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Foreword by Volume Editor

We had our first contact with Brunn am Gebirge, Wolfholz in September 1989. In this month, a public motorway project was started, which had been planned for decades. The Viennese 'Außenring Autobahn A21' (also 'Alland Autobahn') is a motorway in eastern Austria and part of Europastraße 60. It connects the 'West-Autobahn A1' at traffic junction Steinhäusl with the 'Süd-Autobahn A2' at the junction of Vösendorf, where it joins into the 'Wiener Außenring Schnellstraße S1'. The former 'Brunner Feldstraße', also called 'S12', was redirected so that the bypass around the Theresienau farm, a part of the Brenner-Felsach estate, could enable a considerably wider roadway than the former one, which led over the farm. During the realisation of this building project, I first took note of the excavation work that started with a caterpillar in the northern area of Brunn am Gebirge, Wolfholz at the beginning of September 1989.

At first, I found the remains of Brunn site 1, some weeks later the findings from site 3 and further on in the road construction process, a few hundred metres to the south, site 2. The main part of site 3 was excavated very carefully only much later in 1999. The construction of a gas station enabled us to document a planned excavation. In total, twelve houses or parts of houses could be investigated in 1989 and 1999. A large part of Brunn am Gebirge, site 3, according to magnetic investigations, is still preserved, waiting for further explorations. The magnetic prospection showed us about 150 houses including all houses already excavated. Considering all areas, which could not yet be studied, it would be possible that the number of longhouses exceeds 200 or maybe even 250.

The chronological frame for Brunn is fixed with the sequence 2, 3, 4, (5), 1 and 6, with an absolute chronology from 5650 to 5050 calBC. Site 3 gave us the best-preserved longhouses from all areas of Brunn Wolfholz. Because its surface is completely flat, erosion did not destroy as much as on other sites at Brunn. Site 3 belongs to the Milanovce phase of the Linear Pottery culture (LPC).

Houses were classified after different quality depending on kind of destruction before investigation. There were 2 qualifications, fragmented houses and well preserved houses.

Alexander Minnich heard about Brunn during his studies in Regensburg and followed the research on this over the years. After coming to Vienna, he studied with Eva Lenneis. Then he saw the topic was still free and even thought about doing a dissertation during his master's degree. Luckily he did. He got to know me through my university courses. Then finally he visited me and proposed his PhD thesis title. He was the best qualified for this topic as he had done the MA thesis: Investigations into the topography of large linear ceramic longhouses, supervised by Eva Lenneis.

Preface by the Author and Acknowledgement

When I heard about the early Neolithic settlement of Brunn am Gebirge for the first time, I was still studying for a bachelor's degree at the beginning of my studies and was just gaining my first experience digging up LPC features in the vicinity of Regensburg, the Gäuboden and south-eastern Bavaria. At that point in time, I had no idea that I would later do my master's degree in Vienna and thus get closer to this promising settlement.

In my master's thesis I also dealt with a topic on LPC, namely the topography of the type 1 buildings, the so-called 'Großbauten', and had the chance to unearth some Early Neolithic features in Austria as part of excavations. During my master's degree, I kept an eye on the sites of Brunn am Gebirge and attended a course on quantitative methodology, where I worked with the excavator of these sites, OR PD Dipl. Ing. Mag. rer. nat. DDr. Peter Stadler and connected with him. For me it was completely incomprehensible why no one had published these houses in their entirety and so I quickly realized that I would devote myself to this task. The houses in Brunn am Gebirge have been waiting for me in a certain way all these years and after my master's degree it was time to publish the architectural history of these houses. I saw a great opportunity in this, as the settlement included both the oldest houses and, chronologically speaking, extended over almost all phases of the LPC. So, it seemed very promising to me to investigate architectural developments, if they existed, on the houses in this settlement.

For this, the complete photographic excavation documentation had to be digitised as a preliminary work, done by Peter Stadler. There were around 363 colour slide films for 2450 features, the profiles of which had to be processed for publication. At this point I would like to thank my two supervisors, ao. Univ. Prof. Dr. Otto H. Urban and Peter Stadler. Thank you very much for your commitment and help, without which the project would certainly not have worked so well. In addition, both gave me the opportunity to present the results of my work in lectures and conferences, as well as to work on various publications.

Furthermore, I would like to thank the team at the Institute of Prehistory and Historical Archaeology in Vienna, who created an environment for me in which I was able to work well and felt comfortable. Many thanks to Univ. Prof. Mag. Dr. Michael Doneus and Univ. Prof. Dr. Claudia Theune, who made it possible for me to do research at the institute as a research assistant and part of the uni:docs funding program. I would also like to thank Mag. David Zuser, who always helped me with all questions and problems related to the uni:docs. I also want to thank all the scientists with whom I have worked on publications and articles over the past few years.

Special thanks go to Univ. Doz. Dr. Eva Lenneis, who was always open to questions about the LPC. I would also like to take this opportunity to thank my family, especially my parents, who also helped me financially in the difficult time after completing my doctorate when I was lacking a regular income. Without you, I would definitely not have been able to carry out my scientific projects in the way that they have now been done looking back. I would also like to thank my environment and my friends who supported me during the sometimes strenuous and difficult phases of the dissertation. Special thanks also go to all the enthusiastic scientists from various disciplines with whom I have met over the past few years around the Neolithic sites of Brunn am Gebirge. Many thanks to Ao. Univ. Prof. i. R. Mag. rer. nat. Dr. nat. techn. Franz Ottner and his team from the Institute for Applied Geology (IAG) of the BOKU Vienna, who researched exciting questions about the daub from Brunn am Gebirge. Thanks also go to Ao. Univ. Prof. Mag. Dr. Andreas Rohatsch from the Institute for Geotechnical Engineering at the Technical University of Vienna and Ass. Prof. i. R. Dr. Michael Götzinger from the Department of Mineralogy and Crystallography at the University of Vienna, with whom I was able to experience an exciting field trip of the sites. Thanks also go to Sepp Albrecht, with whom I was able to have some very interesting conversations and discussions about the architectural peculiarities of the LPC and who sent me his studies by post.

Preface by the Author and Acknowledgement

Another person I would like to thank is Ao. Univ. Prof. i. R. Dipl. Ing. Dr. techn. Erich Lehner from the Research Department of History of Architecture and Building Archaeology at the Technical University of Vienna. Thank you for the exchange about architectural questions, solutions and reconstructions. In addition, I would like to thank Priv. Doz. Mag. Dr. Karina Grömer from the Natural History Museum Vienna, who gave me access to the stored materials and enabled me to work openly.

Many thanks also to my editors Peter Stadler and Nadezhda Kotova, to my English editor Kayleigh Saunderson, who corrected my manuscript very well and to Andreas Weihs for the final layout.

In addition to an introduction with access to the topic, the introduction describes the current state of research. This is supplemented by further contributions on the various points within the dissertation. I created the work to the best of my knowledge and belief. The control and overview of such a large amount of data, which forms the basis for structured analyses of the architecture, is not that easy and so I myself am responsible for all errors.

The development process of this work was associated with some problems, as the Covid 19 pandemic led to a total closure of the universities and libraries in Vienna, especially in the first half of 2020, and some studies could therefore no longer be carried out as part of my dissertation. This also includes, for example, studies on the shadows cast by buildings, as well as the interior lighting, which would have been considered as part of the LNF (Lange Nacht der Forschung) with the Lightlab of the Danube University.

Vienna, 12.08.2021

Chapter 1. Introduction

1.1. State of Research and Access to the Topic

The beginning of the Linear Pottery culture architecture is closely connected to the concept of the formative phase of the LPC, with which the oldest phase of the LPC begins. This term was introduced about 20 years ago¹ and has since been accepted in research in the Central European Early Neolithic. A number of studies on this complex subject are currently in print.² The actual area of origin of this culture lies in the area between southwestern Slovakia, Transdanubia (northwestern Hungary) and Lower Austria³, but the archaeogenetic studies have shown that the Neolithic population of Europe genetically descends from the Anatolian farmers.⁴ This is also confirmed by the analysis of the LPC graves⁵ from Brunn am Gebirge. Here, two individuals had both Mesolithic and Anatolian genes. So somewhere on the way to Brunn am Gebirge in Austria there must have been a mixture of these different groups. A third individual showed almost all characteristics of Anatolian ancestry.⁶ New studies have shown that there were certain migratory movements even before the Neolithic expansion⁷. These are mainly mesolithic migration movements, which can be traced using the analysis of the trapezoidal microlithic horizon and the regular blades. The so-called 9.2 ka calBP or 7.2 ka calBC anomaly probably played an important role in driving the

spread of this technology⁸ from Asia to Europe.⁹ The previous culture of the LPC is the Starčevo culture (see Figure 1), as the ceramic analyses show. One of the most famous settlements of this culture is the settlement of Alsónyék in Sárköz (SW Hungary), which was settled between 5750 and 5550 calBC. Although it was not possible to document postholes here, but rather huge amounts of burnt daub, these were the first buildings that were oriented to the north, like the longhouses of the LPC.¹⁰ Alsónyék can therefore be seen as a pioneer of a new culture that formed around this period. However, the problem here is the assumption that there has been a continuous change in house orientation within the LPC. Until now, the focus has been on the alignment of the houses in the longitudinal direction, especially in relation to the direction in which the so-called northern parts point. The houses in Brunn am Gebirge show, however, that the builders were less interested in erecting the houses lengthways to the northwest or northeast, but rather focused on the southern parts, either facing southwest, south or southeast. If one pursues this idea further, it is noticeable that the three central longitudinal rows, in contrast to the transverse rows, were constructed uniformly straight. The reason for the changing orientation of these three longitudinal rows could be a different time at the construction of the individual buildings, which could have something to do with the soil conditions and the frost¹¹. In addition, the naves were designed to be of different widths.

¹ See Bánffy 2004, 308; Bánffy/Oross 2010, 257; Stäuble 2005, 214.

² Bánffy/Höhler-Brockmann 2020.

³ See Bánffy/Oross 2000, 262; Bánffy 2013, 117; Gronenborn 1998, 193; Lüning 2016, 273; Bánffy/Höhler-Brockmann 2020; Marton/Oross 2012, 220 – 239.

⁴ Nikitin et al. 2019, 1.

⁵ So far, only settlement burials have been found in Brunn am Gebirge, a cemetery has not yet been proven.

⁶ Nikitin et al. 2019.

⁷ See Gronenborn 2017, 113 – 128.

⁸ Meaning pressure knapping techniques.

⁹ See Gronenborn 2017, 113.

¹⁰ Bánffy/Höhler-Brockmann 2020, 1.

¹¹ An attempt has already been made to determine the time of construction of the individual houses via the orientations of the narrow sides and the position of the sun (see Kotova 2019). This theory will be discussed in more detail later in the text.

In site 3, for example, houses appear for the first time, the east naves of which were made wider than their west naves. This leads to different roof areas on both sides of the house and possibly also to different roof pitches. The orientation of the long sides, especially the east side, seems to have played an important role here, because otherwise these buildings would not have been designed in this way. Within a relatively short period of time, the LPC then advances into new areas that include areas in Austria, Poland, Bohemia and Moravia in the

Czech Republic and Germany.¹² It should be noted, however, that hunters and gatherers already stayed in one place or in a region for a long time if, for example, there was a supply of food resources and it was thus possible to stay in one place longer.¹³ A special feature of the Mesolithic groups seems to have been the fact that they were '(...) either moving as a whole group, or sending out mobile taskforces while the majority of the group resides in larger base camps.'¹⁴

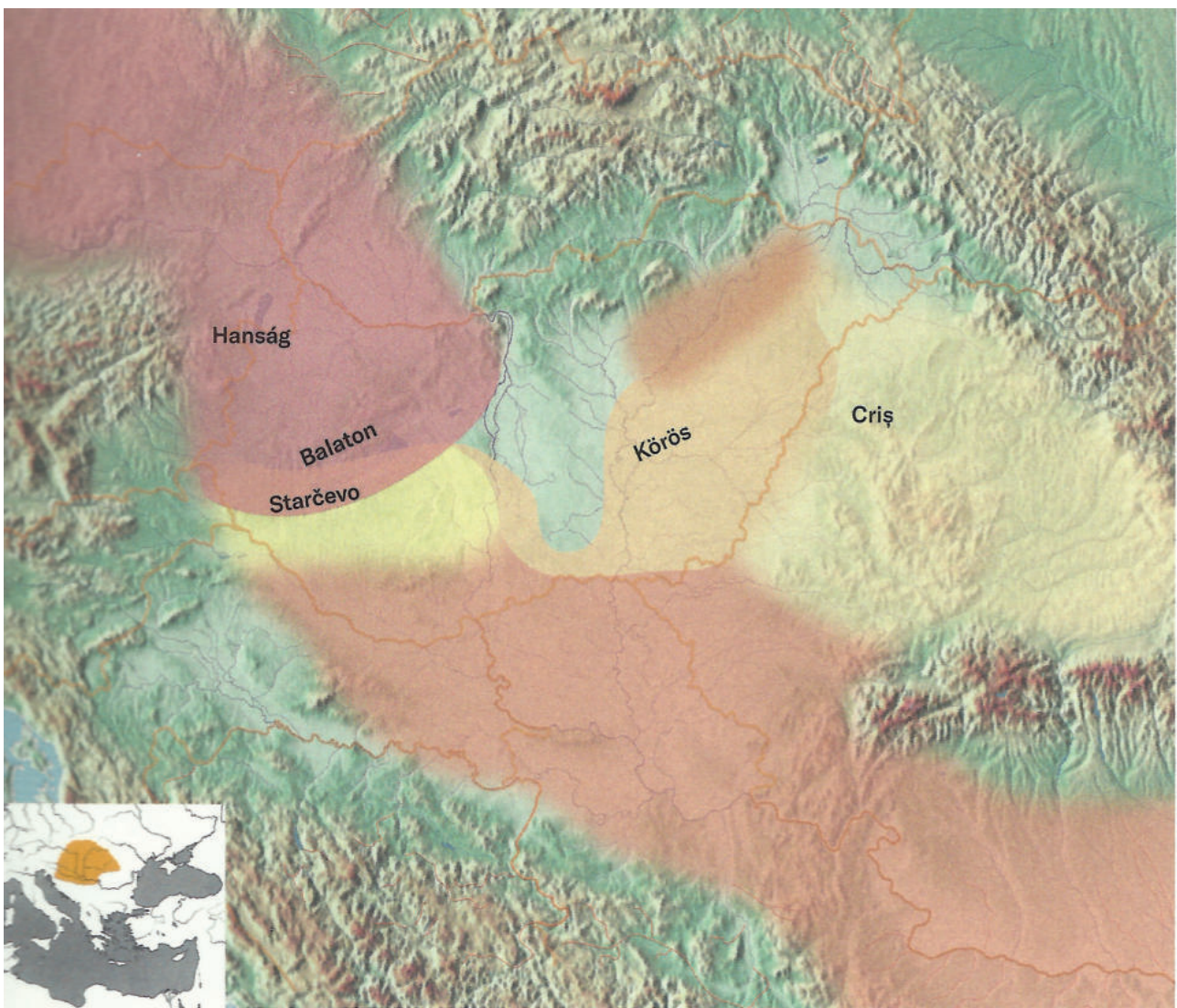


Figure 1: The cradle of the LPC and the complex of the Starčevo-Körös-Criș culture (according to Hofmann et al. 2019, 114; 3).

¹² See Bánffy 2013, 117.

¹³ See Duerr/Seidl 2017, 134.

¹⁴ Gronenborn 2017, 117.

The interesting thing about the formative phase is the fact that both the common settlement model with ovens, working and storage pits outside the houses as well as the typical architecture with longitudinal pits flanking both sides of the house already exist during this phase.¹⁵ But it also shows that the houses of the oldest phase of the LPC cannot be classified in the system¹⁶ that is uniform for the rest of the house development¹⁷, or that classification is only possible with uncertainties. The Szentgyörgyvölgy-Pityerdomb¹⁸ settlement is a good example of this. Although the inner posts are missing in some house floor plans (a circumstance that can certainly also be explained by erosion processes), the houses of the earliest phase of the LPC already have the typical inner structure consisting of three longitudinal rows¹⁹ that carry the load of the roof. In the settlement of Brunn am Gebirge on the outskirts of Vienna in Lower Austria, the earliest houses were built in the typical LPC scheme, which was used until the end of the LPC and then, at the beginning of the Middle Neolithic, changes into new house forms with a further developed architecture. In this context, the continuous development of the load distribution from the inner construction to the walls from the Early Neolithic to the Middle Neolithic should be mentioned, as Stäuble²⁰ correctly recognised. This transition to a further developed form of architecture with houses that are composed of different parts with different functions can also be traced back to a change in the way the first farmers worked. Modderman and v. Brandt's typology, which divides the longhouses into certain types, cannot, however, be applied to

the houses in Brunn am Gebirge. The reason for this is, on the one hand, the fact that these houses are much older than the houses in the Rhineland or the Netherlands, for which this typology was originally developed, and on the other hand, the use of this typology for floor plans with a poorer state of preservation is problematic. A critical examination of this topic can be found in the publication by Stäuble²¹. The houses of the first phase of settlement in Brunn am Gebirge are relatively homogeneous in their dimensions, while a wider range of shapes began, especially from site 3 onwards. During this settlement phase, the first trapezoidal houses were built, with double posts in their southern parts, which according to the current state of research are still associated with storages²². 'At the same time, the varying nitrogen isotope ratios could be a result of oscillating environmental conditions during the Formative phase of LPC leading to the failure of initially maladapted domesticated plants from semi-arid Anatolia to thrive in the continental climate of central Europe and causing early European farmers to periodically rely more on animal protein rather than agricultural crops.'²³ So it can be assumed that during the primary settlement there was no intensive farming or livestock farming and that this only started step by step during the settlement of Brunn am Gebirge. The grain residues and storage pits that were able to be documented in Brunn all come from the last settlement phase, in which even small buildings outside the settlement (site 6) were able to be identified that are addressed as potential storage structures for hay, leaves or straw.

¹⁵ See Bánffy 2013, 129.

¹⁶ Meaning the typology of Modderman and v. Brandt (see below).

¹⁷ See Stäuble 2005, 214.

¹⁸ See Bánffy 2013, 129 – 126 and Lüning 2016, 273 – 289; both with different interpretations of the houses and settlement structures.

¹⁹ In LPC research, five rows are often specified. In addition to the side rows of central posts and the row of ridge posts, the two rows of walls are also included. Since the walls, if they were constructed with posts, wickerwork and clay, were, in contrast to the three central longitudinal rows with different post spacing, built in different ways and are also often poorly preserved, the focus is on these central longitudinal rows.

²⁰ See Stäuble 2005, 212.

²¹ Stäuble 2005, 16 – 20.

²² The interpretation of double or multiple posts as the only possibility of constructing a second floor within a house is currently still widespread and needs to be discussed, since even without double posts it would be possible to build cross connections with the help of tenons. In addition, there are southern parts in which a disproportionately large number of posts within the postholes was documented. Such a large number (for example more than two posts per pit) is actually not needed to build a second floor and must therefore be questioned.

²³ Nikitin et al. 2019, 7.

A pit was also documented in the immediate vicinity, from which more than 12,000 grains of einkorn wheat and emmer were recovered.

A closer look at these buildings of the Brunn settlement, however, reveals that, compared to all later longhouses, they were constructed wider and with more massive postholes, a fact that perhaps has to do with the primary forest that was still present at this stage. The houses of this early settlement phase are therefore wider, which certainly affected the roof pitch. Further post distances mean that the entire roof slope was probably rather flat, otherwise the row of ridge posts would have to be constructed exceptionally high, assuming a 45° inclined roof, or the lateral middle posts would have to be constructed relatively low. Roofs with a uniformly steeper construction were probably only constructed after this phase. A lot of dis-

cussion about the life of a longhouse is still needed. As Hoffmann and Smyth correctly noted, this discussion is often not easy because it can be difficult for us archaeologists to keep track of all points of view in research across the entire range. However, this also applies to the entire LPC complex, which is often referred to as the best-researched culture of Central European prehistory. However, many new studies prove the opposite and at the moment of these lines being written, new trains of thought are being made that could lead to further results, and so I agree with Anna-Leena Fischer's conclusion²⁴: The research is far from over, and right now we have to handle the massive information from the last decades of excavation campaigns. In this context, the term 'mosaic landscape of scholarship'²⁵ has certainly been chosen correctly.

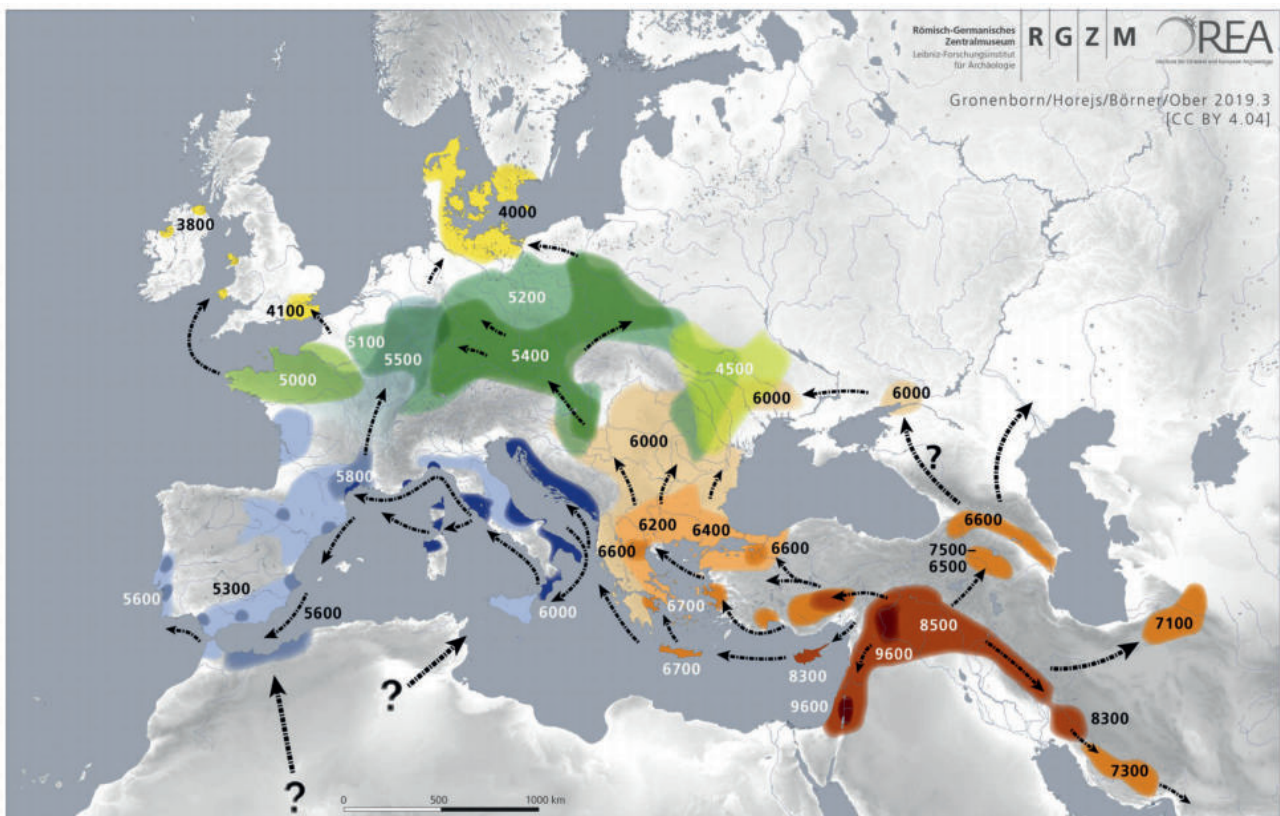


Figure 2: Map of the spread of the Neolithic way of life from the Middle East to Central Europe (Hofmann et al. 2019, 113; 2).

²⁴ See Fischer 2020, 206.

²⁵ Hofmann/Smyth 2013, 1 – 2.