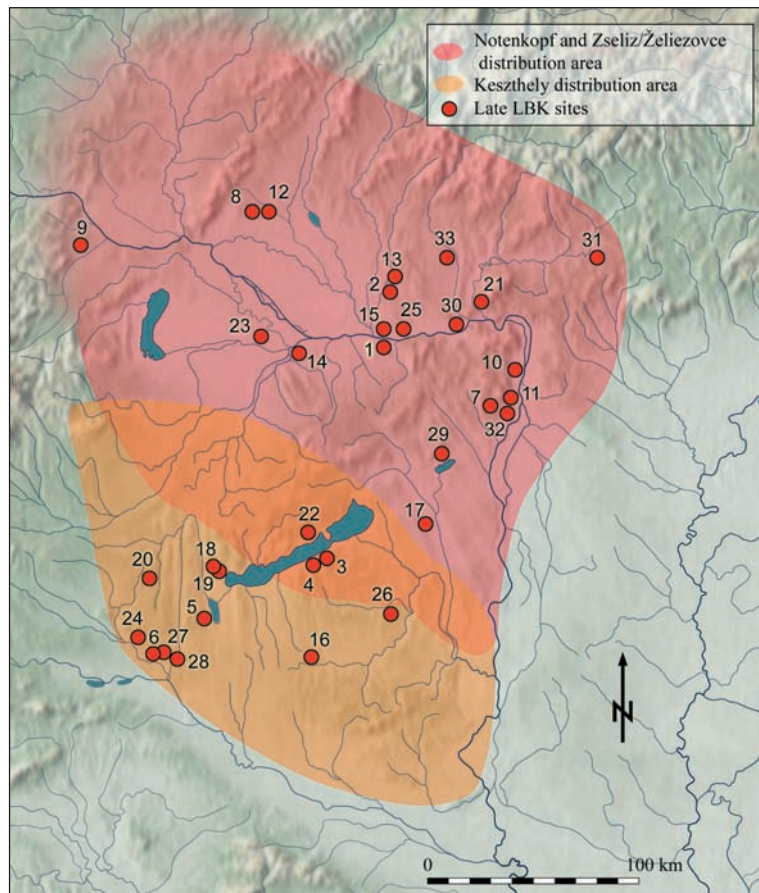
The pottery types described above, labelled Pattern I by Tibor Marton, are typical of the earliest phase of the Balatonszárszó-Kis-erdei-dűlő settlement (Marton 2008.202-203, Fig. 2). The ceramic inventory from Bicske, Bíňa, the north-eastern section of the Balatonszárszó settlement and several other sites is virtually identical, providing a firm basis for using the label 'Bicske-Bíňa phase' for describing the earlier LBK assemblages succeeding the culture's formative phase.

Kalicz had earlier argued that the period's finds from Hungary had a uniform nature, making the identification of internal phases practically impossible (Kalicz 1994.69). However, a spatially well-circumscribed assemblage differing both from the Bicske-Bíňa type and the late LBK finds can be distinguished at Balatonszárszó. Biconical vessels have a rounded carination. Conical bowls become widespread. One popular decoration, typical of this phase, is a bundle of wavy lines encircling the vessel body (Fig. 6). These pottery assemblages, labelled Pattern II in the pottery sequence from Balatonszárszó, can be correlated with finds assigned to the Milanovce phase in Slovakia (Marton 2008.203, Fig. 3).

János Makkay noted the connection between the earlier LBK finds from Bicske-Galagonyás and the earliest Vinča assemblages (Makkay 1978.30-31). Kalicz discussed the possible relation between the early Vinča culture and the new traits of the pottery, such as solid pedestals, pattern burnished designs and the row of impressions under the rim, suggesting a meaningful relation between the emergence of the Vinča culture and the assemblages in question (Kalicz 1994.69-70; 1995.49, 53-54). In his recent analysis of an ornamental motif - incised curved lines arranged in a semicircle - Ferenc Horváth has argued for the strong influence of the early Vinča culture (Horváth 2006.309-313).

Not one single radiocarbon series has yet been published for the period's Hungarian sites. Some of the few available single dates lack the standard accompanying information, such as laboratory number and standard deviation (Budapest-Aranyhegyi út: Kalicz

Fig. 7. The late LBK groups in Transdanubia (after Kalicz 1991) with some important sites: 1. Almásfüzitő-Foktorok; 2. Bajc; 3. Balatonszárszó-Kis-erdei-dűlő; 4. Balatonszemes-Szemesi-berek; 5. Balatonmagyaród-Kápolnapusztá; 6. Becsehely II-Homokos; 7. Biatorbágy-Tyúkberek; 8. Blatné; 9. Brunn am Gebirge; 10. Budapest-Békásmegyer; 11. Budapest-Kőérberek-Tóváros lakópark; 12. Catak; 13. Dvory nad Žitavou; 14. Győr-Pápai vám; 15. Iža-Velky Harčas; 16. Kaposvár-Téglagvár; 17. Káloz-Nagyhörcsök; 18. Keszthely-Dobogó; 19. Keszthely-Zsidi út; 20. Kustánszeg-Lisztessarok; 21. Leitkés; 22. Mencshely-Murvagödrök; 23. Mosonszentmiklós-Egyéni-földek; 24. Muraszeménye-Aligvári-mező; 25. Patince; 26. Pári-Altacker; 27. Petrivente-Újkúti-dűlő; 28. Sormás-Török-földek; 29. Sukoró-Tóra-dűlő; 30. Stúrovo; 31. Szécsény-Ültetés; 32. Törökbálint-Dulácska; 33. Želiezovce.



1995.53; Becsehely II-Homokos: *Barna 2005.23*), and their interpretation raises additional questions. The most secure chronological anchors for dating this period are the radiocarbon dates for the preceding formative phase and the succeeding late LBK period, as well as the dates for two sites in Austria: Strögen and Neckenmarkt (*Lenneis and Stadler 2002*), suggesting that the earlier LBK falls roughly between 5450 and 5300/5250 calBC in the western half of the Carpathian Basin. However, this broad date can hardly be a substitute for a later analysis based on a radiocarbon series, which can be securely correlated with a pottery sequence.

The late LBK period

The onset of the late LBK period is marked by the appearance of Notenkopf wares in northern Transdanubia and south-western Slovakia, and by Keszthely type pottery in southern Transdanubia. While Notenkopf wares were eventually succeeded by the pottery decorated in the Zseliz/Želiezovce style in the north, the ceramic inventory from southern Transdanubia continued to be dominated by Keszthely type pottery until the end of the LBK sequence. A zone characterised by mixed assemblages containing both Keszthely and Zseliz/Želiezovce wares appeared in central Transdanubia, extending in a north-west to south-east direction (*Kalicz 1991.25, Abb. 1*).

The geographic divide between the two northern wares (Notenkopf and Zseliz/Želiezovce) and the southern (Keszthely) pottery types (Fig. 7) essentially corresponds to the one that existed two periods earlier, between the indigenous groups with formative LBK and the late Starčevo (Fig. 1).

Fundamental changes can be noted in settlement layout and settlement networks at the start of the late LBK period. Settlements were now established on fertile loess plateaus. At Balatonszárszó-Kis-erdei-dűlő, this period is represented by the site's southern part. Of the forty-eight excavated house remains where indications of the timber framework could also be documented (Category A), forty-four house plans dated from the late LBK period, and forty-three of these lay in the settlement's densely built-up southern part (Fig. 8). Even a cursory glance at the settlement plan reveals that the southern settlement part differs markedly from the northern section dating from the earlier LBK period, where buildings were more scattered. The house plans of the late LBK period obviously span several generations of houses, and the length of this settlement section's occupation exceeded by far the occupation of the settlement of the earlier LBK period. Even so, the extent of occupation density cannot be explained simply by

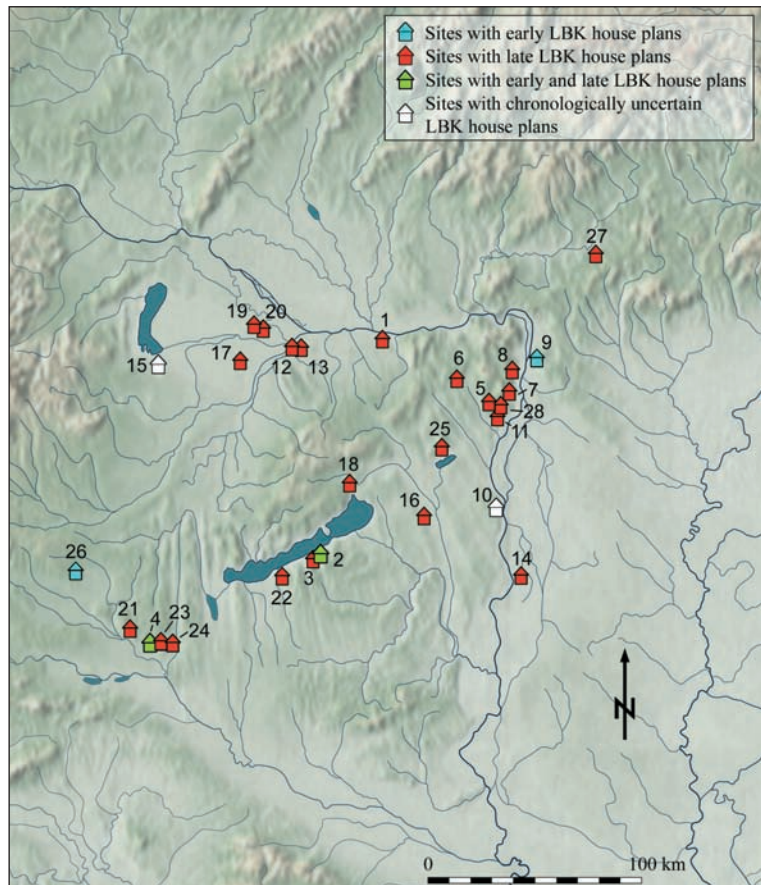


Fig. 8. Balatonszárszó-Kis-erdei-dűlő: aerial photo of the southeastern part of the site.

differences in length of occupation. Some house clusters can be dated to a relatively brief period on the basis of the pottery finds and the radiocarbon dates, indicating that some of the close-set buildings in a particular cluster were contemporaneous and inhabited at the same time (*Marton and Oross in press*).

The Balatonszárszó settlement is by no means unique. Another LBK settlement lay a few kilometres to the west, at Balatonszemes-Szemesi-berek (*Bondár et al. 2000; 2007*). Although there remained no indications of the

Fig. 9. Transdanubian LBK sites with above-ground house plans: 1. Almásfüzitő-Foktorok; 2. Balatonszárszó-Kis-erdei-dűlő; 3. Balatonszemes-Szemesi-berek; 4. Becsehely II-Homokos; 5. Biatorbágy-Tyúkberek; 6. Bicske-Galagonyás; 7. Budapest-Kőerberek-Tóváros lakópark; 8. Budapest-Óbuda-Nánási út; 9. Dunakeszi-Székesdűlő; 10. Dunaújváros; 11. Érd-Hosszú-földek; 12. Győr-Ménfőcsanak-Eperföldek; 13. Győr-Pápai várnagy; 14. Harta-Gátórház; 15. Hegykő; 16. Káloz-Nagyhörcsök; 17. Kóny-Barbacsitó; 18. Litér-Papvásárhegy; 19. Mosonszentmiklós-Egyéni-földek; 20. Mosonszentmiklós-Pál-major; 21. Muraszemenye-Aligvári-mező; 22. Ordacsehi-Bugaszeg; 23. Petrivente-Újkúti-dűlő; 24. Sormás-Török-földek; 25. Sukoró-Tóra-dűlő; 26. Szentgyörgyvölgy-Pityerdomb; 27. Szécsény-Ültetés; 28. Törökbálint-Dulácska.



one-time timber framework, ten houses could be reconstructed from the long pits flanking the house sites. The pottery finds dated the investigated settlement section to the beginning of the late LBK period. This would suggest that several settlements had been established at roughly the same time within a relatively small area (*Marton and Oross in press*). While settlements appear to have been more closely built-up at the onset of the late LBK period, their size exceeded by far the extent of the settlements of the preceding period.

Large-scale investigations have been conducted on several LBK sites during the past two decades, as a result of which some 150 house plans are now known from western Hungary (in contrast to the few timber-framed buildings known before 1990). The remains of the timber framework could be documented in the case of over one hundred buildings. The currently available evidence shows that some 93–95% of the buildings can be dated to the late LBK phases. Most

sites yielded house plans from this period exclusively; the number of sites featuring buildings from both the early and the late LBK period is expressly low (Balatonszárszó-Kis-erdei-dűlő and perhaps Becsehely II-Homokos; Fig. 9). The house plans of the Balatonszárszó settlement reflect similar proportions as the general pattern in Transdanubia: four of the excavated house plans can be assigned to the early LBK, while the overwhelming majority of the buildings, 91–94% in all, belong to the late LBK (depending on whether solely house plans of Category A with indications of the timber framework are considered, or whether the house plans of Category B reconstructed from the position of the long pits and a random scatter of post-holes are also taken into consideration). The archaeological record indicates that settlements were more intensively occupied and that the settlement network became denser during the late LBK phases (Bánffy and Oross 2009:226–233, Tab. 2, Abb. 6).

The house plans and associated settlement features from the Hungarian late LBK distribution, such as from Almásfüzitő-Foktorok (Vadász 2001:Fig. 1), Balatonszárszó-Kis-erdei-dűlő (Oross 2004a:63, Abb. 5; Oross 2008), Budapest-Óbuda-Nánási út (Virág online) and Törökbálint-Dulácska (Virág 2005) allow the reconstruction of rectangular timber-framed houses. In addition to three internal rows of upright timbers, the two longitudinal walls of these buildings were supported by two outer rows of smaller posts. It would appear that the transition to the late LBK period was not accompanied by any major changes in house structure (Marton and Oross in press).

Kalicz described the finds of the Keszthely group as remarkably uniform assemblages, in which the pottery remained virtually unchanged throughout the period (Kalicz 1991:27). The single anchor for an internal chronology was that certain features of the preceding period could be noted in early Keszthely assemblages. These had disappeared by the classical phase and, disregarding a few Notenkopf fragments, imports of other contemporary groups are lacking. The assemblages of the Keszthely group's late phase from south-western Transdanubia are characterised by the presence of Notenkopf, Zseliz/Želiezovce, So-



Fig. 10. Zseliz/Želiezovce style vessel from Balatonszárszó-Kis-erdei-dűlő.

pot, Malo Korenovo and Šarka wares (Kalicz 1991:26–27). A detailed typo-chronological framework for the Notenkopf and Zseliz/Želiezovce assemblages from northern Transdanubia, comparable to that elaborated for the Zseliz/Želiezovce phase in Slovakia (Pavúk 1969), has not been proposed yet, and thus the Slovakian system is also used for the Hungarian distribution.

Globular vessels (Bombengefäß) can be regarded as the hallmark of the pottery from both regions (Kalicz 1991:19, Abb. 6.3). Conical and semi-spherical bowls, as well as amphorae with cylindrical necks are other common forms. The hollow pedestal of pedestal bowls is often pierced with triangular or oval perforations. Face pots occur in assemblages both from northern (Fábián 2005; Pavúk 1969:309–315) and southern Transdanubia (Draveczký 1971; Kalicz 1991:25; Marton 2004:Fig. 7), with depictions of faces appearing on globular vessels and amphorae with cylindrical necks. The incised linear patterns are interrupted by or terminate in punctates on the Notenkopf pottery. The most typical features of Zseliz/Želiezovce pottery are bundles of incised lines combined with vertical incisions (Fig. 10). The Keszthely style is characterised by designs of wide, deeply incised lines. Globular vessels often have an incised line encircling the body under the rim, while the patterns on the vessel body are comprised of a curved horseshoe shaped or spiral motif alternating with chevrons or hook motifs (Fig. 11).

Zseliz/Želiezovce wares were often painted red, with a design of alternating polished and red painted bands. Polychrome patterns in red and yellow were also quite popular. The assemblages brought to light during recent excavations indicate that the use of red was also widespread in the Keszthely distribution, *i.e.* in southern Transdanubia.

The Balatonszárszó-Kis-erdei-dűlő site lies in the area characterised by the joint occurrence of Keszthely and Zseliz/Želiezovce wares. A detailed analysis of the large body of ceramic finds offers a unique opportunity for creating a typo-chronological sequence for the late LBK period of this transitional zone. Some settlement features of the southern, densely built-up area, which can be wholly dated to the late LBK period, yielded mixed assemblages (defined as Pattern III by Marton). These assemblages were spatially restricted to certain areas, usually one or another farmstead parcel, and they mark the start of the southern settlement section. A few elements of the preceding period, such as rounded biconical forms, survived into this period. At the same time, the appearance of the typical Keszthely vessel forms and ornamental repertoire can also be noted. These assemblages contain a low proportion of Notenkopf pottery, although it is unclear whether these were locally made or imported (Marton 2008.203–204, Fig. 4; Marton and Oross *in press*).

The succeeding phase in the pottery sequence, labelled Pattern IV, is dominated by Keszthely wares. The



Fig. 11. Keszthely style vessel from Balatonszárszó-Kis-erdei-dűlő.

few Zseliz/Želiezovce fragments come mainly from bowls decorated on their interior (Marton 2008.204–205). In contrast, the proportion of Zseliz/Želiezovce wares in the pottery assemblage from certain farmstead parcels in the southern settlement section is identical with or even exceeds 50% of the decorated pottery. These assemblages, assigned to Pattern V, were recovered from farmstead parcels in the central part of the southern area and, more typically, along the western and southern edge of the excavated area.

The Balatonszárszó pottery could be ordered into a typo-chronological sequence corresponding to the one described by Kalicz. One major difference compared to his system is that Notenkopf fragments typically occurred in the formative Keszthely assemblages (Pattern III), suggesting that wares decorated in the Notenkopf style represent a relatively brief time-span at the start of the late LBK period.

Compared to the preceding period, no major technological differences could be identified in the lithic implements of the late LBK from Balatonszárszó, although the late LBK saw the appearance of large, long blades, often bearing sickle gloss or traces of use-wear on their edge (Marton and Oross *in press*. Fig. 9, 2, 4–6).

The published radiocarbon dates for various Transdanubian sites (Bánffy and Oross 2009.Tab. 3) and the radiocarbon-based dating of certain Austrian sites (Lenneis and Stadler 1995.Abb. 8) suggest that the onset of the late LBK period can be placed in the decades before 5200 calBC. Other data, such as more recent AMS dates, would rather indicate a dating around 5300/5250 calBC (Bánffy and Oross 2009.233–235; Stadler 2005.270). The calibrated dates for the earliest LBK in Germany and the succeeding Flomborn phase span the entire 53rd century BC (Cladders and Stäuble 2003.496–497). In sum, the start of the late LBK period can be confidently dated to the 53rd century BC. There is increasing evidence that an earlier date around 5300/5250 calBC might also be justified, although additional large radiocarbon series are necessary to prove this. It must also be noted that the cluster of the starting dates of the calibrated intervals

around this date is a consequence of the wiggles in this section of the calibration curves. The end of the LBK sequence in Transdanubia can be dated between

5000 and 4900 calBC. The latest dates coincide with the radiocarbon dates for the early Lengyel culture (*Bronk Ramsey et al. 1999.202–203*).

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