Linear Pottery Houses and Their Inhabitants

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Abstract: Neolithic houses can be classified into different types according to their construction; therefore, we tried to find whether the inhabitants of different types of Neolithic houses engaged in different economic activities. The existing interpretation of the function of individual parts of Neolithic houses was broadened to include a hypothesis based on an exceptional case from the Harta settlement in Hungary. We used the revised analysis of animal bones from the Bylany settlement as a starting point to assess the means of subsistence of the inhabitants of Neolithic houses. The way that food was handled and consumed was observed in the distribution of formal functional types of pottery according to the number and the lipid compounds. Based on current results, we can prove that inhabitants of different types of Neolithic houses used different means of subsistence. Food was shared similarly in all types of houses; however, the processing and preparation of food differed. Therefore, we can support the hypothesis that the inhabitants of a single settlement were of different genetic and historical origins.

Keywords: Neolithic, Linear Pottery, Bylany, Houses, Typology, TLE (total lipidic extract), ORA (organic residual analysis)

1 Preface

This paper follows the analyses of Linear Pottery finds from the Neolithic site at Bylany (Kutná Hora, CZ) that have been successively dealt with in three books: structure of artefacts in the first, activities on the site in the second, and Neolithic society in the third book (Pavlů 2000; 2010; 2014). The artefacts were analysed in terms of formal, functional, and stylistic attributes and consequently interpreted in corresponding concepts. Activities were modelled according to the distribution of artefacts outside of house ground plans, since records are lacking for inside activities. Finally, the society was interpreted mainly hypothetically, based on the typology, chronology, and respective configuration of the houses on the site, since there is very limited data on the ecology on the site. As the available records have increased in numbers recently, there is a possibility that our hypotheses will take longer to complete. This paper will continue with these interpretations, based on new archaeological evidence and new results coming from the natural sciences.

The paper, therefore, starts with an overview of an interpretation of the tripartite structure of the houses, though it is speculative (section two). Following this discussion, some hypothetical templates of Neolithic architecture are proposed (section three). For contrast we include new archaeological evidence from the Harta site in south-eastern periphery of the Linear Pottery settlement area. An exceptional situation of basic house ground plans together with polygonal fences appeared here. It is the only tangible evidence of the organization of farming activities in connection with the residential area of the house. Then the paper considers the skill of house construction. This is one of the diagnostic formal attributes, not only from the
point of view of the building efforts of the Neolithic people at the Bylany site, but also from the point of view of their economic values (below in section four). As a consequence, the following text presents an overview of our existing, yet once again speculative, knowledge about the activities that took place inside and outside the house space as well as the common economy of the households (section five). Finally, the three-part typology of the houses is not interpreted in terms of size function, but in terms of an economical one (section six).

Secondly, we present the recent results of lipid analysis of pottery sherds (ORA-organic residuals analysis) that were obtained in collaboration with University of Chemistry and Technology in Prague. However, the publication of the chemical analyses results itself is not included here. In the preceding publications, the information based on animal bones from houses was revisited according to the bones’ amount and weight in section seven, comprising of comparative data on the household economy. Next, we have tried to compare the structure of functionally-interpreted pottery types based on their potential occurrence in house complexes with the structure of these types in terms of the measured total lipidic extracts (TLE). These results are projected into the functionally-interpreted typology of house ground plans in section eight. To conclude, we believe the paper could make some new contributions – however hypothetic they might be – to the research on the food distribution and the livelihood at a Neolithic site.

2 Introduction to the Typology of Linear Pottery Houses

We only have indirect evidence of the inhabitants of Neolithic settlements. The main pieces of evidence are the ground plans that have been known since the 1930s. The typology of the construction of the houses has been studied based on the analyses of post hole positions within the ground plan of a house. Several thousand Neolithic houses have been studied within the whole Linear Pottery area. On the one hand, we have no archaeological evidence of how the houses were built above ground, which is why any reconstruction of a Neolithic house is largely hypothetical. On the other hand, the analyses of artefacts, mainly pottery (Pavlů 2010, 2014; Frirdich 2005; Gomart et al. 2015) and animal bones (Hachem 2000), as well as typological details of the ground plans, have allowed for the formation of hypotheses about the activities that the inhabitants engaged in inside as well as outside their houses and about their means of subsistence. The initial hypotheses concerned mainly the interpretation of the functions of individual house parts as evidence of the economic activities of the inhabitants as well as the social role of the home.

The last overview of Neolithic houses in Czech literature has shown that the number of such houses found has grown recently, not only in Bohemia and Moravia, but also in other countries (Podborský 2011). The author of the overview also has summarised briefly the current opinions on the function of individual house parts of standard south-to-north oriented houses. He explains that the entrance passage was linked to agricultural activities, the central part was the residential area, and the back section was a secluded space without an interpretation.

We can reiterate the genesis of the standard interpretation in the words of P.J.R. Modderman, who had an eminent interest in the typology of Neolithic houses. In the 1950s and 1960s, when the research on the Dutch Limburg was published, Modderman defined three main types of houses and several sub-types. His primary goal was to use this study to develop a chronology of how Neolithic houses constructions changed over time. This was not successful, but the basic scheme of his typology can still be used today. He also developed a detailed typology of the houses researched at Bylany (Modderman 1986). In connection to the publication of extensive research at Elsoo and Stein, he came up with an interpretation of the functions of individual house sections in 1970 (Modderman 1970: 109-112).1

The evolution of P.J.R. Modderman’s opinions, as he later described them in his final synthesis of the

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1 "...Mehrere Erwägungen führen dazu, den Mittelteil als Wohnteil zu betrachten: jedes Gebäude hat einen Mittelteil, die Kleinbauten werden nur von einem Mittelteil gebildet..."; "...Der Nordwestteil, der sich auf den ersten Blick wegen seiner Holzwand als Wohnteil anbietet, ...So wäre es möglich, ihn als Stall zu betrachten, denn die Holzwand verträgt das Reiben der Tiere besser..."; "...Den Südostteil als einen Getreidespeicher zu erklären, wirkt bestehend ..., wenn man die enge Stellung der Pfosten während der alten Linearbandkeramik berücksichtigt...".
Linear Pottery culture (Modderman 1988: 90), is very interesting. After almost twenty years, he still did not doubt the residential function of the central section of the houses, although he managed to provide new arguments against the existence of ovens in the house at Postoloprty (district Louny, NW Bohemia). However, his opinion on the functions of the northern and southern sections of the houses is still only hypothetical. He cast doubt upon the notion that animals were stabled in the northern section of the house, since even today animals are predominantly stabled outside the house. He supported the theory that the southern section was used as a granary, citing the social significance of the houses, although that would suggest that all the houses shared the same type of grain agriculture.

The most detailed analysis of the significance of the three sections of a house in the earliest Linear Pottery period was carried out by H. Stäuble (2005: 191-198). Above all, he criticises the theory that closely set internal posts could bear the weight of a second floor, claiming that such construction would not be stable. According to him, inner post holes linked into ditches might be interpreted as a possible lengthwise divide that would allow for the stabling of animals. Ultimately, he accepts the opinion that this was a kind of roofed porch or a space opening to the south where different activities could take place, and which led into open space further to the south of the house (Stäuble 2005: 194). He also criticises existing arguments regarding the solid construction of the northern section of the house and the fact that it might have been a “bedroom”. He refutes claims that this section served as a stable, pointing out the absence of data from the phosphate analysis. He sees the northern section as a space chosen by the inhabitants to store valuables and supplies, but it also could have served for sacral purposes. Its variable size seems to reflect how much of their property the inhabitants wished to show off (Stäuble 2005: 198).

A. Coudart has already used the variability of the northern sections of the houses to adjust her own typology. She also classifies the houses into three types, but she defines them according to the number of constructional cross-rows in this section. She refutes the notion that the existence of a one-section house is valid for the entire Linear Pottery area (Coudart 1998). Recently, her typology of houses present in the western Linear Pottery area was reduced to only two types, to large and small ones (Gomart, Hachem, Hamon, Giligny, Illett 2015).

3 Principles of Constructions of Houses and their Origin

Neolithic longhouses of the European temperate zone are characterised by their post-frame structure and their supposedly simple wattle and daub walls that covered a relatively large space. They were apparently used for housing and also for the requisite economic activities. Given increasing evidence that reveals the mobility of the Neolithic population, it is possible to challenge the generally accepted concepts regarding the continuous year-round occupancy of these buildings in association with other pre-existing ideas about the Neolithic villages. These ideas were the result of extrapolating our anachronic concepts of primitive rural settlements, illustrated at best by the sparse information available concerning the rural areas of medieval Europe.

Throughout its length, the construction of the building is based on five rows of posts, most commonly of oak wood (Whittle 1996: 163). The relative distance between the posts and the pattern of their positioning have given rise not only to an interpretative concept of the original design of the building, but also to a basic typology (compare above). Different parts of ground plans are derived from the presence of three aspects, the southern, the central and the northern part. Hypothetically they are defined as modules serving for storage, for living and possibly for sacral purposes. It should be noted that this interpretation of the usage of these sections of the longhouse is not supported by any de facto evidence. The modules, by their mutual, though not arbitrary, combination, established the final size of the building. The individual modules were separated from each other by cross-rows of posts placed a shorter distance apart from each other than was

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2 "... An acceptable explanation for the use made of the north and south sections has never been given...” (Modderman 1988: 90).
3 "... In the very earliest LPC phase, the south part was added to each house...” (Modderman 1988: 90).
customary. Still remaining unknown are the height of the structure and also the occasionally considered existence of a raised floor (Rück 2007). This will usually be reconstructed only in one part of the house either on the southern or the northern side, where the density of the posts is increased or where there is a foundation trench. The existence of a full-fledged floor is not usually considered, but rather the existence of a lighter-built attic (loft) (Whittle 1996: 81).

At the very beginning of the LBK the buildings differ in the details of the construction from the architecture of the Later LBK (Coudart 1998; Pavlů 2000). The origin of the longhouse in the Carpathian Basin is difficult to verify (Lenneis 2004). Rather, it is more likely that the earliest houses were built on the basis of some earlier experience with erecting the roof and supporting it. The relatively large width span of the Early LBK houses required a tighter connection between the support posts and the lintels of the roof, for which our current level of evidence proved to be insufficient.

Therefore, in the earliest ground plans we find between central and northern parts triplets of deeply set posts that apparently supported most of the weight of the roof, while the construction was additionally supported by external supports set into trenches. These elements later disappeared, thereby providing evidence of the origins of the actual Neolithic architectural experience. The Wien Brunn II site provided documentation of the earliest houses, which usually consisted of only a central part (Lenneis 2004, 151).

It is probably no coincidence that a system using five longitudinal rows of posts, three of which are utilised as roof supports, already appears in ground plans of a semi-circular shape in the Near East (Pavlů 2006). Therefore, models of Neolithic buildings can be explained as symbolic representations of real templates of house constructions that existed during pre-Neolithic times in the area now defined as the Near East.

Finding a point of house construction origin is not possible. However, in the case of Neolithic houses we are facing a situation in which fully developed architecture appears in the area without any kind of template. We are not able to find the previous forms of architecture in our territory, and it is very difficult to find any in the areas where the entire Neolithic culture supposedly originated, such as the Carpathian Basin. The historical and evolutional continuum of Neolithic architecture is only confirmed by archaeological finds in the Near East. At the same time, we can use those finds to observe the development and changes in the social organisation of Neolithic people. In the Czech lands, there is no evidence of any objects from the pre-Neolithic era, the several centuries before Linear Pottery emerged, that could be classified as residential buildings. For a long time, this situation has been considered the natural expression of a historic divide that constituted Neolithic settlement in the Czech lands. The absence of continuity in archaeological finds from the pre-Neolithic and Neolithic settlements was regarded as indisputable evidence of a mass arrival of new inhabitants with a new culture – and therefore also new architecture – into a land long since abandoned by the earlier settlers.

The concepts of the authors who were searching for origins within the earlier architecture only included the initial notions of irregular roofed interconnected pits, as the earliest houses (like at Köln-Lindenthal) illustrate. Similar notions are still found in the context of the earliest Neolithic architecture and they are not uncommon in areas where the standard ground plans of Neolithic longhouses with post constructions have been uncovered only recently (Domboróczki 1996).

Given the results of numerous paleogenetic studies, the known scenarios of the Neolithic origins are no longer sustainable, although an alternative interpretation which builds upon continuity of settlements is hard to substantiate. If we admit that one of the decisive factors in Neolithisation was a climatic deviation, which occurred around 6200 cal BC (Gronenborn 2005), then we have to say that before this date, only some areas in the Aegean and the Balkans were Neolithised step by step. After this date, the Carpathian Basin in the east and parts of Transdanubia were Neolithised, as evidenced by the occurrence of Starčevo-Körös pottery after the year 6000 cal BC, in 5800-5600 cal BC at the latest. We do not know much about the areas further to the west, but in Hessen (Wetterau) there is trace evidence of Neolithisation under foreign influence in pollen diagrams (Schweizer 2005: 293), even though there was no known Mesolithic settlement in the area.

Recently the whole point was summarized briefly but very responsibly by J. Kozlowski and P. Raczky in the concluding remarks of their book on Neolithisation in the Carpathian Basin. They showed that the
Mesolithic evidence is irregularly dispersed in Europe, which serves as evidence of an uneven history of individual European regions. It is also necessary to distinguish between two different dimensions of Neolithisation: the material aspects and the waves of expansion as dual mechanisms of the same phenomenon. The elementary units of these processes are then manifested archaeologically in the households (Kozłowski, Raczky 2010: 352). This process was marked by the arrival of a Neolithic Linear Pottery society around the year 5600 cal BC.

If we imagine a similar scenario for the Czech lands, there would have to have been a restructuring of the settlement within the existing mode of occupying land at this time, i.e. the first half of the 6th millennium BC. Individual groups of inhabitants moving in larger regions could have started to gather in the more optimal parts of these regions, a land which they then occupied and kept as their own. Furthermore, there would have to have been more permanent settlements with pre-Neolithic architecture, which is archaeologically almost indiscernible. The first rectangular buildings would have had the form of small houses with a simple construction without any inside divisions into different parts, and their role would have been similar to the role in pre-Neolithic economy. Neither families nor individuals would have had any kind of social prestige.

At the Harta-Gátőrház locality, archaeologists have explored a part of a Linear Pottery settlement and have found evidence of standard Neolithic buildings. The locality lies on the left bank of the Danube, on the borderline between Linear Pottery culture and Vinča culture. Several post houses of the standard type are fractionally preserved, as well as several rectangular post enclosures that are often in superposition to the houses. The majority of the houses have a distinct basic central section and a less pronounced northern part, such as buildings number 2 and 5 (Kustár, Lantos, Hajnalová, Sümegi 2014: Fig. 3).

At the southern end of house 5, an irregular enclosure seems to continue in the eastern row of posts. It is comprised of fenced-in space at the southern part of the house, which is the supposed entrance. To the north of the house, an incomplete row of posts labelled as enclosure IV seems to be oriented in accordance with the walls of the house. It could be explained as another fenced-in enclosure to the north of house 5 (Fig. 1). Both enclosures seem to constitute one unit with the post construction and may be interpreted as a common household part. Their function, however, would be different. Only one comparable example can be cited from the Bylany site, where an enclosure is attached to the northern part of house 912. It was originally interpreted as a space for a herd of animals (Soudský 1966).

One possible interpretation of house 5 at Harta is that the inhabitants of the house used them as spaces for farming activities. There are also other possible interpretations: first, that the central residential part was supplemented from the south and the north by undocumented constructions, according to the usual disposition of buildings in the Czech lands; second, that the enclosures were connected to the house as a fence enclosing open agricultural spaces (Fig. 2). If we accept the second interpretation, we can conclude that the same would be valid for all houses: that the constructions commonly found to the south and to the north of the central section were agricultural parts of the building. To the north, there would have been a possible pen for livestock; to the south, a sheltered space for growing grain.

The principle of a three-part division of the ground plan of houses is applicable to most of the LBK area. It may be modified in some areas, whereby, for example, the southern part is restricted to nothing more than a narrow entrance area. Should the house be differently oriented, the northern part, or its equivalent space, could be more variable. Recent archaeological findings in Harta-Gátőrház provide a clear argument for considering both the northern and the southern parts to be annexes of the house, each having an economic function. These economic functions apparently still had been retained even after the roofing of these spaces. The existence of enclosures attached to the central residential part of the house suggests that the economic functions of these house enclosures had been transferred gradually to the other individual parts of the house. The ground plan from the Harta-Gátőrház site and its interpretation can be regarded as a kind of preserved residuum of the original layout of the Neolithic holding.
Figure 1: Harta (Hungary). Linear Pottery house No.5. After Kustár, Lantos, Hajnalová, Sümegi (2014).
4 The Skill of Building Houses

T. Ingold studied the theoretical relation between technique and technology to a great extent. For pre-industrial society, he draws upon the notion of individual skill (Ingold 2007: 289-419) characterised by
five basic attributes. For our purposes, the key notion is that of a pre-industrial society, which Ingold identifies as hunters and gatherers. In most cases, he leans toward an interpretation that is the opposite of the traditional one. Technology did not originate as a result of the growth of primitive techniques; they are qualitatively different. They differ in their relation to society. Technique is an intrinsic part of society; while technology is outside society. In pre-industrial society, people are at the centre of all action: man works with a tool that would be inactive without him. Gradually, the man is pushed to the margin of society; he is only operating the machines that can work independently.

If we accept the basic thesis that in pre-industrial society, technique is one of the aspects of society (Ingold 2007: 318) linked to other social aspects such as kinship or ritual behaviour, it means we can use archaeology to study artefacts and learn about the social forms of prehistoric society. Individual skill is one of the markers we have observed in various types of artefacts. We have determined the quality of the main kinds of tools in proportion to the level of difficulty involved in the making of said tools.

In order to measure the quality of an artefact we used a score created from the combination of the degree of raw material quality used and the complexity of the suggested manufacture efforts (Pavlů 2000: 270). The tangible form was different for every artefact. The sum of average scores then represents the overall quality or economic value of the material products in one phase. Variability of these scores during the time surprisingly corresponded among different kinds of artefacts and showed their common increasing and decreasing modality. It was therefore possible to define six separate time intervals of the settlement development with unimodal modus, each (Pavlů 2014: Fig. 4.5) representing more real oscillating site history than the ceramic chronology itself.

Apparently, every house is an individual construction, the work of the members of one or two households that participated in the building of the house. The coefficient of the quality of the building (Pavlů 2000: Fig. 6.3.1) was measured using the combination of reconstructed volume of wood necessary for the post skeleton for the wall and the main construction. This reconstruction was done using the evidence of post diameters – where possible – and the supposed length of the beams. In this way, the coefficient is relative to the number of postholes evidenced for each house ground plan.4

Houses that have high-quality construction are amassed in all phases of the third interval (Pavlů 2014: Fig. 2.6: D), i.e. the period of the earliest development of a newly established settlement. By contrast, only 37% of buildings with the coefficient 8 have a single central part; there are two houses without a defined central part. The relation between the number of inhabitants and the quality of the building is a logical one because the more people cooperated, the more work they could do. This could be evidenced in the increased quality of some buildings with a single central part (14 in total). Counting only evaluable houses, there are fewer buildings with a lower coefficient than those with the highest coefficient (46.3% compared to 53.6%).

5 Outside and Inside

Anthropology, which in theory studies the history of architecture, introduces a number of specific concepts that serve to define the social aspect of human dwellings (Ingold 2007: 153-287). People dwell in a natural environment, and this environment becomes a part of their daily actions. However, people create their own cultural and social view of the world in which they want to live. People dwell in the landscape in time and on many levels of symbolic meaning that they attribute to their surroundings. Pre-modern society sees the world as anthropomorphic; it does not differentiate between human and natural or between local and global.

The basis of Neolithic settlement is, without a doubt, one dwelling, sometimes interpreted as a farmstead. Usually, it consists of the ground plan itself, holes along the long walls, and other pits or other sunken features surrounding the house within a distance of up to 25 m. We can document this situation in

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4 We count the reconstructed amount of wood for weaker constructions up to 3 m³, for more solid constructions over 3 m³. For weaker walls we count up to 1 m³ and for more solid walls over 1 m³. By multiplying the marks we get the score of 2, 4, 6 and 8. These limits were defined according to the structure of the frequency distribution of the coefficients.
the example of one isolated building from Frimmersdorf 122 (Classen 2005). Not all features listed by the author can be counted as part of one ground plan (Classen 2005, Abb. 2). By contrast, objects that share fragments from the same pots can be assigned to one house. These are smaller as well as larger pits; pots are concentrated in one of the larger pits to the south of the house. The concentration of finds in pits alongside the houses in Bylany was attributed to the fact that people might have worked outside their houses. Pits that are further apart from the buildings in settlements with a large building density are more difficult to assign to individual houses; therefore, it is only the pits alongside the houses that are counted in the building compound.

The existence of pits outside the ground plans illustrates that some of the inhabitants‘ activities took place outside. Apart from pits that were part of the construction of the house and apparently had been filled soon after the house was finished, there are also pits further from the house. We interpreted the model of the outside spaces of house 702 from phase 19 (Pavlů 2010). These pits initially might have been used for a variety of purposes, but given the concentration of finds, we can assume that there were specific activities carried out in specific sections of the outside area, especially the processing and preparing of food on a certain kind of fireplace (Pavlů 2010). The space in front of the entrance to the house, which we know from evidence was open and unbuilt on (Rück 2007: 115), was not in fact a working space for everyday activities. As seen in Harta, this space could have been a sheltered space for growing crops. The Neolithic economy was based on intensive horticulture (Boggard 2004: 164) and it supposes an accordingly large space in the direct vicinity of the house. This could also be the main reason for the loose organisation of the houses: at most settlements, the ground plans never overlap. Every new building seemed to need its free space. It could also be why most settlements had to shift after some time had passed. Recently, there have been discoveries of large built-up areas (Těšetice: Milo, Kazdová 2008; Vráble: Furholt, Bátora, Cheben, Kroll, Rassmann, Tóth 2014) that have been confirmed by geophysical research. The houses are built next to each other, but they do not overlap; they do not form any discernible groups, but resemble a row model of houses.

We have no direct evidence that the interior of the house was divided into sections. In Bylany, we only found rare embedded artefacts: one of them is a large storage vessel in the floor of house number 96 (Soudský 1960: Fig. 11-2), close to the wall of the central section. It was probably used as storage for the main source of alimentation: grain. Contrary to silos that served for storing seeds for future use, this home reservoir was probably intended for immediate use. The tank itself is a rarity and has no parallel elsewhere; its position within the large house of unusually solid construction and its function are also uncommon. It might have been a place where food was stored to be used by the community on special occasions. Other storage areas were small cellars that occasionally can be found underneath the northern part of the house. One such cellar was also found at house number 96 (feature 143).

6 Economic Activities

In the whole Linear Pottery area, the social principles of the structure inside the settlements could change, as well as the principles of mutual identification of social units that inhabited those settlements. Further west from the Rhineland and the valley of the river Aisne, the settlement Cuiry-lès-Chaudardes is divided into four, or may be only three sectors. The houses are more or less organised into rows, but the animal bones that have been analysed so far clearly divide the houses into three sectors according to the main means of subsistence. The bones found belonged to wild pigs, sheep, and cows. The first indicate that the means of subsistence of the inhabitants was hunting of wild animals; the second and third indicate that the inhabitants lived off domesticated animals. Wild animals‘ bones are mostly found at smaller houses, while domesticated animals‘ bones are found at larger houses. The proportion of houses that bred domesticated animals gradually increases. This specialisation in economic activities is interpreted as resulting from the specific identity of the inhabitants, which shows different origins of people in one community sharing the same settlement (Hachem 2011; 2000: 269). This classification was later confirmed by an analysis of grinding stones and by an analysis of the technology of pottery; however, there was no consequential link to pre-Neolithic artefacts (Gomart, Hachem, Hamon, Giligny, Ilett 2015: 244).
The initial notion that the size of a house corresponds to the number of its inhabitants needs to be replaced by a brand-new interpretation of Neolithic architectonic types. The coexistence of social units with different means of subsistence and economic activities in one space led to the formation of a very reliable community that was able to deal with expectable fluctuation of the upcoming development of Neolithic agriculture (Pavlů 2014: 87). It is archaeologically documented that these settlements account for several centuries’ worth of settlement in defined microregions. Some of the larger Linear Pottery settlements lasted for more than 400 years, even in conditions that did not guarantee a stable source of subsistence. Smaller settlements, which constitute the majority of all settlements, had to have been moved periodically to more convenient places. This phenomenon shows that the earliest Neolithic society had a high level of settlement mobility.

It also has been proven that individual houses with different economic activities also show the occurrence of different types of stone tools or certain non-standard forms of pottery making (Gomart, Hachem, Hamon, Giligny, Ilett 2015). This means that our existing notions of life in the Neolithic, which have so far only reflected our knowledge of agriculture in recent historical eras, must change. These are the beginnings of agriculture in the earliest period, i.e. 5600/5300 to 5100/4900 cal BC in the Czech lands. The two main concepts are the long-term and relatively high settlement mobility and the great variability in the earliest forms of agriculture. With regard to the several centuries of development that preceded this situation, it is impossible to rule out the possibility that this was a cohabitation of people with different genetic and historical origins. One group of inhabitants would still rely on hunting, while other groups would be characterised by the older way of farming based on the breeding of sheep, and also the newer way of farming based on breeding cattle. This hypothesis does not require the presence of direct artefactual evidence. After several centuries of Neolithisation, artefactual evidence could have disappeared already from the contents of assemblages of finds.

We believe that the notion of different genetic origins of inhabitants cannot be ruled out until such time as enough paleogenetic data are available. The biographies of individuals found at the burial site of Vedrovice already give some evidence of the fact that inhabitants had more than one genetic origin (Zvelebil – Pettit 2008). This new perspective on the inhabitants of Neolithic settlements leads us to refuse the notion of a uniform character of houses and their organisation into groups. On the contrary, there is an increasing amount of evidence showing a great variability of traditions that manifest themselves in different ways of settling, different means of subsistence, and variable organisation of Neolithic communities. This “diversity in uniformity” (Modderman 1988) has created a durable and stable system of coexistence of various forms in an unstable situation, which can be evidenced during the whole Linear Pottery era.

7 Different Activities in Bylany Households

The distribution of animal bones on a Neolithic settlement is still the primary direct evidence of the contents of economic activities and of the inhabitants’ way of acquiring meat. This is the case in an extensive and very detailed analysis of zoological materials from the CFF settlement (Cuiry-lès-Chaudardes), which is one example of the extensive literature on the topic that is available today. The premise of this type of study is finding well-preserved bones in the soil of the settlement, which we did at the CFF settlement. The obtained results then have a safe basis and can be generalised for other cases. In the case of the Neolithic settlement of Bylany, the data assemblage of biofacts needed for the study of economic activities and means of subsistence is very limited. This is caused by unfavourable conditions for preserving animal bones in the sediments of embedded features, which contain high amounts of acids.

The classification of animal bones was expanded and revised by L. Peške (Peške, Rulf, Slavíková 1998). Due to bad conditions for preservation, their number is relatively low. The assemblage contains 656 animal bone fragments coming from objects explored in the years 1953-1967. The total weight of those fragments is 19,953 g, but a large part (58%) comes from isolated embedded pits that cannot be assigned to houses or that are not properly dated. Only the remaining 42% can be attributed to individual ground plans of houses, and only a part of these houses can be classified into types. Therefore, we only have 33% of the total mass...
of biofacts to use as a basis for the assessment of the relation of individual kinds of animals to each of the three basic types of houses. This means the results we obtained are not as strong as if the number of bones would be sufficiently high.

So far, two sets of animal bones assigned to different types of houses attained from correspondence analysis of data have been published. The overview that each of them gives us differs; due to small amount of available data the result is susceptible to any small change in the data assemblage. According to the first publication (Pavlů 2013: 32, Fig. 1; Pavlů 2014: 125, Fig. 3.4.3a), type 1 houses are linked to pigs, type 2 houses are linked to sheep, and type 3 houses are linked to cattle. In the second revisited case (Pavlů 2014: 126, Fig. 3.4.3b) the results are different: type 1 houses are linked to oxen and sheep, type 2 houses are linked to cattle and sheep, and type 3 houses are linked to cattle and pigs. The limited numbers relevant for the houses from phase 19 are compared both from the point of view of the amount of the bones (in grams) as well as the frequencies of the bones (Table 1a, b; Table 2a, b).

### Table 1a: Bylany (distr. Kutná Hora), pottery phases 1 to 8. Amount of animal bones in house types. Data after Peške, Rulf, Slavíková (1998).

<table>
<thead>
<tr>
<th>House type</th>
<th>B.species</th>
<th>B.taurus</th>
<th>Ovis/Capra</th>
<th>Sum of grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
<td>62</td>
<td>24</td>
<td>92</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>488</td>
<td>8</td>
<td>496</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>79</td>
<td></td>
<td>79</td>
</tr>
<tr>
<td>Sum</td>
<td>6</td>
<td>629</td>
<td>32</td>
<td>667</td>
</tr>
</tbody>
</table>

### Table 1b: Bylany (distr. Kutná Hora), pottery phases 1 to 8. Frequency of animal bones in house types. Data after Peške, Rulf, Slavíková (1998).

<table>
<thead>
<tr>
<th>House type</th>
<th>B.species</th>
<th>B.taurus</th>
<th>Ovis/Capra</th>
<th>Sum of amounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>13</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
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</tr>
<tr>
<td>Sum</td>
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<td>26</td>
<td>3</td>
<td>30</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>House type</th>
<th>B.prim</th>
<th>B.species</th>
<th>B.taurus</th>
<th>Equus</th>
<th>Ovis/Capra</th>
<th>Sus scd0</th>
<th>Sus scf</th>
<th>Sum in grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>431</td>
<td>3</td>
<td>453</td>
<td>15</td>
<td>88</td>
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<tr>
<td>3</td>
<td>173</td>
<td>139</td>
<td>3001</td>
<td>44</td>
<td>160</td>
<td>100</td>
<td>3619</td>
<td></td>
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<tr>
<td>Sum</td>
<td>713</td>
<td>199</td>
<td>4656</td>
<td>44</td>
<td>248</td>
<td>100</td>
<td>6001</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2b: Bylany (distr. Kutná Hora), pottery phases 9 to 25. Frequency of animal bones in house types. Data after Peške, Rulf, Slavíková (1998).

<table>
<thead>
<tr>
<th>House type</th>
<th>B.prim</th>
<th>B.species</th>
<th>B.taurus</th>
<th>Equus</th>
<th>Ovis/Capra</th>
<th>Sus scd0</th>
<th>Sus scf</th>
<th>Sum of amounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>1</td>
<td>24</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>37</td>
<td></td>
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<tr>
<td>2</td>
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<td>1</td>
<td>31</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>37</td>
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<td>4</td>
<td>104</td>
<td>1</td>
<td>2</td>
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<td>1</td>
<td>8</td>
<td>14</td>
<td>2</td>
<td>203</td>
</tr>
</tbody>
</table>
The difference between the two analyses is the result of the inclusion of the assemblage from pit 743. According to the situation, this assemblage pertains to house 741, whose ground plan is disrupted by pit 708. In the first analysis, this assemblage was omitted. The assemblage contains 5 fragments of *Bos primigenius* bones, 7 fragments of *Bos taurus* bones, and 1 fragment of *Sus scrofa* bone. However, since this is a relatively big assemblage of bones, it was included in the second analysis along with house 741 (classified as type 1). Both results, although they are not unequivocal, show that the economic activities in different types of houses were neither uniform nor coincidental.

Therefore, we proceeded to do a new verification and new data analysis. A zoological determination of types of bones was published in 1998. It is important to make a distinction between *Bos taurus* and *Bos primigenius* because it can influence the determination of the ratio between hunted and domesticated animals. Bones of other hunted animals appear only sporadically, just one specimen at a time and mostly as isolated objects that do not pertain to any house. Furthermore, we drew upon the revised classification of house types published in 2014 (Pavlů 2014: 33-36). This time, we divided the analysis into two parts based on the chronology of the objects: the earlier settlement pottery from phases Bylany 1-8 and later settlement pottery from phases 9-25. The details obtained from the chemical analyses are not included in this paper.5

The amount and weight of bones from earlier phases are relatively small (30 pieces weighing 0.667 g). *Bos primigenius* bones were found only in isolated pits, which confirms the link of *Bos taurus* to type 2 and type 3 houses. Type 1 houses are linked to sheep and goat bones (Table 1a and 1b). In later phases, we have more data available (203 pieces in total, weighing 6,001 g). *Bos taurus* is also linked to type 2 and type 3 houses. Type 1 houses are linked to *Bos primigenius* bones (Table 2a and 1b). According to the results of this analysis, there are no significant differences between the behaviour of houses with parts added to the north of the house or to both north and south of the house. Both are linked to bones of *Bos taurus*. Small type 1 houses have a different context, which allows us to link them with the breeding of smaller domesticated animals, or with hunting wild oxen. Whether the inhabitants of these houses preferred hunting to breeding cattle cannot be unequivocally determined based on the available data. Even so, we can come to an important conclusion: single-part houses constitute residential buildings whose inhabitants engaged in different economic activities than the inhabitants of larger houses, at least as far as meat is concerned. Based on our analysis, there is no evident difference between the economic activities of inhabitants of two-part houses and those of three-part houses. We could presume the former would have a higher share of sheep and goats; the latter, a higher share of cattle.

8 Informative Contribution of Pottery Functions

A functional classification of pottery based on the analysis of markers that have been evaluated as suitable for a functional interpretation by ethnoarchaeological studies has been established for the Bylany settlement. These markers include the diameter of the mouth of the pot and the slant of its rim. These markers were combined with three basic types of shapes: bowls, “bomb-shaped” vessels, and bottles. The volumes of these shapes were also reconstructed. Most rim fragments could be classified this way; this classification provided different results for the earlier and later phases (Pavlů 2000: 120). The original classification was made for the whole assemblage of finds. So far, we have focused on a limited time period: pottery phase Bylany 19 (Pavlů 2010: Fig. at the page 253; Pavlů 2010: 78). This phase entails ten compounds of houses and six isolated pits in areas A and B. There are three ground plans of one-segment houses and three ground plans of three-segment houses. Three houses pertain to two-segment houses, but we can also add the rather long house 702 to this type. This house is characterised by a double central part (Pavlů 2010: 87).

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5 Based on preliminary results of the measurement of isotopes C and N, which has been made in connection with ORA, we can assume that there will be a difference between the details of the means of subsistence in earlier and later phases. This is confirmed by the shift of the whole settlement from section F to section B, as well as the architectural change of house types. A small amount of samples contained isotopes that allow us to assume that milk was processed in phase 8. By contrast, in phase 19 no similar data was obtained from any of the samples. (I must thank Ing. V. Mátlová at the University of Chemistry and Technology in Prague for this information.)
Even though the length of the house would allow us to compare it to the three-segment houses, the structure of the construction corresponds to that of two-segment houses without a southern part.

The distribution of formal functional shapes in relation to basic types of houses could show that the processing of food differed according to various economic activities. The original archaeological classification was depicted on the area of all classified finds in two chronological units, the earlier pottery phases (1-10) and later pottery phases (11-25). As a result, we had a higher level of classification into 5 sets, hypothetically interpreted (Fig. 3a) as groups of pots designed for water manipulation, for cooking, for serving solid and liquid food, and for storage (Pavlů 2000: 121). However, this classification is only authoritative based on an inaccurate analogy drawn from ethnoarchaeological studies; it has never been independently authenticated from purely archaeological contexts that are available to us.

For comparison, we had the opportunity to observe direct evidence of food remains in the form of molecules of fatty acids that were preserved as residues in the walls of pots (ORA – Organic Residual Analysis) on fragments from phase 19. We welcomed the possibility to use available chemical analyses. Those analyses provide independent data on which the archaeological classification of 14 SHAPE (SHApe-SIze) functional types and their initial interpretation could be tested. The goal of the analysis of lipids and isotopes was to compare independently obtained amounts of chemical compounds to the archaeological functional classification and to different types of economic activities represented by the three house types. Based on the interpreted distribution of functional forms of pots and house types within the multidimensional space of quanta lipid compounds, we can form a foundation for a hypothesis. The repeating structure of prevalent links between pots and houses indicates that the inhabitants tended to choose only certain sets of forms pertaining to their households. However, this hypothesis does not answer the question of why they would do that. If we insist on the original interpretation of five functional sets, we would see that at single-part houses, “water manipulation” pots from the first functional set prevail; at double-part houses, “cooking” pots from the second functional set prevail; and at three-part houses, big “storage” pots from the fifth functional set prevail. By contrast, the prevalence of smaller shapes of pots in three-part houses seems illogical.

The preference for other shapes is irregular at individual houses, although one would expect that according to our existing notions: the people in houses of different economic activities would cook in a similar manner. Only the fact that storage pots are found at three-part houses is logical, because the inhabitants of those houses would store crops they had grown. The second possible way to interpret these facts is to refuse the original formal interpretation as unverifiable from the point of view of preserved residues. We do not think it likely that our results would be significantly influenced by the formal structure (i.e. the amount and contents) of our samples.

The conclusion of the ORA carried out on pottery samples from Bylany settlement phase 19 was formulated in brief:

...Non-ruminant adipose fat was detected in 14 vessels whereas 24 of examined vessels contained also a contribution of ruminant adipose fat. Furthermore, as mixture of both fats occurred across all types of houses without any preference, it was not confirmed the ruminant-fat based diet should be bound more with the long houses and non-ruminant based diet with the middle or small houses, suggesting some divergence in a cultural status of inhabitants of the settlement. If we presume the inhabitants of long houses have bigger social status in Bylany and could breed cattle and pigs in wider range than other households, in the light of the results, they had to share their economies to support also their neighbours...

(Mátlová, Roffet-Salque, Pavlů, Kyselka, Sedlářová, Filip, & Evershed, in press).

Even though the results of the measurements of organic residues have not confirmed an unequivocal preference for the breeding of different kinds of animals at different types of houses, they can support the notion of different economic activities and means of subsistence of the inhabitants of different types of houses. If there were differences in the breeding of different kinds of animals at different types of houses, the results of ORA (Organic Residue Analysis) support another hypothesis: the inhabitants of the houses

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6 Here I would like to thank Ing. V. Mátlová and Prof. Vl. Filip (University of Chemistry and Technology in Prague) for their long-standing cooperation, and for providing me with data and information beyond my archaeological erudition.
had to share different kinds of crops among themselves. The meals they cooked must have been virtually the same in all houses.

The results of the total lipid extract and the different relation of functional types of pottery to the houses support the claim that there were different food preparation preferences in different house types. We have previously observed the relationship between the shapes of pots and the houses based only on the amounts in which they occur, and the relationship was more or less coincidental. According to this, food
was prepared differently in different types of houses. The invariable connection with certain shapes of pots (compare above) has shown that the inhabitants of one-segment houses preferred water manipulation and “dining,” the inhabitants of two-segment houses preferred cooking itself, and the inhabitants of three-segment houses preferred storage of food. Based on results obtained so far, we can prove that economic activities differed in different house types, but food was comparably shared in the same manner in all houses. However, the processing and preparation of food was different at each house type.

9 Concluding Remarks

We cannot rule out the possibility that we have touched upon an area called “culinary mythology,” which has been composed based on the study of the mythology of the diet of various native tribes on the American continent (Lévi-Strauss 2007). The author includes a number of references to ancient European mythology, which means we can take his conclusions as generally valid. This is by no means a permission to make simple analogies between the world of various American ethnic groups and the inhabitants of European Neolithic settlements. The author has come up with a certain universal structure he calls the “culinary triangle,” which is based on the processing of meat: raw – cooked – rotten. This triangle was then expanded to roasted – smoked – boiled (Lévi-Strauss 2007: 425). Finally, he considers expanding the triangle even further to the whole cultural system in all areas; not only culinary areas but other cultural areas as well. In our case, it is possible to use his general conclusion that roasting is older than boiling (Lévi-Strauss 2007: 416). It was only the invention of pottery that enabled people to boil meat in water, although we know that in different ethnographic situations, indirect boiling was already used before pottery was invented. The link between three-segment houses and pork and the relative absence of cooking pots could be explained by the preference for roasting meat. Different forms of cooking at two- and one-segment houses could mean that two-segment houses preferred beef and one-segment houses preferred mutton. We could go on, but we think that continuing to link forms to the food that was processed at different types of houses is beyond the possibilities of these analogies and hypotheses.

Settlement was not perceived analytically through the eyes, but synthetically through the ears, and hearing is subjective and unifying (Ingold 2007: 155). We cannot, of course, listen to any sounds around the houses in the Neolithic landscape. Based on some of the visible details of archaeological appearances around Linear Pottery houses, however, it seems we could see Ingold’s taskscapes.

English by R. Bičíková.

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