

Historic cob structures in Moravia

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ABSTRACT: Cob has a long and continued history throughout many parts of the Danubian region, to which Moravia as a historic land of actual Czech Republic belongs. The traditional cob including two basic variants of stacked or coffered bread-shaped pieces - *války* was the predominant technique in Central and Southern Moravia especially in Haná and Znojmo regions. Besides, these two techniques with many regional variations, several examples of pitched-forked (tooled) cob were identified. Appreciated by generations of art historians and ethnologists for their significant aesthetic qualities *války* represent today perhaps the most vulnerable part of our earthen architectural heritage. The objective of this paper is to present our actual knowledge of cob in Moravia enriched (through surveys of the last decade) with a number of findings dating from 16th to 20th centuries.

1 INTRODUCTION

The building construction manifestations of Moravia as one of the historic Czech countries are similar to those of other Central European neighboring countries (Upper Austria, Slovakia, Hungary), with whom we share also the history of the Habsbourg monarchy and its interventions in construction since the half of 18th century.

We encounter here two basic groups of historic structures, that can be referred to as an „unburned clay masonry“:

- structures of massive earthen material to which belong stacked or coffered bread-shaped pieces - *války*, pitched-forked (tooled) cob and rammed (moist fresh) earth
- structures of sun-dried bricks (adobes) shaped by hand or by using molds laid with mortar

These techniques were used for both loadbearing and non-loadbearing walls. While adobe bricks can be found practically all over the territory of actual Czech Republic, the first group of techniques is present practically only in central and southern Moravia.

The presented paper is mainly based on a systematic inventorial works of the Association of the village and small town (SOVAMM) and on series of historic structures analysis that were elaborated by its members, and the investigation of historic earthen materials carried out within the project conducted in 90th by Jan Kříž (Kříž & Vorel 1998). The earthen techniques were recently studied in the framework

of several research projects, mainly the project *Technology of traditional clay architecture in Moravia and its relationship to the Central Danube region* focused on the possibilities of transfers and reconstructions in open-air museums, granted by the Czech Ministry of Culture (NAKI project DF11P01OVV015 2011-2015) and the *Zpátky na Zem / Down to Earth - Earth Building in Central Europe* (transnational cooperation Austria - Czech Republic project Nr. 7AMB16AT019 2016-2017).

2 EARTHEN BUILDING MATERIAL

Already the analysis of Moravian historic earthen constructions carried out by Jan Kříž (Kříž & Vorel 1998, Syrová et al. 2000) proved that the predominant earthen building material in Morava valley was loess, which, thanks to its properties was used for all traditional techniques with no need of additives. The work with loess is easy, which was probably its main advantage for the builders. Its negative aspects as chalking surface and water sensitivity, were mitigated by structural details traditionally used as protection of the surface of the walls; i.e. clay or lime plaster or tilework. In practice, using only non-destructive historic structures analysis and inventories that means, that it is difficult to identify the type of historic earthen technique used in the building.

3 HISTORIC MORAVIAN COB TECHNIQUES

Among the historic structures with massive earthen walls the stacked earth structures are, most archaic, if not most ancient. All variants of this technique have several common properties. The walls are built in successive technological layers from earthen material in its plastic state. The amount of vegetal fibres mixed with earth and water may be very low if loess is used in the construction. None or simple tools are used. No formwork is needed, but it can be used to simplify the construction.



Figure 1. 3.1 Pitched-forked cob construction in Žitný Ostrov (Rye island) in 1950s (Credits Václav Mencl)

3.1 Pitched-forked (tooled) cob

Earthen walls with pitchfork, which are for most of our ethnologists and historians of architecture the only representatives of staked earth construction in Danubian region, can be found mainly in neighboring lands. Known as *WellerBau* in Saxony, Saxony - Anhalt and Thuringia in Germany (the term *WellerBau* being used in German for stacked earth in general) (Ziegert 2003), *gesatzte Mauern* (*g'satze Mäuer*) in Lower Austria and Burgenland (Meingast 2014), *rakott sárfal* (*fecskerakásos sárfal*) in Hungary (Novotný 2014).

This technique came to the Czech literature through the work of architect and historian of art Václav Mencl (1905-1978), who uses for the technique the term *lepenice*, used from Middle Ages in Bohemia for daubed earth, or *nakládání*, derived from Slovak *vykladanie*. As a heritage curator in Slovakia he had in the 1950s on Žitný ostrov (Rye island in the Danube river) the opportunity to observe and document this techniques and traditional know-how by a series of photographs (Fig. 1). Thus he describes the construction: „If one enters one of the Hungarian farms around Komárno and Nové Zámky at the moment when the construction is in progress, then the first thing, he sees, is the courtyard transformed in a great pool of mud: Its entire surface is covered with a thick layer of black earth, extracted out into the loess dunes and mixed with

bullets and straw to reinforce the structure. The cattle are trotted on this earth, trample it and work with their hoofs; the wet mixture is then placed in a wheelbarrow and mounted with the aid of a pitched-fork. The walls stacked up to the top are covered with straw and left to dry for two years. Then the surface of the walls is cut with an ax and small openings are pierced (the large ones were built at the same time as the walls) and it is only afterwards that the roof is erected and the walls rendered. Thus formed wall is incredibly strong, warm and durable, if it is not threatened by water.“ (Mencl 1980)

According to ethnological surveys, peasants in the southern regions of Slovakia considered the pitched-forked cob much better than *nabíjenice*. It is hard to say today which technique this comparison refers to as the literature very often confuses two techniques of construction characterized by the use of formwork: rammed (moist fresh) earth and coffered pressed bread-shaped pieces (*války*).



Figure 2. Wine cellar built with pitched-forked (?) cob in Šatov (dist. Znojmo) (Credits Zuzana Syrová 1995).

If the pitched-forked cob existed also in Moravia, the know-how had disappeared here before the first ethnological investigations of the 19th century. The hazards of conservation made us possible to observe on the wine cellars of the small market-town Šatov (distr. Znojmo), which had partially lost their coatings, the structure of the walls with rounded corners constructed in several layers with the traces of treatment of the surface by a sharp tool (Fig. 2). The earth used in this constructions seemed to be mixed with relatively large volume of straw. (Syrová & Syrový 2007). These buildings could be dated in the middle of the 18th century. Inventoried in 1995, both of these cellars already disappeared. Martin Novotný interpreted as pitched-forked (?) cob the walls of the granary of the farmhouse no. 5 in Dobříčice (distr. Přerov) (Novotný 2013, 2014). In other cases of the walls of monolithic appearance, that we know from Znojmo, but also from Haná region, it is often uncertain if it is not one of the variants of *války* techniques.



Figure 3. Garden façade of a barn with *války* left without plaster in Hruška (distr. Prostějov) (Credits Zuzana Syrová 1994).

3.2 *Války*

The term *válek* (pl. *války*) designates a piece of building material fashioned from plastic earthen material to be used in cob walling. Traditional vernacular terms and therefore also the ethnological literature often confuses the two main *války* techniques: freshly stacked (piled) on top of one another and the constructive variant in which the formwork is used. Josef Kšír (1892 - 1978), heritage curator in Haná region in 1940 - 60, was the first who tried to distinguish them correctly. He speaks of *války hroudové* (lumps or clods) and *války válečkové* (rolls or rollers) (Kšír 1956). The two adjectives (*hroudové* and *válečkové*) were added and invented by Kšír.



Figure 4. *Války* structure of the remains of cottage with partially conserved plastering of interior surface of the walls and visible piece of wood that served as reinforcement of its corner; Hruška (distr. Prostějov) (Credits Zuzana Syrová 2000).

In the Slavic languages of the Danube region the words used for the all construction variants are the same: *válek* or *vál* (in Moravian dialects also *kochval*, *krupec*, *šulec*) (Frolec & Vařeka 2007). From the point of view of etymology the word *válek* is derived from the verb „*váletí*“, signifying here kneading and rolling of the earthen dough (Machek 1968, Mjartan 1970). The Hungarian word *valyog*, used for loam and adobe, according to some authors

should have the same old Slavic roots and the nomadic Hungarians (or Magyars) who came to Pannonia at the end of the 9th century adopted this term as well as many other words related to the construction of the Slavic population of the Great Moravia (Mencl 1980, Mjartan 1970). In Hungarian literature (and we can only regret, that in the articles published in English, French or German by hungarian experts the original terms are missing (Buzás 2011) term *csömpölyeg* for *války* and *gombóc*, *gömbölyeg* for their „ball“ variant can be found. From Lower Austria we know terms *Wuzel* / *Wutzel* (also *Wuzelmäuern* or *Batzbau* in Austrian dialects) (Meingast 2014). German term *Lehmbrote* is linked to the modern technique used in Westfalia during the interwar period (Ziegert 2003, Novotný 2014).

3.2.1 *Stacked cob structures*

According to contemporary descriptions that we have available primarily from the first half of the 20th century, the earthen material was usually kneaded and then shaped into a form of elongated bread or cylindrical roller with dimensions of 25-35 cm x 10-16 cm approximately. Their surface absorbed often straw and chaff sprinkled on the ground on which they were prepared. They were used directly or prepared one or two days before construction and then simply plunged into water to ensure their better adhesion. Typical practice was diagonal laying with an angle of up to 45°. Direction could be alternated in next course (Fig. 3) or changed after five or six courses (the layer corresponding the work of one day). The decorative value of this structure is not negligible and it naturally attracted the curiosity of ethnologists and art historians. One of the best known descriptions of the traditional *války* construction of the Vyškov region gives J. Zháněl, doctor and amateur ethnologist, cited by Václav Mencl:

„Shortly before the harvest in 1903 the wooden barn of the Přibilík family in Pačlavice no. 48 fell down. There was not time enough to make vepřovice (sun-dried bricks), used at the time for most constructions, and the barn had to be finished and prepared for harvested unthreshed cereals. So they decided to build with války. The earth was taken directly on site - still you can see a pit next to the barn. The surface black soil and the yellow clay soil is used without making the difference between the two, which gives the variety of colors of the courses. The water is added and they left the earth to rest until the morning of the next day, so that the water is absorbed slowly and the earth is not too wet. In the morning the earth is trampled to a paste consistency; at the same time fibres are added, usually barley straw. It is mainly the work of women. The quantity of mud required for one válek is simply estimated from experience. It can be separated from the mass of earthen mixture by a large hoe (graca) or by both hands. People work on bended knees. The separated

piece of mud is kneaded on the ground, sprinkled with balls, in the shape of a válek, in the same way as an elongated bread is kneaded. Válek is approximately 30 cm long and 15 cm thick. In general, a stone basement is used. Usually three války are laid side by side, giving a wall about 50 cm thick. First two external války are placed and the third then pressed in between the two. They are laid wet, without mortar, as they stick together themselves. The horizontality of the courses is controlled by means of a cord. It is especially difficult to keep the same inclination of války, which is an appreciated know-how. Usually one course is built per day. One day of drying is sufficient so that the wall is not deformed. The construction of the corners and the heads of the walls on the sides of the gate is interesting, because války are laid horizontally there. Any surface inequalities are cut after drying with an ax. The work can continue only when the weather is nice, in case of rain the crown of the wall covered with straw. The construction usually consists from 16 to 20 courses, which correspond to the working days.“ (Mencl 1980)

According to description of one of the observers of války construction in Němčice nad Hanou (distr. Prostějov) in 1920 the external válek was pressed by hand after been laid in the wall, so that its footprint became triangular. The intermediate války were prepared already as conical (Kšír 1961). Martin Novotný had the opportunity to disassemble similar structure during the demolition of a barn of the farmhouse no. 13 in Tištín (distr. Prostějov). According to his findings all války were shaped as triangular (Fig. 5). He presented an experimental reconstruction of this structure on the exhibition Earth Architecture in Moravia in Strážnice open-air museum (Novotný 2013, 2014).

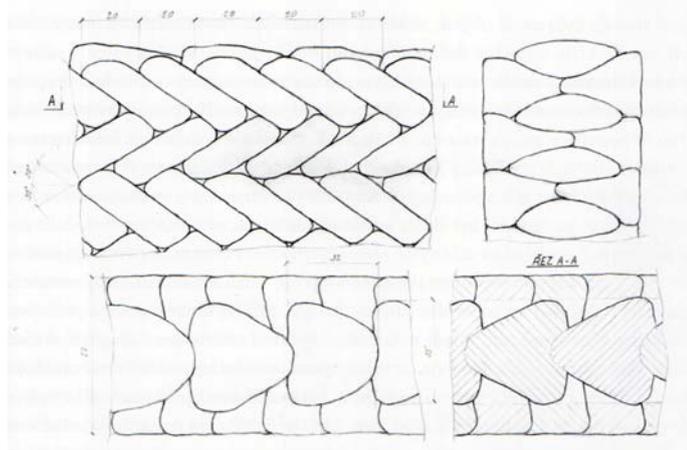


Figure 5. Documentation of triangular války structure of the barn in Tištín (distr. Prostějov) (Credits Martin Novotný 2012).

The inclination of the rollers prevents their possible sliding, but they can even be arranged in horizontal layers. It is especially the case of the repairs and the raising of the walls by cylindrical „rollers“. Several cases of the walls built entirely from such

cylindrical války, when one course was laid lengthwise and the next in a transverse direction, were documented. We know them from our personal observation of barn walls in Hruška (distr. Prostějov) (Fig. 6).



Figure 6. Remains of the barn built with cylindrical války in Hruška (distr. Prostějov) (Credits Zuzana Syrová 1995).

Ball-shaped pieces known from Hungary (Buzás 2011, Mileto et al. 2013) seem not to have been used in Moravia.

Field work in recent years has brought a series of cases of války walling from ordinary lumps or clods in Haná and Znojmo region (Novotný 2014, Syrová 2014) which, according to the literary descriptions should be used only with formwork (Kšír 1961). The problem in their identification lies of course in fact, that we have rarely chance to document a surface of a wall, that is not degraded, and see the traces of treatment of the surface by a sharp tool.

It should "pointed out that, even if the bare surface appear to be beautiful to our aesthetic feelings, herringbone války structures used to be cut and plastered, at least in case of facades facing the public space or exposed to prevailing winds and rains.

3.2.2 Coffered cob

The technique coffered války was introduced in the Czech ethnographic literature by Antonín Václavík in his monography about the Slovak village of Chorvátský Grob (Václavík 1925). It was mentioned also in other sources like the village chronicle of Příkazy (distr. Olomouc). The detailed description of

coffered *války* was brought by Josef Kšír from the Haná region in central Moravia (Kšír 1956). This technique, was widely used also in Znojmo region in south-western Moravia and in the neighboring regions of Slovakia, Lower Austria and Hungary (Syrová & Syrový 2007, Buzás 2011).

The hand made *války* were in plastic state thrown or simply put in the formwork and compressed to join together in a compact wall. The tools used for compacting and formworks were same as those used for rammed (fresh moist) earth (Syrová & Syrový 2012).



Figure 7. Remains of barn built with coffered *války* in Míšovice (distr. Znojmo) (Credits Zuzana Syrová 2016).



Figure 8. Detail of the cob structure of the Míšovice barn. (Credits Zuzana Syrová 2016).

In the context of the use of formwork it must be emphasized that this construction variant can be faster and that the boards can simply prevent the deformation of the wall during construction and drying. If only one course of *války* is laid by hand per day, the height of the layer constructed with formwork corresponds to 6 - 8 courses (Fig. 7-8).

Války compacted in formwork show significant deformations. In several documented examples, mainly from Znojmo region (e.g. barns in Slup, Míšovice or Želetice) the effort to obtain a regular structure of inclined courses on the surface of the wall can be shown. In these cases of *války* we can observe imprints of wooden boards against which they were pressed. If the interior surfaces indicate at the same time the technique of stacked *války* laid in the wall by hand, we can assume, that the wooden planks were used only in exterior to obtain faster a perfect flat surface, that did not need any additional treatment by cutting.

3.3 Mixed structures

Structural variants, in which *války* are used mainly as non-loadbearing are numerous in Danubian region and they were described recently with focus on Hungary (Buzás, Mileto). From south-eastern Moravia and adjacent parts of Slovakia we know combinations of *války* and adobe. Structural support of wooden wattle or wooden poles was documented mainly in Slovakia (Mencl 1980, Mjartan 1970). Josef Kšír gives a detailed description of the coffered *války* covered with „fur-coat“ of thick earthen layer hung on wooden nails (*ježkování* – „hedgehog“), similar to earthen coating corner-timbered constructions (Kšír 1961, Syrová & Syrový 2013)

4 PRESERVED BUILDING STOCK

Cob structures can be traced back to the end of 16th century, which seems to be the period when the massive earthen structures start to replace previously dominant wooden structures even in vernacular architecture. Older archaeological findings in Moravia were practically all interpreted by archeologists as rammed earth as they knew them from ethnographic descriptions (Syrová & Syrový 2007). Pieces of clay clearly interpretable as *války* used as infilling of wooden structure of village house from 16th century were found in Slovak Chřába (Ruttkay 1998). Without micromorphological analysis we are not able to identify if the massive earthen walls of the lower chamber of house no. 115 in the market-town Pouzdřany (distr. Břeclav) can be classified as cob or as rammed earth. The horizontal wooden pole used here as reinforcement of the wall is undatable by the means of dendrochronology, but the stratigraphy of the construction enable its relative datation

before 1607. *Války* or *Wuzel* structure was discovered during the reconstruction of Brandlhof in Radlbrunn (Lower Austria) open as cultural centre in 2005. Unfortunately the methods of building archeology were not applied during the reconstruction works, so that the age of cob walling may not correspond to the published date 1590.

In Moravia the oldest identified cob structures were built with coffered *války*. They were used for the construction of chamber-granaries of archaic houses with porch-*žudr* dating from 17th–18th centuries in Haná region and wine cellars dating from the same period in Znojmo region. The vast majority, however, dates from the 19th century, which is as in the case of other traditional Moravian earthen building techniques also one of the consequences of construction regulations and interdictions of use of wood. (Syrová & Syrový 2014).

5 CONCLUSIONS

Our present knowledge is (through surveys of the last decade) enriched with a number of findings of variants of cob structures dating from 16th to 20th centuries. It is paradoxically neglected maintenance of farm buildings such as barns and also abandoned farmhouses, which lose their original plaster, that allows us to identify a significant number of cob structures. The exact specification of used construction method is often difficult; the need of use of the exact methods of building archeology seems to be more important than in the past as the preserved examples of cob structures represent perhaps the most vulnerable part of our earthen architectural heritage. There is a need of comparative studies and international and interdisciplinary cooperation with the disciplines of history of art, buildings and classical archaeology, structural analysis. We hope that we will be able to define these needs in transnational cooperation Austria - Czech Republic project whose aim is to become the basis for a wider Central European network. For now we try, in the framework of this project, to gather available information from this region.

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