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FORTIFICATION OF THE SUBURB OF THE GREAT MORAVIAN STRONGHOLD AT MIKULČICE-VALY

Abstract. Fortification of the suburb of the Great Moravian stronghold at Mikulčice-Valy

The aim of the paper is to present the fortification of the suburb of the early medieval central agglomeration of Mikulčice-Valy. Methodically seen, the work is based on three pillars: post-excavation analyses of old documentary materials from fieldwork (GIS, spatial analyses, stratigraphy), modern excavations focused on obtaining as many as possible exact data, and subsequent environmental analyses. Post-excavation analyses of fieldwork documentation from excavations of the fortification in 1960-1977 together with knowledge from the 2012 field research aim to answer three basic questions: original dating of the defensive wall (its origin and demise), description of relics of its functional elements and building reconstruction, and identification of events which induced the build-up and subsequent demise of this structure. The results of analyses performed provide a base for discussion about the hypotheses of chronology and construction of the defensive wall, which were published by Z. Klanica, J. Poulík and B. Kavánová in the second half of the 20th century. In the end the authors present an interpretational model of dating, construction and demise of the fortification in the suburb of the Mikulčice agglomeration.

Keywords: Great Moravia, Mikulčice-Valy, fortification, stratigraphy, GIS, environmental analyses

1. INTRODUCTION

A large volume of specialised literature exists on the problem of fortification systems in early medieval Central Europe (recently comprehensively for the central part of Great Moravia with further literature e.g. D r e s l e r 2011b; P r o c h á z k a

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2009; U n g e r 2008). However, an in-depth analysis and interpretation of fortification relics at one of the most significant central localities of Great Moravia – Mikulčice – is still missing. In the 2013 journal Přehled výzkumů we published papers, which represented the first outcomes of the past few years of research focused on the fortification of the Mikulčice agglomeration (H l a d í k 2013; M a z u c h 2013) (Fig. 1).

The above work was cited as the first part of a revision analysis of the research into the fortification in the suburb of the Mikulčice stronghold (Hladík 2013). We have defined here the basic research problems as well. Among them were mainly the chronology of fortification, spatial arrangement of the fortification with its determinants, construction of the defensive wall and the destruction horizon of the fortification. In the first part of the revision analysis we paid attention to the gate and its immediate neighbourhood. Beside the fortification we also focused on settlement, whose relics were unearthed immediately behind the defensive wall and around the access road to the gate inside the fortified area. After having presented the archaeological situation based on the original documentation, we have paid attention to stratigraphy and definition of relative chronology of the unearthed and documented contexts. With the help of material culture we tried to classify individual horizons within a wider frame of chronological and spatial relations in the environment of the Mikulčice agglomeration.

The work which we present here is a next step in the research into the fortification in the suburb of the Mikulčice agglomeration. In the focal point of interest still remained questions defined in 2013. The research also continued following the same methodological and methodical plan (for details see below). The revision analysis of fieldwork documentation and movable finds, however, has advanced to such an extent that in this phase of research we already are able to present some more definitive conclusions. The problematic nature and relativity of formulated hypotheses are discussed in closing parts of this paper. The definitiveness of the drawn conclusions has to be treated with regard to the informational potential contained in old fieldwork documentation, that is from the viewpoint of extraction of the knowledge included in 1960-1977 excavation documents. The interpretational concept presented is by far not definitive. However, it is mostly based on hitherto examined archaeological situations in the area of the defensive wall in the suburb. Therefore it is an indispensable part of research and I dare to say that many of its components will not be revised in the future, not even after realisation of further modern excavations and analyses.

2. OBJECTIVES AND METHOD

The post-excavation analyses of fieldwork documentation from excavations of the fortification in 1960-1977 together with the knowledge from the 2012 field research are focused on answering three basic questions: original dating of the

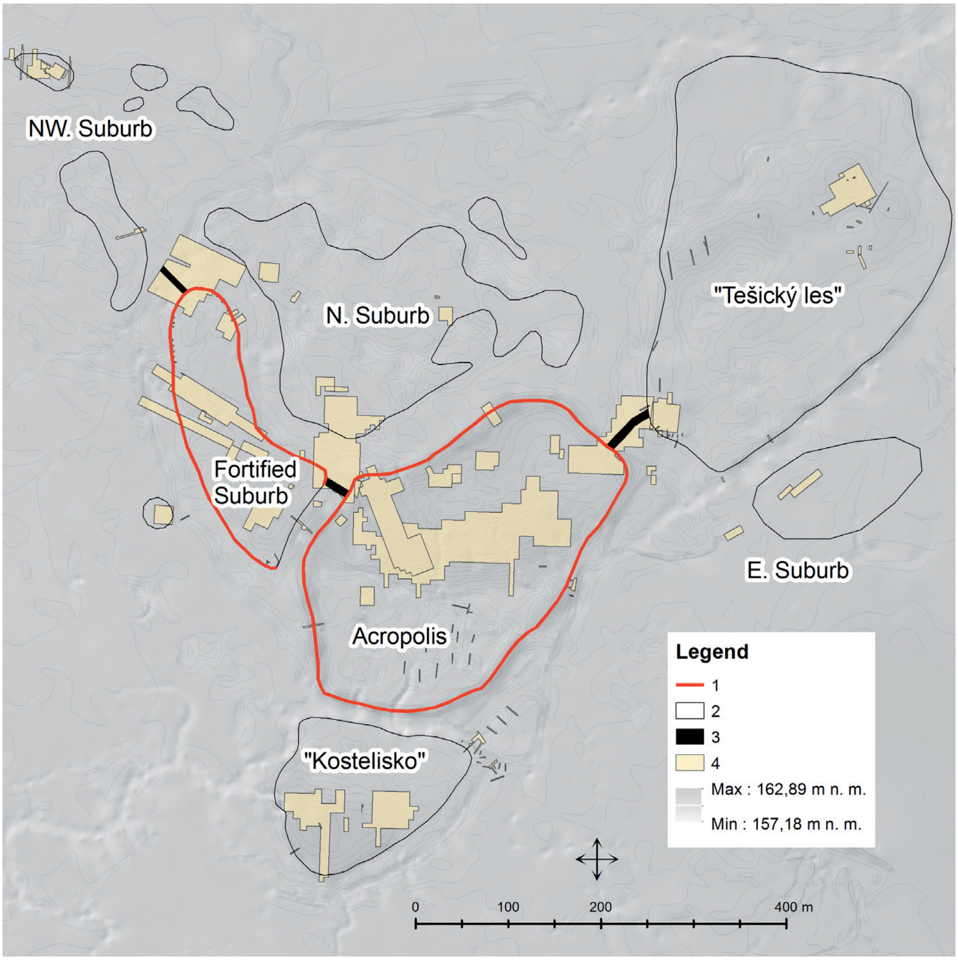


Fig. 1. Mikulčice-Valy, suburb, fortification, General plan of the stronghold with marked bridges
Legend: 1 – fortification; 2 – settlement areas; 3 – bridges; 4 – excavated areas

defensive wall (its origin and demise), description of relics of its functional elements and building reconstruction, and identification of events which induced the build-up and subsequent demise of this structure. These three problem areas essentially represent three levels in the view of archaeological sources, which constitute the methodical base of the whole research. The sources are treated by us on an empirical level (quantification and formal description of contexts), on a level of description of archaeological phenomena (structure and hierarchy of sources – contexts) and the last step is the interpretation of phenomena in a culture-historical context (interpretation of structures, understanding the phenomena and description of events). This methodical concept is described in detail elsewhere (H l a d í k 2014).

As we already stated above, one of the basic foundations of the whole research is the analysis and interpretation of information contained in fieldwork documentation, which was mainly made in the 1960s. A research conducted in this manner is thus burdened from the very beginning with the problem of quality and quantity of data. Considering the way of field research and the character of fieldwork documentation in the second half of the 20th century, we can designate Mikulčice-Valy as a *site without principles* or a *pre-matrix site*. These terms were used by P. Clark in 1993 to classify localities, whose excavations did not yet involve methods of formalised description, standardised methodology and principles of archaeological stratigraphy (C l a r k 1993). The cardinal problem with these localities consists in the fact that the information on stratigraphy of discovered and described contexts is not included in the documentation in a comprehensive and formalised form, but occurs in various kinds of records such as plans, notes, data sheets, photographs etc. So when we try to set up stratigraphic sequences, we encounter multiple problems. One of the most substantial ones is the overestimation of significance of area plans for understanding the stratigraphic situation at the site. For example, we meet with a situation where one and the same context documented on different plans appears in varied dimensions or shape. From this fact follows that we are not able to identify unequivocally its relation to the other contexts. Area plans very often do not correlate with section plans and textual documents. We even encounter situations when area plans of the same contexts made in different scales do not correlate. After the end of field research, general plans of some of the areas, made for example in the 1:200 scale, are not in accordance with plans of individual squares, which were drawn in the 1:20 scale immediately during excavations (for particular examples see H l a d í k 2010). The absence of a systematic approach to archaeological stratigraphy during excavations was also evident in basic analysis and evaluation of movable finds. The authors of these works mostly had to confine (provided that they wanted to construe an overall picture of distribution of some of the finds over the agglomeration) to primary cataloguing and basic spatial “2D“ mapping of individual categories of finds without taking into detailed consideration their stratigraphic relations (for examples of such works see e.g. P o l á č e k 2003). This approach, however, brings a very distorting view of stratigraphy and chronology of artefacts, contexts and components and subsequently of the entire agglomeration as well.

Despite the above-mentioned state of documentary materials it is possible and even necessary to carry out stratigraphic evaluation of particular find contexts in the examined area. Our main starting point in this activity is in opposite to the statement that archaeological contexts are best interpretable directly in terrain. Even though we are conscious that we cannot resign from interpretation of contexts in terrain, it is necessary to have in mind several facts (C l a r k 1993, 2000). During field research it is necessary to interpret the stratigraphy, but without any complete information from the excavated area; and we do not dispose of any comprehensive evaluation of movable finds, scientific analyses etc., either. We are not able to assess which influence the older contexts, still undiscovered at that time, have exerted on later, already discovered, contexts. These facts are the reason why the interpretation of stratigraphy in terrain can be considered a very subjective discipline (Clark 2000). Problematic is above all the step between description and interpretation of a structure. An effort for a fast interpretation in terrain increases the risk of uncritical attribution of interpretational terms to individual contexts. Such an approach therefore often induces an interpretation which is based on deep-rooted customs (folklore) rather than on real effort to understand the structures unearthed. In field research but also during post-excavation analyses we handle two issues at once, that is, we are trying to create a meaningful hierarchy of archaeological contexts (stratigraphic sequence) and interpret it at the same time as a reasonable story. Thus, the main question essentially is a discussion on the relationship between the hierarchy and changes of stratigraphic sequence and the socio-economic history (story) of the locality.

Our efforts for a post-excavation analysis are therefore justified and even inevitable for understanding the stratigraphy in the Mikulčice stronghold in a global view. We try to verify the conclusions drawn from such analyses with the help of modern excavations which apply the principles of formalised methods and archaeological stratigraphy using as many as possible scientific analyses.

The method of post-excavation analysis of the research into fortification in the suburb proceeds from principles which were already presented at several places (Hladík 2013; Mazuch 2005). The whole definition of relative chronology and stratification of finds were based on evaluation of as original as possible information from fieldwork documentation. This stratigraphic evaluation consisted of three basic steps. In the first step we carried out quantification of all interpreted contexts. It means the definition of a set of entities (analysis of entities) (Neustupný 2007). The first step also included the setting up of a context database (set of entities) with defined qualities (analysis of qualities) and creation of an interpreted plan (spatial determination of interpreted contexts). The second step was represented by description of stratigraphic relations (spatial analysis of entities), determination and definition of basic stratigraphic sequences and subsequent elaboration of relative chronology. The aim of this procedure was to group the entities discovered during excavations into a hierarchic system. The last step involved examination of possibilities to reconstruct the links of movable finds to individual contexts (stratification of material) and the related possibilities of chronological and functional interpretation of archaeological structures unearthed. Finding out the rules in archaeological sources (synthesis of archaeological structures) is enabled by an MS Access database (description system) representing the outcome of the analysis of entities and qualities (Neustupný 2007), the Harris matrixes processed in the Stratify programme (Herzog 2006; Herzog and Hansohm

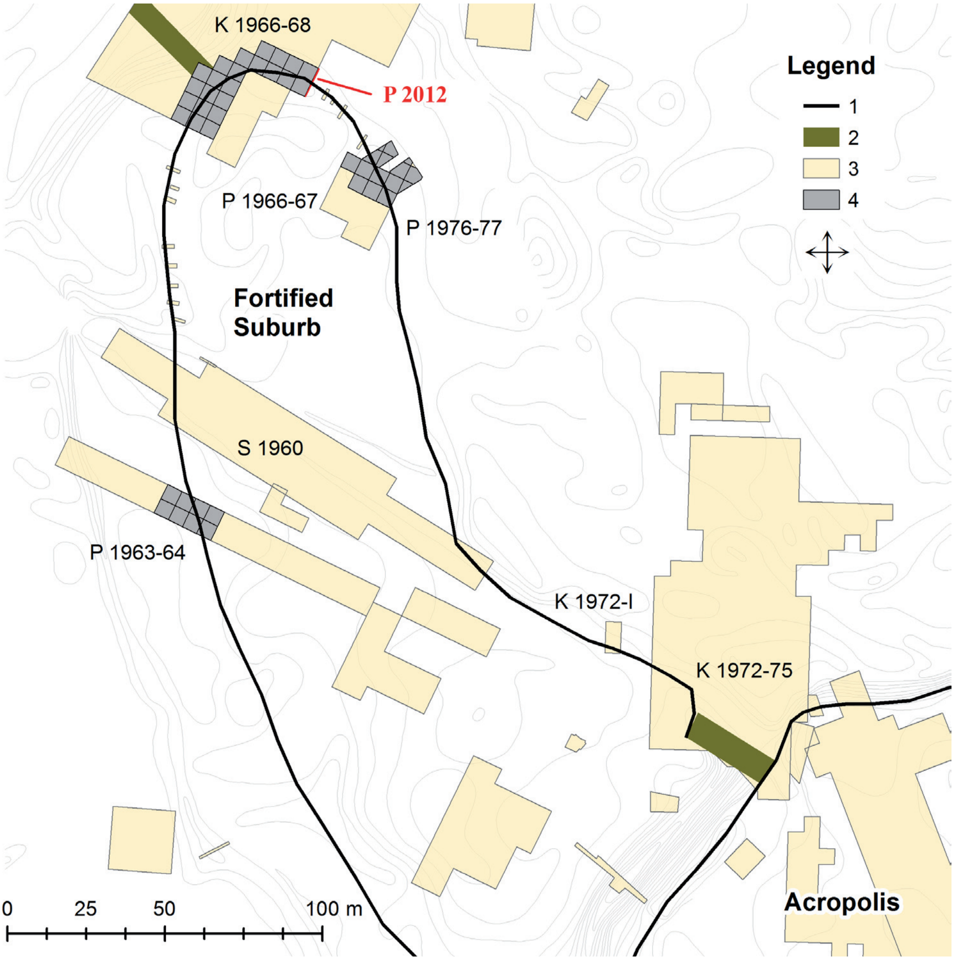


Fig. 2. Mikulčice-Valy, suburb, fortification, General plan of the suburb with marked excavation areas
Legend: 1 – fortification; 2 – bridges; 3 – excavated areas; 4 – squares analysed in the work

2008) (www.stratify.org/index.htm) and a digitalised interpreted plan (vectorisation of fieldwork documentation) of the entire archaeological situation created in the GIS environment. The map project is set up in the ArcMap ArcGIS 10.2 application. These basic outcomes of the post-excavation analysis provide a foundation for the interpretation of archaeological situations.

3. RESEARCH INTO THE FORTIFICATION IN THE SUBURB

The fortification in the suburb, as one of the main components of the whole complex of settlement agglomeration, already began to be explored in the early 1960s by small-scale trenching. Regarding the fact that in the area of the suburb, unlike the acropolis of the stronghold, fortification was only indicated by indistinct terrain configuration instead of some well-visible relics, the earliest trenching was mainly focused on as precise as possible identification of the course of the defensive wall. This survey was followed by more extensive excavations, which were already oriented on in-depth examination of construction of the defensive wall and its dating. The fortification in the suburb has gradually been explored in areas P 1963-1964 (No. 17), P 1966-1967 (No. 22), K 1966-1968 (No. 23), P 1976-1977 (No. 50) (Fig. 2). The results of post-excavation analyses of this field research are presented below.

However, on a general plan of all excavated areas in the suburb (Fig. 2) we can still observe three other areas adjacent to the fortification: S 1960 (No. 10), K 1972-I (No. 40) and K 1972-1975 (No. 43). No fortification relics were detected during excavation within the area S 1960 (No. 10) (Poulík 1961, 1975). Interesting is that in the area where, with regard to findings in adjacent trenches and areas, we would suppose the presence of a defensive wall we only found relics of houses, other settlement features and graves. This situation is most probably caused by erroneous localisation of area S 1960 (No. 10) on the general plan of areas examined within the stronghold (Dresler 2011a). The whole area S 1960 was probably situated inside the fortified precinct, which maybe was the reason why no fortification relics were detected in that area.

The areas K 1972-I and K 1972-1975 were not analysed within this work because they are in the focal point of interest of L. Poláček within the river archaeology project at Mikulčice (Poláček 2013). Therefore I believe that the analysis of fortification in the suburb will soon be supplemented by analysis, evaluation and interpretation of findings from the above two areas.

Until today, a total of about 110 m of the fortification in the suburb were explored. Based on area excavations, trenching and terrain configuration we suppose that the fortification in the suburb was slightly over 600 m long so that today about 18 % of the total length are explored. The situation in the acropolis of the stronghold is a little different. Here only about 8 % of the entire fortification were excavated (Hladík and Mazuch 2010; Mazuch 2013).

A larger part of the fortification in the suburb was first excavated in 1963 and 1964 – P 1963-64 (Klanica 1964, 1965; Procházka 1990, 2009; Štelcl and Tejkal 1967). During these excavation campaigns about 13 m of the defensive wall were examined as well as a total of 44 squares. Eight of these squares touched the area of the fortification – -I/4 to -L/4 and -I/3 to -L/3 (Fig. 2, 10). The aim of this research was to identify the relationship between settlement fea-

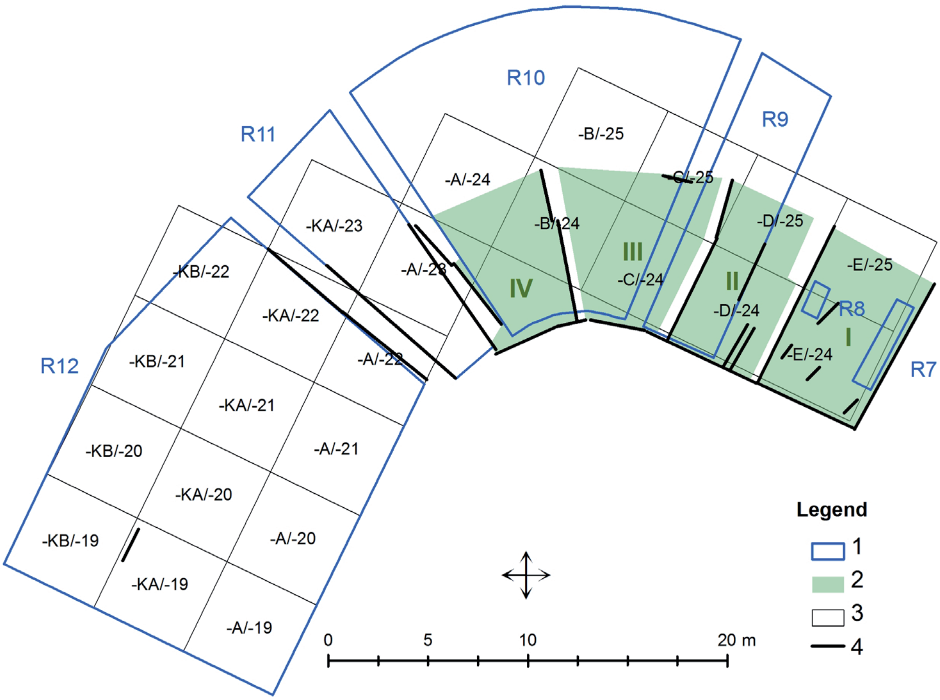


Fig. 3. Mikulčice-Valy, suburb, fortification, area K 1966-1968, Spatial units defined during the field research, and documented sections

Legend: 1 – cross sections (excavation trenches) (examined 1966); 2 – sectors (examined 1968); 3 – squares; 4 – documented sections

tures (houses) and the fortification, considering the fact that the fortification was not detected by excavations in 1960 (S 1960 see above).

The longest, more than 50 m long, segment of the fortification was examined within the area K 1966-1968 (Klanica 1967, 1968, 1970, 1974). The terrain configuration indicated that this area included the ruined defensive wall. The first fieldwork in 1966 was carried out with the aim to identify the course of the fortification (trenches R1 – R12) with more accuracy (Fig. 2, 3). After the course of the ruins was specified, an area excavation was opened which has been carried out within variously defined and localised surface units – trenches, sectors, squares (Fig. 3) (Hladík 2013).

The last part of the fortification, with which we will deal in this work, was excavated southeast of area K 1966-1968 in 1966-1977 – P 1966-1967, P 1976-1977 (Klanica 1978, 1980). Approximately 15 m of the fortification were examined during four excavation campaigns. The fortification was only identified in the northern part of the excavation area (Fig. 2, 13). Fieldwork documentation of this research does not contain any more detailed information on its reasons and objectives. From the general context of research activities is evident that the main focus was laid on fortification and settlement, and parallel excavations were carried out in the neighbourhood of the gate (Fig. 2).

With the aim to verify as much as possible results of post-excavation analyses of the above research and discuss the hypotheses of construction and dating published in older works, we conducted revision excavations in 2012, in immediate neighbourhood of area K 1966-1968. The area P 2012 (No. 100) was situated exactly at the eastern border of area K 1966-1968 (Fig. 2, 15). During excavations in the 1960s in this area (squares -E/-24, -E/-25) a cross section perpendicular to the course of the fortification was documented, which the site director used as one of the main arguments to support his hypotheses (Klanica 1970). Our goal in 2012 was to reopen this cross section, clean it, document the stratigraphic situation and take samples for environmental analyses – geoarchaeology (micromorphology, chemistry), botany and palynology.

4. STRATIGRAPHY

In the next part of the work we will try to present as clearly as possible the stratigraphic relations interpreted on the basis of findings from individual excavated segments of the defensive wall. The base for setting up a hierarchic system was the area K 1966-1968. Decisive for choosing this procedure were several factors. It is the longest explored segment of the fortification in the suburb and at the same time the best documented excavation. Important was also the fact that most of the hypotheses of the fortification in the suburb (its construction and dating), which were published in specialised literature, were based on information from this particular excavation. In the second part, however, we will also try to present as clearly as possible the basic stratigraphic relations from the other excavations of the fortification.

Here we will not present any detailed description of the archaeological situation extracted from the original documentation during the analytical process, which represented the base for the interpretation of stratigraphy. This phase of research was published in the above-mentioned work (Hladík 2013).

4.1. Area K 1966-1968 (No. 23)

The whole stratigraphy in the area under review can be imagined in three basic surface "units". It is a fortification segment south of the bridge and gate together with the gate and the road (squares -A to -KB/-19 to -22), the fortification north and east of the gate, and a part of the settlement immediately adjacent to the defensive wall on the inside of the fortification (squares -KA/-23, -A/-23, -A/-

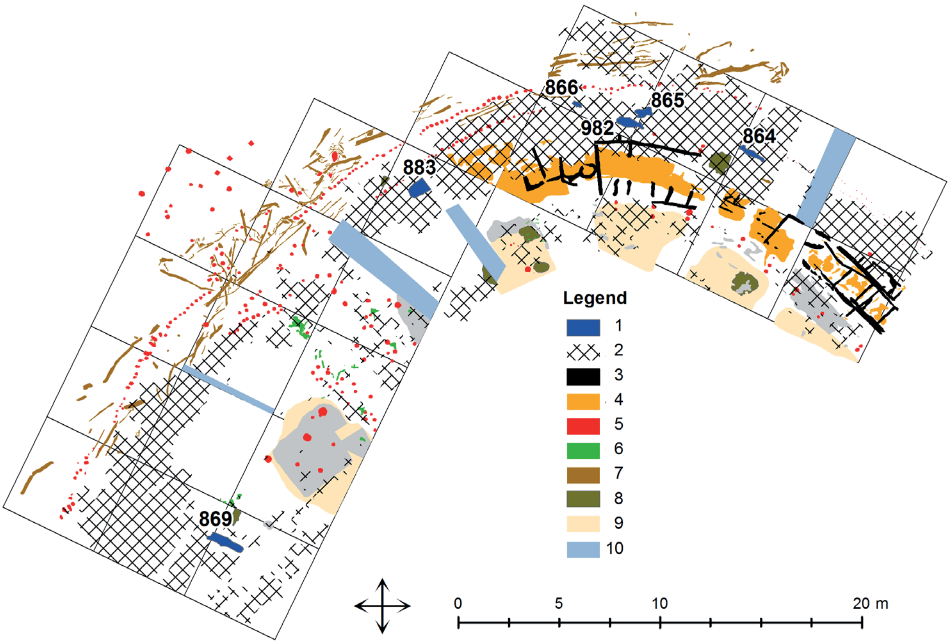


Fig. 4. Mikulčice-Valy, suburb, area K 1966-1968, General plan of archaeological situation in the area under review.

Legend: 1 – graves; 2 – ruined stone defensive wall; 3 – timber latticework inside the rampart; 4 – burnt layer in the bottom part of the clay rampart; 5 – posts and postholes; 6 – animal bones; 7 – drifted wood in the river bed; 8 – hearths, ovens; 9 – houses; 10 – unexplored area

24, -B to – E/-24 to -25). Since the findings from this area were presented in detail in 2013 (Hladík 2013), we will describe here in brief only the basic contexts and their stratigraphic relations.

Defensive wall south of the bridge and gate, the gate and the road

Below the alluvial clay in the upper layers of this area occurred collapsed stones of the defensive wall and below them a clay rampart (Fig. 4). The defensive wall was fronted by a row of wooden posts situated at the edge of the river bed, about 1.5 m deeper than the top of the stones. Drifted wooden beams were accumulated between these palisade stakes, and on a layer of river sand between the palisade and the front of the defensive wall, 2 m below the level of collapsed stones, a dugout boat was found in square -KB/-19 (Fig. 5). The ruined defensive wall was interrupted in the area of entrance into the stronghold at the mouth of the bridge. The wooden palisade, which was otherwise situated in front of the stone

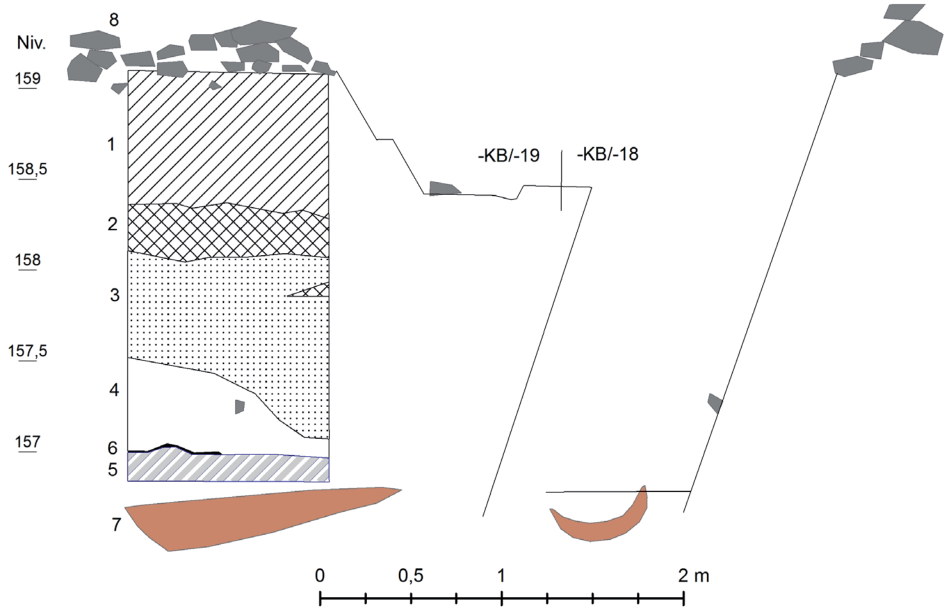


Fig. 5. Mikulčice-Valy, suburb, area K 1966-1968, Section in square -KB/-19

Legend: 1 – dark grey clayey-sandy loam; 2 – grey clay with rusty spots; 3 – grey sand with small pieces of charcoal; 4 – light-coloured sand; 5 – fine gravel; 6 – organic sediments; 7 – dugout boat; 8 – stones (ruined defensive wall)

revetment, also was interrupted in the area of the gate. The gap in fortification was 4 m wide. In this gap, wooden posts were concentrated in several irregular clusters – therefore we suppose that they represented relics of the gate construction. The unevenly distributed postholes continued towards the rear side of the defensive wall, to inside of the fortified area (Fig. 6). From the view of stratigraphy it appears important that the posts (of the gate) and the defensive wall have recognised each other and the bottom of the clay rampart was situated at approximately the same level at which the postholes were identified.

Fortification north and east of the gate

The fortification north and east of the gate (squares -KA/-23, -A/-23, -A/-24, -B to – E/-24 – -25) was examined in more detail. In this area occurred 4 types of archaeological contexts, whose spatial relations constitute the base for stratigraphy and the subsequently construed relative chronology. Among them are the defensive wall itself (with all its constructional elements preserved and documented), ovens or hearths, graves and layers.

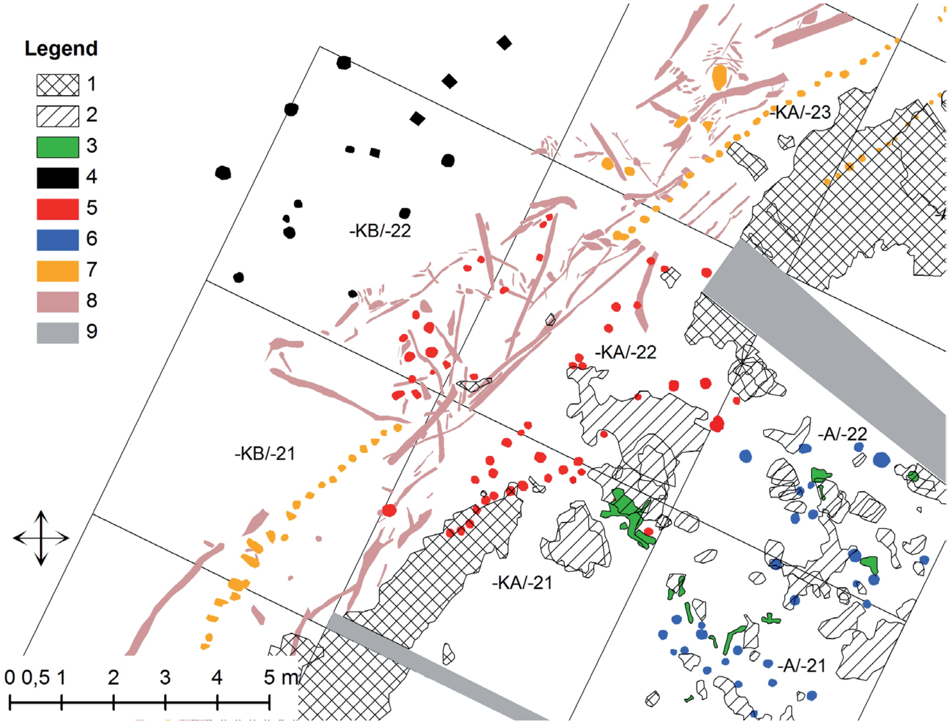


Fig. 6. Mikulčice-Valy, suburb, area K 1966-1968, Archaeological situation in the area of the gate

Legend: 1 – ruined stone defensive wall; 2 – collapsed stone structure above the road; 3 – animal bones; 4 – bridge pillars; 5 – posts and postholes in the area of the gate; 6 – posts and postholes in the area of the road; 7 – posts and postholes in front of the defensive wall; 8 – drifted wood in the river bed; 9 – unexplored area

Defensive wall

Alluvial clay in this area was identified to as deep as about 30 cm. Below this clay along the whole segment of the defensive wall occurred collapsed stones (sandstone and conglomerate) (Fig. 4) (Hladík 2013). On the outer side of the defensive wall, below this collapsed stone structure, there was the front of the fortification. It consisted of larger stones with indications of fitting. In front of this stone revetment, two rows of postholes were found about 40 cm from one another at the same depth as the lowermost stones of the front wall. Below the collapsed stone structure rested a clay rampart. This part of the defensive wall consisted of two components. Behind the stone revetment was a clayey-sandy layer, which reached about 1 m to inside of the defensive wall. The emergence of this layer, however, is probably associated with the collapsed front stone revetment. The other part of the defensive wall consisted of pure clay. Inside this clay rampart,

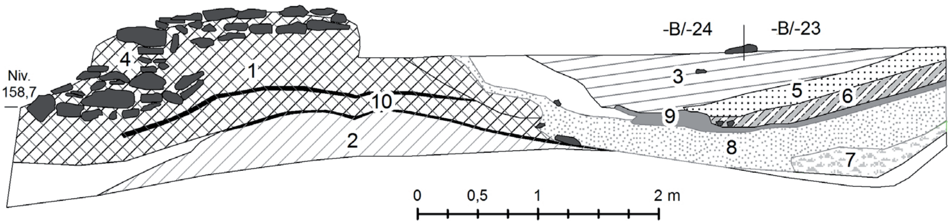


Fig. 7. Mikulčice-Valy, suburb, area K 1966-1968, A section perpendicular to the defensive wall in squares -B/-24 and -B/-23.

Legend: 1 – clayey layer (rampart); 2 – clayey-sandy layer; 3 – loamy-clayey layer; 4 – stones (ruined defensive wall); 5 – clay adjustment; 6 – sandy adjustment; 7 – light-coloured sand; 8 – dark clayey-loamy layer; 9 – burnt clay daub and ash; 10 – burnt layers

charred and carbonised remnants of wooden beams began to appear at the depth of 60-70 cm (Fig. 4). Lowering of the clay rampart has revealed that the wooden beams formed an evenly arranged system of chambers. In the bottom part of the rampart below the wooden chambers there was a burnt layer including remnants of charred pieces of wood. The arrangement of these wooden remnants indicated a timber latticework. The inside of these "chambers" was filled in with burnt clay. In square -B/-24 there was a thin charcoal layer 20 cm above the bottom of the clay rampart (Fig. 7). It rested immediately below the lowermost layer of stones inside the defensive wall. Immediately behind the clay rampart of the defensive wall, pairs of postholes were found in the subsoil (Fig. 4). At multiple places below the clay rampart and under the burnt layer there was a layer of rusty river sand only. The width of the defensive wall varied between 4 and 5 m.

We do not suppose that the base of the clay rampart of the defensive wall was sunk into the subsoil. Based on the archaeological situation we neither suppose that the surface under the defensive wall was raised for some reasons, whether static or anti-erosive, prior to construction of the defensive wall. On all documented sections and on area plans there are fluvial sediments below the base of the defensive wall. The sections documented enable us to follow up the elevation above sea level of the base of the defensive wall at regular distances within the whole segment of about 30 m, which was examined north and east of the gate. The base of the clay rampart of the defensive wall immediately at the gate occurred at a depth of 90 cm. It is a grade level of around 158.50. The upper edge of the ruined defensive wall immediately besides the road was situated at around 159 m ASL (Fig. 8). The section in square -A/-23 about 5 m from the gate gives evidence that the base of the defensive wall was situated in this area at a height of around 158.7 m ASL (Fig. 9). On a section in square -B/-24 about 10 m from the gate we can observe that the base of the defensive wall in its highest point reaches

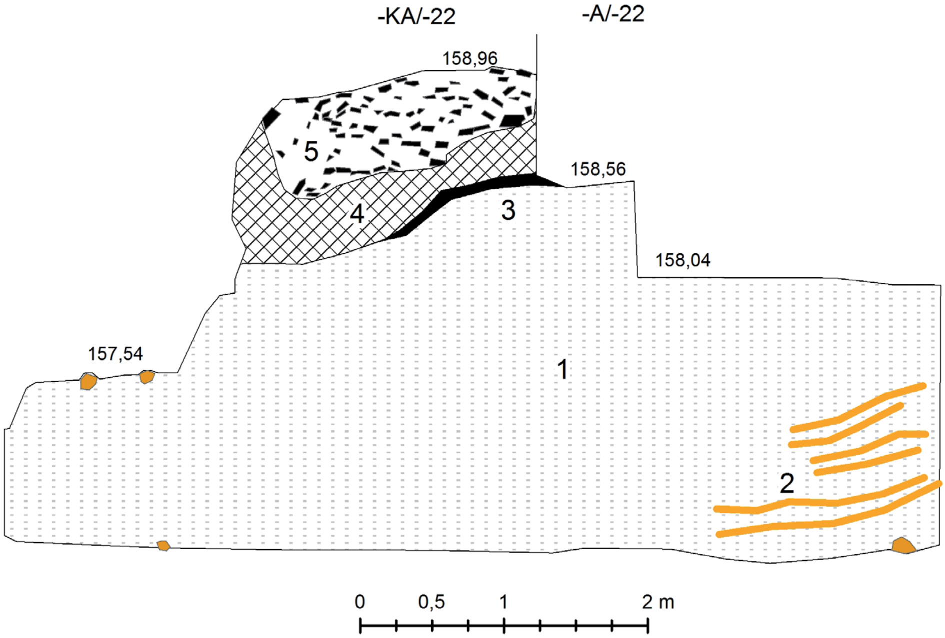


Fig. 8. Mikulčice-Valy, suburb, area K 1966-1968, A section perpendicular to the defensive wall in squares -A/-22 and -KA/-22

Legend: 1 – river alluvial sediments of sand, clay and organic remains; 2 – wood; 3 – burnt charcoal layer; 4 – rusty clayey layer (collapsed rampart); 5 – stones in loamy layer (ruined defensive wall)

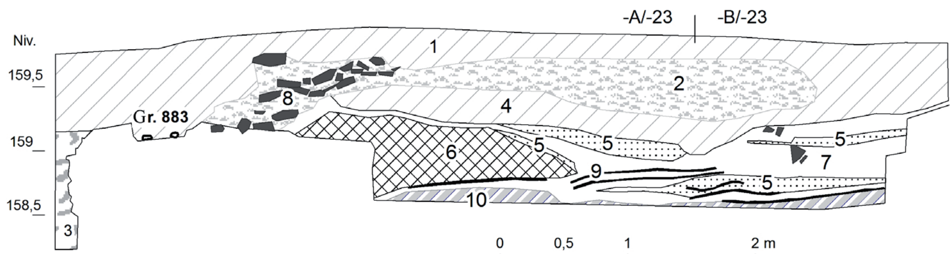


Fig. 9. Mikulčice-Valy, suburb, area K 1966-1968, A section perpendicular to the defensive wall in squares -A/-23 and -B/-23

Legend: 1 – brown loamy layer; 2 – rusty loamy layer; 3 – grey loamy layer; 4 – loamy layer; 5 – clay; 6 – clayey-sandy layer (rampart); 7 – grey layer with charcoal; 8 – stones (ruined defensive wall); 9 – burnt layers with charcoal; 10 – sand a value of 158.7 m ASL (Fig. 7). And the sections in squares -E/-24 and -E/-25 about 30 m from the gate show that the defensive wall was founded at the level of around 159 m ASL (Fig. 16, 17). I explain the 0.5 m wide range of values of the elevation above sea level at the fortification base by mainly two facts. It is a fortification segment more than 30 m long. The difference in the ground level within such an area is therefore normal and it surely did not represent any major obstacle to the fortification builders. The height values at the base of the defensive wall, however, vary within individual sections as well. This is caused by the fact that the defensive wall was founded immediately at the edge of the river bed (probably active at that time), which explains the declination of the ground towards the watercourse. For interpretation of the settlement's occupation layer during existence of the defensive wall is therefore necessary to take into primary consideration the elevation above sea level in the rear part of the fortification base. Very important in this regard is that the foundation of the defensive wall in its rear part remains below the grade level of 159. Dominant values are slightly above the height of 158.5 m ASL. However, the conclusion that the settlement in the north-western part of the fortified suburb during the existence of the defensive wall was situated at the height of 158.5-159 m ASL can only be verified by stratigraphic analysis of the entire settlement.

Graves

In the area north and east of the gate a total of 5 graves were examined (864, 865, 866, 982, 883) (Fig. 4). The documentary information on these graves is quite brief. A description is only given with graves 864 and 865. The information on the other graves is only present in the form of drawings and photographs. Most important with regard to stratigraphy of the graves is their relation to the ruined defensive wall. Graves 864 and 865 were situated at the depth of 50-60 cm below the alluvial clay, on the ruined defensive wall. Graves 866 and 982 rested on or in the upper parts of, the ruins of the defensive wall. The existence (as well as stratigraphic relations) of Grave 883 is not mentioned at all in textual documentation from the area plan. However, from the documented section follows that the grave was situated about 70 cm below the ground surface, in front of the defensive wall, under or between the bottom stones of the collapsed structure (Fig. 4).

Ovens

A total of 4 ovens or hearths (charred stones) were examined in the area of the defensive wall and in front of it (Fig. 4). Their documentation was even less systematic than that of the graves. Separate descriptions of these contexts do not exist and just two of these ovens are documented by drawings on an area plan. The other two are only briefly mentioned in descriptions of archaeological situation in individual excavation trenches or sectors. The oven documented by drawing in square -C/-25 was situated in the upper parts of the collapsed stone structure. Further two ovens which were found in square -B/-25 cannot be exactly localised. However, from the description of the situation is evident that they rested below the collapsed stones. The last oven is documented by drawing and from the description follows that it was situated outside the fortification at the depth of 80-90 cm in square -KA/-23. It rested on a layer of collapsed and levelled stones (floor?). The ovens which were found laying upon or inside the collapsed structure indicate that the area of the ruined defensive wall has been used in late medieval and modern times (M a z u c h 2012a).

Layers

The knowledge of stratigraphic position of various layers, which were found within the area under examination, represents one of the most important information resources with regard to study of constructional development of the defensive wall. In this place I will focus on the situation in the rampart. At the bottom of the clay rampart there was a horizon of burnt clay containing charcoal and wood remnants (Fig. 4). This layer was only identified under the defensive wall. It is the lowermost part of the defensive wall, below which rested the clayey-sandy alluvial deposits. Apart from this layer and traces of charred timber latticework, the clay rampart in square -B/-24 also contained a second thin charcoal layer, which rested 20 cm above the bottom of the clay rampart, immediately below the lowermost stones of the front revetment (Fig. 7). The relationship between layers inside or at the bottom of, the clayey bank and those adjacent to the defensive wall from the settlement area is not clearly described in documentary materials. Similarly as with settlement features, in not a single case it was documented that the layers at the bottom of the defensive wall and those beside it represented the same find context. So the occupation layer situated behind the rear of the defensive wall recognised the fortification. And the burnt organic layers inside the clay rampart are remnants of individual constructional elements of the defensive wall.

The settlement adjacent to the fortification

Besides the defensive wall with gate, which represents the focal point of our interest, in the area under review also a part of a settlement was unearthed, which continues further towards the centre of the fortified area (Fig. 4). Behind the rampart there was an ashy settlement layer. Inside this layer in the area under review we can identify remnants of 6 houses or accessory buildings. The lower levels or bottoms of these contexts are embedded in the underlying clay or river sand. Interesting from the view of stratigraphy is the fact that all of the settlement contexts (as well as a grave discovered in this area) recognise the defensive wall and the related contexts (above all postholes, which are remnants of supporting posts from the rear timber reinforcement of the defensive wall) as well as the relics of a gate and the course of a road running to the gate. From a spatial point of view, the settlement contexts discovered are structured into six clusters (houses, accessory buildings) which recognise one another (Fig. 4). However, within these six spatial clusters it will probably be possible to follow up some chronological development (mutual intrusion or overlap of contexts within individual clusters were documented).

4.2 Area P 1963-1964 (No. 17)

The stratigraphy of contexts related with fortification in area P 1963-64 is much simpler than with previous case (Fig. 10, 11, 12). Any more detailed interpretation, however, is limited by the quality of fieldwork documentation. Constructional elements, which most probably belonged to the fortification, were discovered in squares -I/4 to -L/4 and -I/3 to -L/3. Documentary materials to these squares contain a total of 10 plans with sections. Only in two sections (Fig. 11, 12), however, we are able to clearly determine exact location; the sections also contain description of drawn contexts and data on elevation above sea level. The first stones of the ruined defensive wall began to occur at a depth of 10 cm already. The upper edge of a homogeneous block of collapsed stones was found about 20 cm deep, at the height of around 159.3 m ASL (Fig. 11). The ruined defensive wall was overlaid by a layer of fine alluvial deposits and extended over a band about 6 m wide. The longer axis ran in north-southern direction. Within the whole area uncovered, no preserved stonewall was found. Therefore we are not able to identify the level on which the fortification was founded. All stones of the defensive wall were scattered unevenly in multiple layers one on top of the other (Fig. 12). The stones of the ruined defensive wall rested in a clay layer with a subjacent black layer containing charcoal and preserved pieces of wood. From the documented sections is evident that the black layer extends below the entire ruined defensive wall (Fig. 12). Some stones of the fortification are not placed in the clay layer but in the black layer with charcoal. The layer of collapsed stones sloped moderately down to the river bed (outside the fortified area) and was around 60 cm thick. It means that its base was situated at the height of 158.7 m ASL.

The second constructional element of the defensive wall identified during excavations is represented by wooden posts (or postholes) of palisades. They were discovered in squares -J/3 and -K/4. In square -J/3, the documentation does not inform us on their height above sea level. In square -K/4, postholes (the uppermost preserved edges) were recognised at the height of around 158.6 m ASL. The bases of posts were placed around the level of 157.4 m ASL (Fig. 11). From the spatial point of view, the posts are arranged in two parallel palisades. These also are parallel with the longer axis of the ruined defensive wall (Fig. 10). Two rows of posts were found in square -K/4, at a distance of about 2.5 m from each other. The second, “inner” , palisade most probably continued into square -J/3 as well.

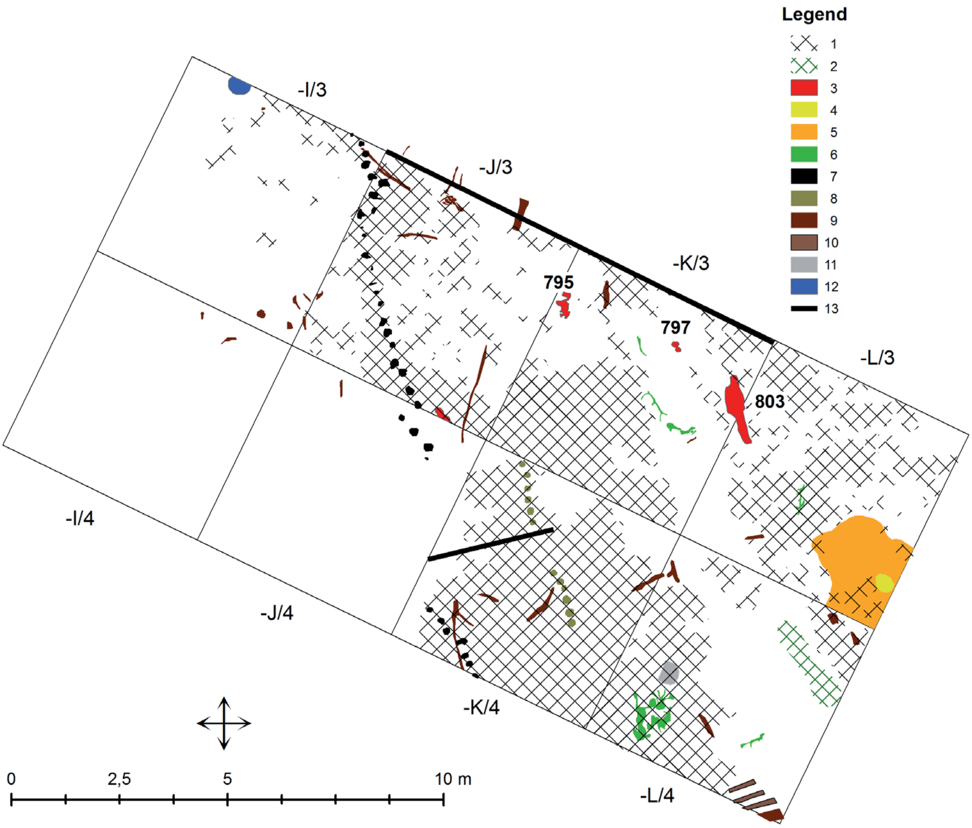


Fig. 10. Mikulčice-Valy, suburb, area P 1963-1964, General plan of archaeological situation in the area under review

Legend: 1 – stones; 2 – stones and animal bones; 3 – graves; 4 – gravel and clay; 5 – clay layer; 6 – animal bones; 7 – posts; 8 – postholes; 9 – wood; 10 – charred wood; 11 – charcoal pieces; 12 – quern, 13 – sections

The documentary materials, however, only contained a sketch of the situation which could not be exactly localised within the square. These postholes are thus not included in the plan (Fig. 10).

The documentation does not clearly show the relationship between the black charcoal layer and the fortification (palisade and collapsed stones). Above all on the basis of sections we suppose that the said context is stratigraphically older than the ruined defensive wall. However, we are not able to describe the stratigraphic relation between both of the palisades and the black charcoal layer. This fact is caused by the degree of preservation of sources and the condition of documentary materials. It is not clear whether the posts have intruded into the above-mentioned

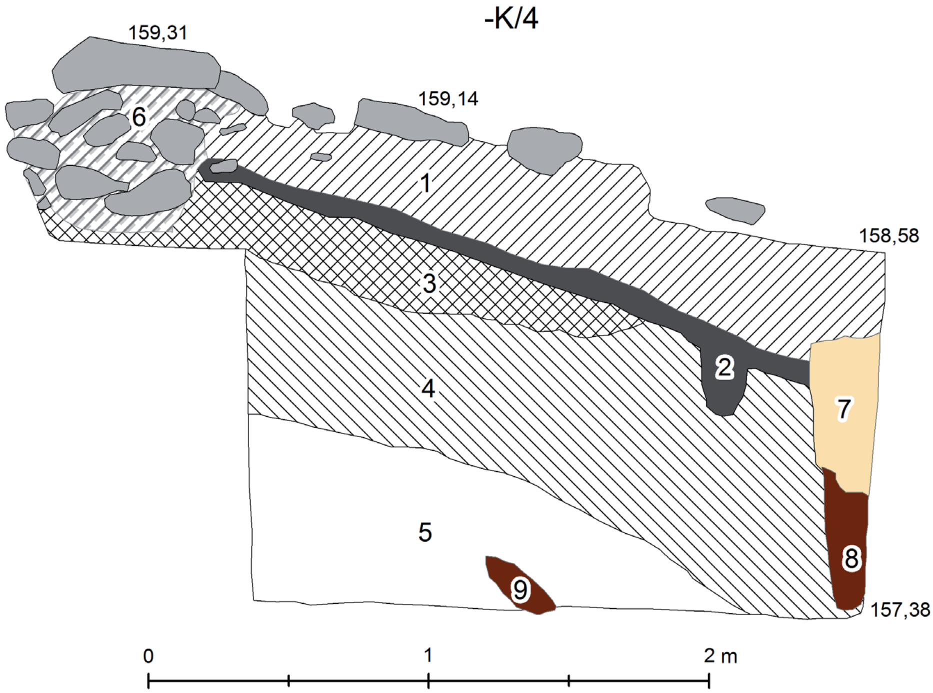


Fig. 11. Mikulčice-Valy, suburb, area P 1963-1964, A section perpendicular to the defensive wall in square -K/4

Legend: 1 – clayey layer; 2 – black charcoal layer; 3 – light-coloured clayey-sandy rusty layer; 4 – clayey-sandy rusty layer; 5 – grey sandy layer; 6 – collapsed stone structure; 7 – posthole; 8 – wooden post; 9 – wood

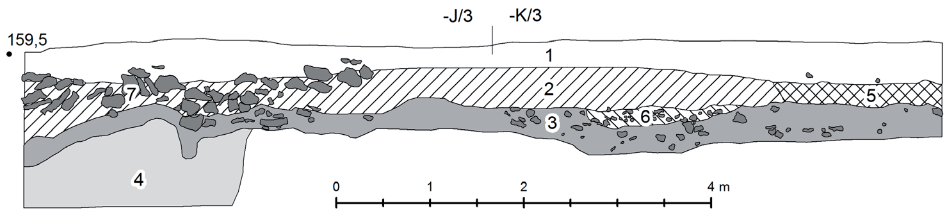


Fig. 12. Mikulčice-Valy, suburb, area P 1963-1964, A section perpendicular to the defensive wall in squares -J/3 and -K/3

Legend: 1 – black loamy layer (topsoil); 2 – clay layer (mixed clay); 3 – black charcoal layer; 4 – clay; 5 – light grey layer; 6 – mixed clay layer; 7 – stones from the ruined defensive wall layer and are herewith stratigraphically younger, or whether this layer emerged as late as during existence of the palisades. Based on documentation, we are not able to clearly identify the level on which the defensive wall began to be built, so it is very problematic to draw any conclusions about the relationship between the fortification and settlement features situated behind. Settlement features immediately behind the defensive wall are situated at the height of 158.3-159 m ASL. It is a height range, which is essentially the same as with individual elements of the fortification. The degree of preservation of the fortification does not allow us to localise exactly the rear of the defensive wall. If we would base ourselves on analogous situations from the other excavated fortification segments in the suburb and suppose that the defensive wall reached max. 4-5 m in its foundation part, we might find out that below the defensive wall there are neither settlement features nor graves, only the above-mentioned black charcoal layer. The question, however, remains how the defensive wall in this part of fortification did look like. No evidence of any more complicated structures are preserved in terrain. Most likely in this regard appears the hypothesis of a simple construction of the defensive wall, which consisted of a wooden palisade and a stonewall. Or, regarding the existence of two parallel palisades in one of its segments, we can suppose that the stonewall was reinforced by a palisade on the rear side as well. Such interpretation would also be corroborated by the fact that between the "rear" palisade and the nearest settlement features (pits, floors) behind the defensive wall there is an approximately 6 m wide free space. This area does not show any evidence of building activity; on the contrary, there are concentrations of animal bones and human skeletons below the ruined fortification (graves No. 803, 797, 795).

4.3 Areas P 1966-1967 (No. 22) and P 1976-1977 (No. 50)

The last large segment of the fortification with adjacent settlement was examined within areas P 1966-1967 and P 1976-1977 (Fig. 13, 14). Fortification relics were discovered in the northern parts of these areas in squares -K/-22, -K/-23, -L/-21, -L/-22, -L/-23, -M/-20, -M/-21, -M/-22, -M/-23 and -N/-21. An about 15 m long segment of the ruined fortification was documented in this area by only a single cross section perpendicular to the fortification (Fig. 14). The documentation in general yielded only very little information on contexts constituting the ruined defensive wall and their relationships to the settlement immediately adjacent to the rear of the fortification. Similar to all the other previous cases, here also first occurred a block of collapsed stones from the front wall. The first stones began to occur at a depth of around 20 cm already, at the height of 159.6 m ASL. The lowermost stones of the ruined structure rested at the level of around 158.5 m ASL. Below the collapsed stones in the area of fortification there was a relatively thick clay layer. The course of the defensive wall in this area, however, is not clearly defined by for example a wooden palisade or by preserved masonry. In the

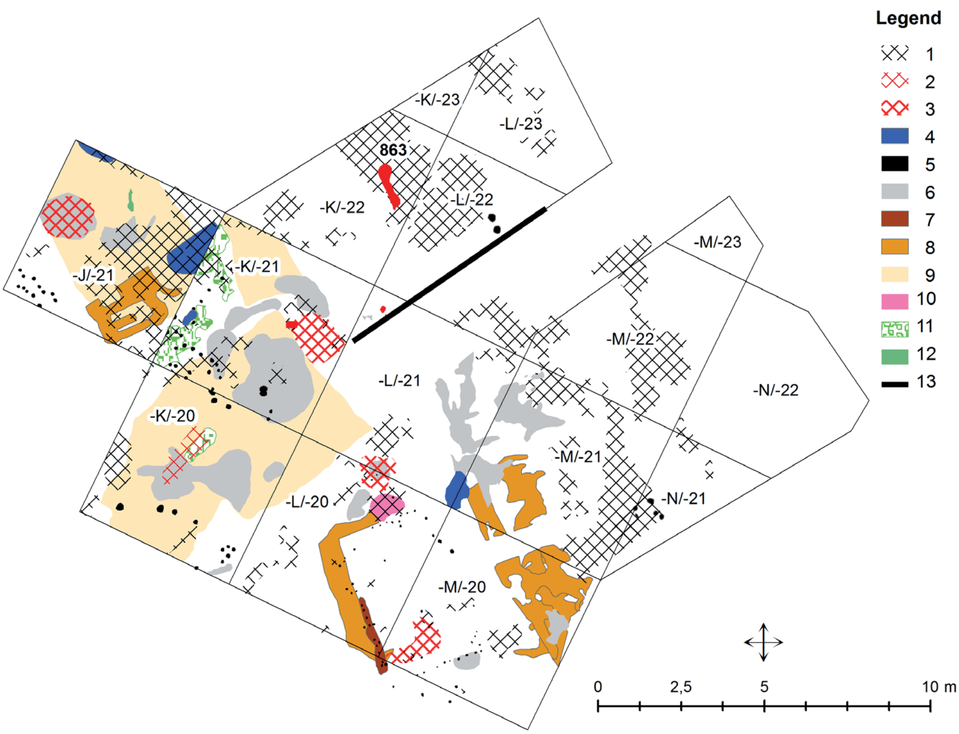


Fig. 13. Mikulčice-Valy, suburb, areas P 1966-1967 and P 1976-1977, General plan of archaeological situation in the area under review

Legend: 1 – stones; 2 – charred stones; 3 – hearth; 4 – clay daub; 5 – posts and postholes; 6 – burnt layers; 7 – wood; 8 – charred wood; 9 – clay floors; 10 – sand; 11 – animal bones and stones; 12 – animal bones; 13 – section

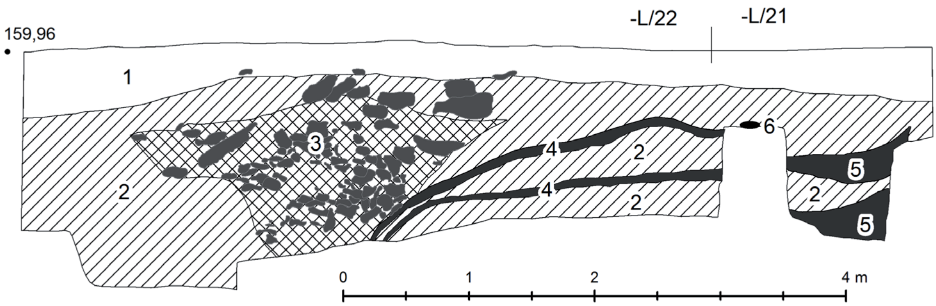


Fig. 14. Mikulčice-Valy, suburb, areas P 1966-1967 and P 1976-1977, A section perpendicular to the defensive wall in squares -L/22 and -L/21

Legend: 1 – dark loamy layer; 2 – clay; 3 – clay mixed with sand, ruined masonry; 4 – black layer in the rampart; 5 – black charcoal layer behind the rear of the defensive wall; 6 – grave area where the existence of the wood-and-earth rampart of the fortification is supposed, two distinct black burnt layers are preserved inside the clay layer (Fig. 14). The course of the fortification is also indicated by remnants of charred pieces of wood from the defensive wall (Fig. 13). Excavation did not unearth any preserved constructional elements, based on which we could interpret the appearance of the fortification.

The degree of preservation of sources does not allow us to clearly define the level, on which the defensive wall began to be built. If we would base ourselves on the elevation of the lowermost charred pieces of wood in the defensive wall and the situation in the settlement immediately behind the rear of the defensive wall, we can take into consideration the level of around 158.5 – 159 m ASL. This would correspond to the situation with the north-western gate at a distance of some dozens of metres from the discussed area (Fig. 2).

Also problematic is to describe the relationship between the fortification and the settlement. Maybe the most important conclusion which can be drawn on the basis of sparse documentation is that, similar to previous cases, below the fortification there was no stratigraphically older context in which we can definitely exclude any connection to the construction of the defensive wall. In other words, no older settlement feature was found below the fortification.

Besides the constructional elements of the defensive wall and settlement features, there also were graves in the area of the fortification. Grave No. 863 in square -K/-22 was found in the upper parts of the ruined stone structure at a height of around 159.7 m ASL (Fig. 13). Other two graves were discovered immediately behind the fortification in ruined settlement features (Fig. 13, 14). The graves are stratigraphically younger than the preserved constructional elements of the defensive wall.

5. EXCAVATION P 2012 (NO. 100) AND ENVIRONMENTAL ANALYSES

After we have carried out the major part of post-excavation analyses presented above and confronted them with hitherto unpublished hypotheses, we decided to conduct a revision research into one of the sections perpendicular to the fortification in the area from which we obtained the most complete set of information on the construction of the defensive wall, its dating and spatial relations to the other settlement features. It was the eastern edge of area K 1966-68, where fortification relics were explored in greatest detail (Fig. 15). Archaeological situation in this area thus became the basis for most of the hypotheses of the fortification in the suburb, which were published by Z. Klanica and B. Kavánová. Area plans and sections in squares -E/-24, -E/-25 documented the archaeological situation, which was used by Z. Klanica as one of the main arguments supporting the hypotheses of an older pre-Great Moravian phase of the defensive wall (Fig. 15) (K l a n i c a

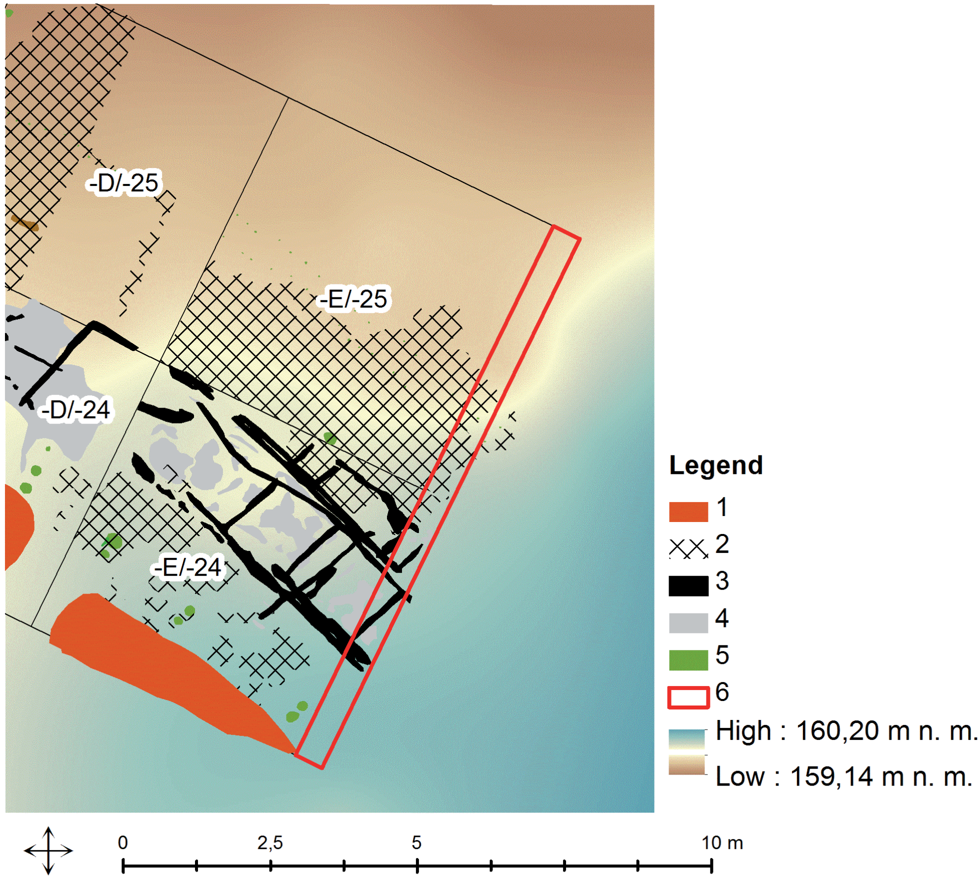


Fig. 15. Mikulčice-Valy, suburb, area P 2012, Localisation of excavation P 2012 (No. 100) at the edge of squares -E/-25 and -E/-24 examined in 1968. The plan of archaeological situation is based on a digital contour model surveyed before the 2012 excavation

Legend: 1 – settlement features; 2 – ruined stone defensive wall; 3 – charred remains of the wooden construction of the fortification; 4 – burnt layers at the base of the fortification; 5 – postholes; 6 – area P 2012 (No. 100)

1970). After we have documented the stratigraphic situation using single-image photogrammetry (Krajňák et al. 2010), set up a digital vector plan of the fortification relics in GIS environment and described the stratigraphy using a Harris matrix (Fig. 16, 17), our main goal was to take samples for environmental analyses. The sampling spots were chosen based on hitherto published hypotheses and results of post-excavation analyses.

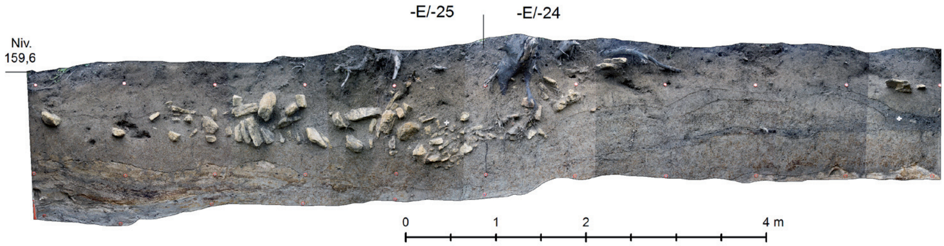


Fig. 16. Mikulčice-Valy, suburb, area P 2012, Orthogonalised vertical photographs of a section perpendicular to the fortification in squares -E/-25 and -E/-24, documented in 2012.

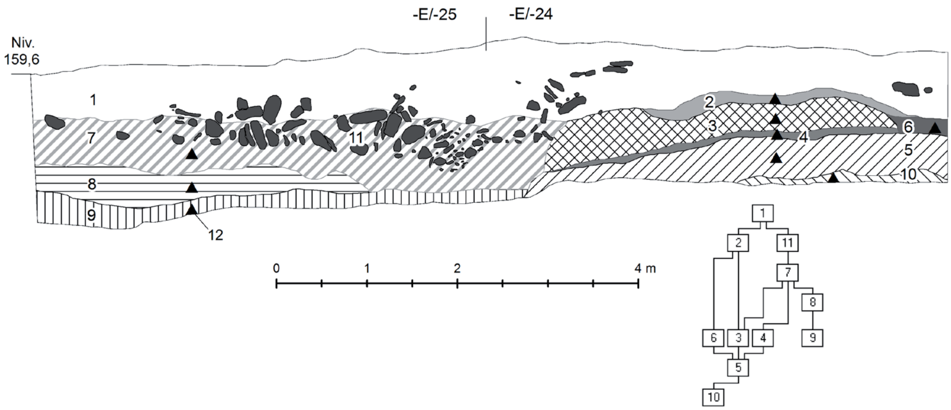


Fig. 17. Mikulčice-Valy, suburb, area P 2012, Vector plan of a section perpendicular to the fortification in squares -E/-25 and -E/-24 set up on the basis of orthogonalised photographs, and Harris' diagram

Legend: 1 – black loamy-sandy layer; 2 – greyish-yellow clay mixed with sand; 3 – yellow clayey rampart; 4 – greyish-yellow clayey-sandy layer with distinct admixture of organic material; 5 – brown clayey-sandy layer; 6 – black loamy-sandy layer containing bones, ceramics and small stones; 7 – yellowish-brown sandy-clayey layer (flood sediments); 8 – sandy gravel layer (river sediments); 9 – fine sand layer; 10 – rusty-yellow sandy layer; 11 – stones from the ruined defensive wall; 12 – places of sampling for environmental analyses in individual contexts (botany, palynology, micromorphology, chemistry)

The primary objective was to answer the questions arising from three main arguments, on which the hypothesis of a pre-Great Moravian fortification is based (see chapter Discussion).

1) Is the black layer in the lower part of the clay rampart (Context 4) identical with black layer (Context 6) behind the rear of the defensive wall?

2) May it be a single fire horizon and herewith the evidence of activities older than the rampart of the Great Moravian defensive wall?

3) With regard to chronology of the fortification, these two cardinal questions were still supplemented with question of subsistence strategy of the community who lived in the agglomeration, and of the impact of natural environment on the agglomeration in the area of the floodplain.

4) How will be the spectrum of species of cultivated and wild plants in individual contexts and which changes will occur in relation to the stratigraphy of the defensive wall and the settlement? Will the impact of existence of the agglomeration on natural environment be proved?

5) How is the relationship between the collapsed stone structure of the defensive wall above the river and the sandy and clayey deposits, which have filled in the river bed?

Before we present the results of individual environmental analyses, with the help of which we searched for the answers to the above questions, I will describe the stratigraphic situation as we have interpreted it based on section P 2012 (Fig. 16, 17) and the basic lithological characteristics of layers. Before the beginning of the research, the elevation of the ground surface in the area under review varied between 159.14 and 160.2 m ASL (Fig. 15). Approximately the uppermost 50 cm below the ground surface were represented by black clayey-sandy sediment (Context 1), distinctly degraded by ploughing. This layer contained only sporadically stones from the ruined defensive wall. The situation below this layer was different in squares -E/24 and -E/25. If we go ahead a little and enter directly the interpretational level, we can conclude that the relics of fortification and of settlement behind its rear were found in square -E/-24, and a filled-in river bed, which was situated immediately in front of the defensive wall, in square -E/-25.

Square -E/-24 (defensive wall)

Below Context 1 there was an indistinct greyish-yellow layer. It was an unstable loam with sandy admixture and clay interlayers (Context 2), which rested on the clay rampart (Context 3). Essentially, it was the upper edge of the defensive wall, which formed the boundary between layers 1 and 3. The most distinct context in square -E/-24 was Context 3, that is the rampart of the defensive wall. This context was characterised by greyish-yellow colour. It was a silty loam with clayey admixture. The base of this context rested on Context 4. This layer consisted of silty-sandy loam with admixture of clay and organic material (visible wood fragments, charcoal pieces) sized 1-3 cm. Below Context 4 there was a brown clayey-sandy layer – Context 5, without any visible evidence of settlement. It was a greyish-yellow silty-sandy deposit with clayey inruns. Behind the fortification below Context 1 rested Context 6, which did not go under the rampart (Context 3) and rested upon Context 5. It was a dark loamy-sandy layer containing pottery, animal bones, plenty of charcoal and small stones (occupation layer of the settlement). On the border between squares -E/-25 and -E/-24 in front of the defensive wall there were collapsed stones of the front revetment wall. The stones were scattered without indications of any regular structure in layers 1 and 7. Context 7 was a fine yellowish-brown clayey-sandy flood sediment, which partly overlaid the front part of the clay rampart and continued into square -E/-25.

Square -E/-25 (river bed)

In this square, below Context 1 there was the above-mentioned Context 7, in whose upper parts were found the most stones of the collapsed front revetment wall – Context 11. Below Context 7 rested Context 8, which consisted of sandy gravel deposits in the river bed. At the bottom of the area under review below Context 8 rested Context 9, which was formed by fine sandy sediments.

As is evident, describing the stratigraphic situation we did not avoid blending of the empirical and the interpretational level. The interpretation, however, was only presented in those contexts which were easy to identify with contexts interpreted on the basis of post-excavation analyses of older research (Context 3 – rampart, Context 6 – occupation layer, Context 11 – collapsed front revetment wall).

We tried to enhance our interpretational possibilities and prove or disprove older hypotheses with the help of several environmental analyses, which were chosen with the aim to find answers to the above questions.

5.1. Geoarchaeology

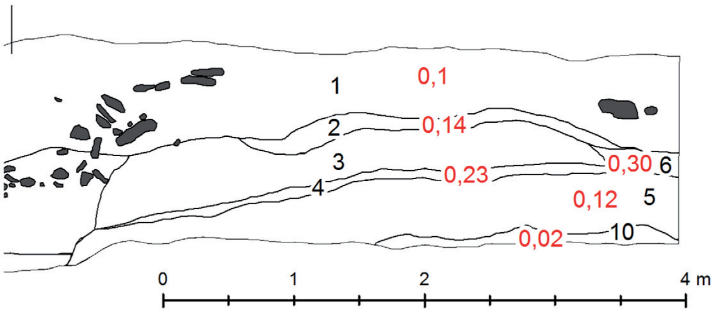
The geoarchaeological survey conducted was primarily targeted at the comparison between contexts 4 and 6 (Fig. 17). Samples for micromorphological analyses were taken from both these contexts. Sample MIVZ1/2012 was taken from layer 4 and sample MIVZ2/2012 from layer 6 (Fig. 18, 19). Magnetic susceptibility was measured on a section, using the Kapameter KT-5c. Micromorphological samples were impregnated and polished to desired thickness by Julie Boreham in the University of Cambridge laboratory. Together with micromorphological samples also soil samples were taken for chemical analysis by a hand-held X-ray analyser Delta Professional (Š u š o l o v á et al. 2013).

Methods

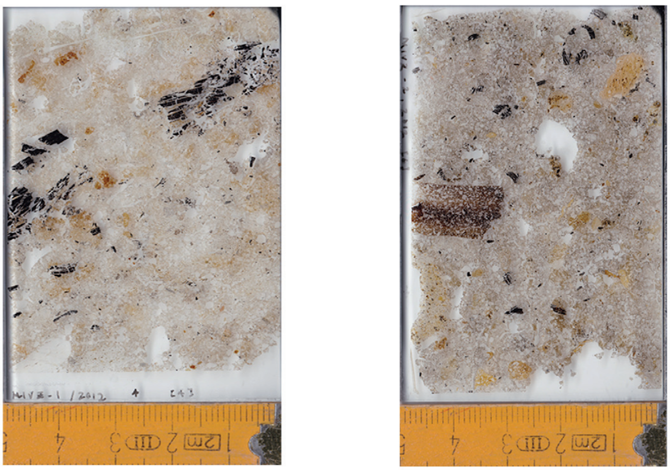
Micromorphology in archaeological context has evolved from soil micromorphology. Essentially, it is microscopic study of soil thin sections. In this way, information can be obtained on the composition of coarse fraction, matrix, number and size of pores, texture elements and mutual relationships. This method is able to detect the presence of micro-artefacts, excrements and pebbles, distinguish

A

1	2	4	5	6	10
0,1	0,16	0,20	0,01	0,20	0,06
0,17	0,11	0,16	0,17	0,26	0,02
0,2	0,17	0,22	0,17	0,46	0
0,19	0,10	0,20	0,1	0,35	0,02
0,2	0,17	0,24	0,14	0,26	0
0,07	0,11	0,23	0,11	0,27	0,06
0,27	0,17	0,32	0,17	0,32	0,02
0,19	0,10	0,3	0,1	1,72	0,18
0,4	0,11	0,19	0,11	0,28	0,02
0,00	0,16	0,24	0,12	0,59	0,8
0,19	0,14	0,23	0,12	0,30	0,02



B



MIVZ1/2012 (Context 4) **MIVZ2/2012 (Context 6)**

Fig. 18. Mikulčice-Valy, suburb, area P 2012, A: a section with marked magnetic susceptibility and median calculated from ten measurements. B: scan of thin sections showing a massive microstructure

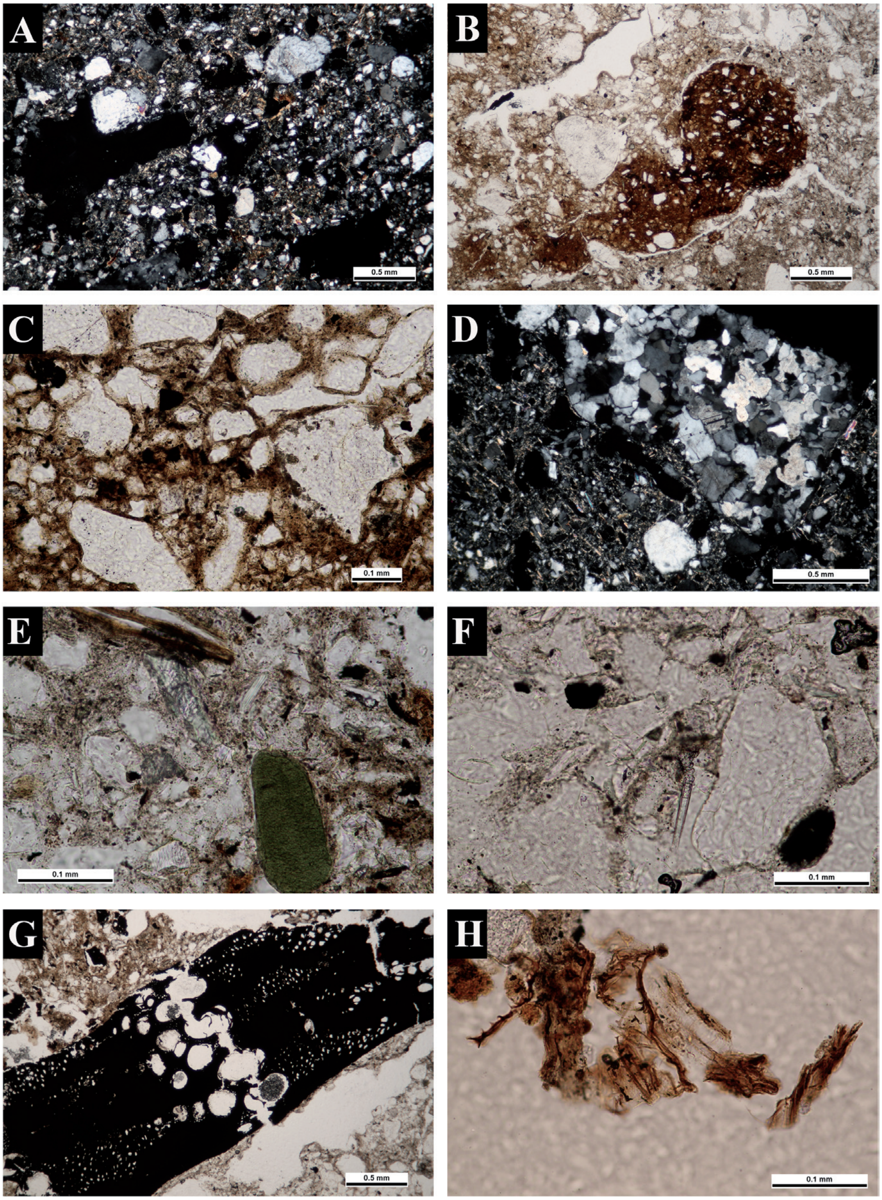


Fig. 19. Mikulčice-Valy, suburb, area P 2012, Micromorphological thin section, sample MIVZ1/2012 (Context 4)

A – isotropic orientation, massive microstructure, XPL; B – amorphous Fe-Mn nodule, in the upper part there is a channel with clay coating, PPL; C – mineral grains with clay coating, PPL; D – detail of quartzite, XPL; E – lamellar biotite at the top of the photograph, green chlorite at the bottom, PPL; F – rod-shaped phytolith, PPL; G –organic matter, plant remain with visible structure of tissue, PPL; H – organic matter, plant remain with visible structure of tissue, PPL charred bone fragments from those which passed through the digestive system, and charred organic matter from the long-oxidised one (L i s á et al. 2009). Samples were taken in situ into the so-called Kubiena boxes marked with location in terrain. Sampling can be done vertically, horizontally or within a specific area, as needed for further analysis, evaluation and interpretation of given archaeological situation. In our case we were limited by the revision research so that only vertical sampling was carried out. This method further develops and even though many experimental data are already available, the observation done cannot be always clearly interpreted. Some of the texture elements may be caused by multiple types of processes. For the general interpretation it is necessary to take into consideration macroscopic description of sediments, geomorphology and geological background of the locality (Š u š o l o v á et al. 2013).

Kapameter – the basic measuring quantity is magnetic susceptibility, which indicates the degree of magnetisation of materials, rocks and soils. The intensity of magnetised material is proportional to an applied magnetic field. In our case we used the Kapameter KT-5c. Portable kapameters have in general a small depth range in centimetres. Hitherto results indicate a high potential of applying this method in excavations to follow up both horizontal and vertical relations.

XRF spectrometry with Delta device – the Delta spectrometer uses a large-area SSD detector for very accurate measuring. Along with standard elements Ti, V, Cr, Mn , Fe, Co, Ni, Cu, Zn, Zr, Nb, Mo, Hf, W, As, Ta, Re, Pb, Ag, Sn, Bi and Sb, the device is also able to analyse elements such as Au, Pd , Pt , Ir , Rh as well as Al, Mg, Si, P, S without the use of vacuum or helium. This device, however, cannot measure organic compounds and the first elements of the Periodic Table inclusive of carbon. The analysis of split cores of sediments according to XRF core scanners becomes more and more popular in the last decade, because it enables a non-destructive extraction of records on intensities of sediment elements of a core by minimal analytical effort. The disadvantage of XRF core scanning (compared to the conventional geochemical analysis) is a problematic conversion of the scanner output towards the concentrations of elements (Weltje and Tjallingii 2008).

Results

The results of measuring of magnetic susceptibility – the median of ten measurements of magnetic susceptibility of soils reaches in the case of subsoil sand the value of 0.02 x 10-3 SI (Fig. 18). The values of some deposits are below the limit of detection. From this follows that these are probably diamagnetic materials. The highest values, on the other hand, were recorded during the measurement of Context 6 (occupation layer). The values measured for individual contexts and their medians are summed up on Fig. 18.

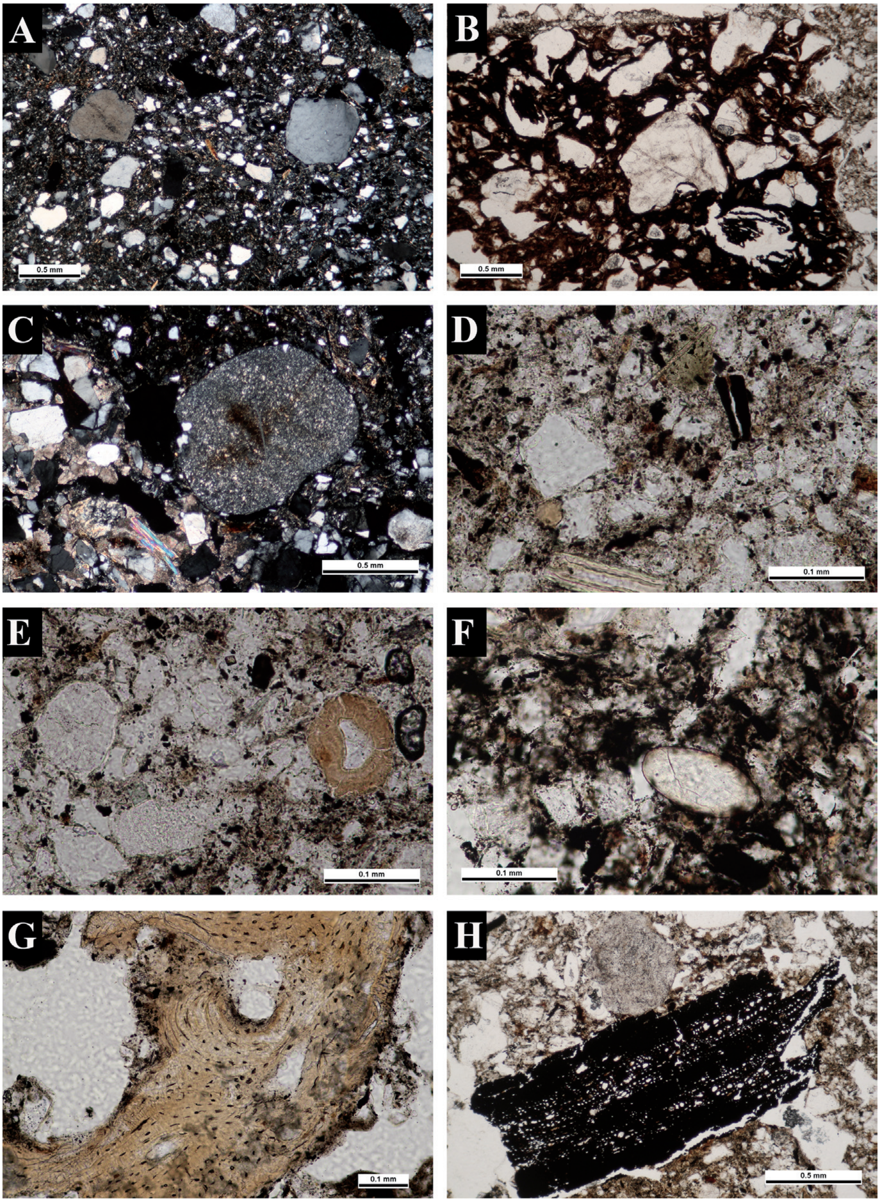


Fig. 20. Mikulčice-Valy, suburb, area P 2012, Micromorphological thin section, sample MIVZ2/2012 (Context 6)

A – isotropic orientation, massive microstructure, XPL; B – ceramic fragment with plant tissue remnants in its cavities, PPL; C – on the left carbonate cement binding sharp-edged minerals, on the right fine-grained matrix with oval chert, XPL; D – decomposed organic matter, phytoliths, PPL; E – partly to entirely decomposed organic matter, phytoliths, PPL; F – detail of probably a parasite egg, PPL; G – bone in detail, PPL; H – organic matter, partly decomposed, remnants of plant tissue with visible structure, PPL

Micromorphology

Sample MIVZ1/2012 (Context 4): From a micromorphological point of view, it is a soil with well visible marks of soil development and with higher occurrence of long-oxidised organic matter. The matrix contains dissolved organic acids mixed with clay and with iron and manganese oxides, which form rusty-brown smudges in the horizon. Amorphous iron – manganese nodules continuously occur in the whole sample and fade out downwards. Further attribute is represented by clay coatings around channels and mineral grains, which occur in soil horizon Bt. The whole sample exhibits evident bioturbation marks and channels from soil edaphon (Fig. 19).

Sample MIVZ2/2012 (Context 6): Micromorphologically seen, the evident soil horizon is considerably enriched with organic matter, which gives it dark brown colours, mixes up with clay minerals, covers the grains, and causes changes in minerals as well. The coatings of grains is not as distinct as with MIVZ1. It might be the upper parts of horizon Bt, similar to sample MIVZ1. At the same time there is an evident representation of elements indicating anthropogenic activity, such as pottery fragments, bones, charred bones or ash. The sample in general might correspond to settlement remains, that is an occupation layer which subsequently underwent soil development (Fig. 20).

Soil chemistry

Table 1 contains measured values of representation of individual chemical elements from contexts 4 and 6 (Tab. 1). Regarding the fact that during repeated measurements we recorded similar or even identical representation of individual elements, here we present a model analysis with both of the contexts.

Tab. 1. Mikulčice-Valy, suburb, area P 2012, Table of soil chemistry measured by XFR hand -held analyser (the values are given in ppm units – Parts Per Million).

number analysis	SJ	Al	Si	P	Ti	Mn	Fe	Cl	K	Ca	Sr	Zn	As	Hg
9	4	4400	31407	728	3030	215	0	0	10265	9601	78	68	13	8
10	4	3476	11870	368	2670	410	0	0	9474	7579	104	275	11	11
11	6	2335	3494	96	1958	297	20099	229200	4679	5498	61	57	0	0
12	6	4100	9478	0	1334	120	0	0	7115	0	87	42	0	0

Context 4 – The representation of potassium macro-elements shows statistically a distinct increasing tendency with decreasing elevation ASL, where the measured values are in no way extreme (Con. 4, analysis No. 9 – 10265 ppm, Con, 4 analysis No. 10 – 9474 ppm). It can thus be supposed that in lower horizons,

potassium is bound to primary minerals whereas in higher horizons it is washed out by rain and consumed by plants. The main nutrient, calcium, shows a trend and representation very similar to potassium. Its values, however, are surprisingly low (VR, 4 analysis No. 9 – 9601 ppm, VR, 4 analysis No. 10 – 7579 ppm) and so it is evident that despite local occurrence of calcium as construction material, the layer does not exhibit a high representation of primary minerals containing calcium. Iron already does not show such a continuous trend. Above the limit of detection of the applied device, iron is only represented in Context 6 (20099 ppm), whereas in layer No. 4 it was not detected at all. Further macro-element – sulphur – is present only in minimal concentrations approaching the detection limit of the device used. A very interesting finding is the extremely high content of sulphur macro-element with analysis No. 9 (728 ppm) and a half content with analysis No. 10. In literature, the value above 185 ppm is already considered high. It is probably sulphur released from the surrounding bones. Anyway, the high value is remarkable because in nature, sulphur is normally washed out very quickly. The microbiogenic element manganese does not show a continuous trend, and the values of individual measurements differ statistically very considerably, even within the same context. However, manganese reaches distinctly higher values in Context 4 with maximum value of 410 ppm. Further trace element, titanium, exhibits statistically a distinctly increasing trend with decreasing elevation ASL. Its values are surprisingly even extremely high (2670 – 3030 ppm). The representation of strontium shows the same trend as titanium, but its values do not go over 110 ppm. The risk element arsenic as a potential evidence of distinct human activity, on the other hand, decreases with increasing depth (the values in Context 6 are already below the detection limit) and its values are not significant (maximum 13 ppm). Zinc shows highest representation in Context 4 with maximum value of 275 ppm. Other potential heavy metals, such as for example cobalt, copper, vanadium and lead, were detected in the excavation trench but their representation is not significant (usually immediately above the detection limit or close to possible measurement deviation). An important finding is the detection of a small but statistically significant amount of mercury with values around 10 ppm.

Context 6 – The macro-element potassium shows statistically significant differences even within the same layer, and its value unevenly increases with increasing depth (VR 6, analysis No. 11 – 4679 ppm, VR 6, analysis No. 12 – 7115 ppm). The lower value in the same horizon with analysis No. 11 attests to heterogeneous representation of potassium feldspars and probably also partial decomposition of feldspar into clay minerals. The higher potassium content in analysis No. 12 indicates that this element was bound to primary minerals with dominant potassium feldspars. Calcium shows the same trend as potassium, so the value increases downwards and is highest in the upper part of the layer (5498 ppm). In general, however, its values are very low, from which also can be inferred a very low representation of rock-forming minerals containing calcium. Zero detection of calcium with analysis No. 12 is unique because calcium is commonly present in local soils. The important nutrient, iron, is again in the second Bvp horizon (20099 ppm), which is a relatively high value. In neither of the samples from this layer, macro-elements such as sulphur and phosphorus were detected in increased concentrations, and their value usually did not go over the detection limit of the device. This fact is in direct contradiction to the observation made with Context 4. Phosphorus was probably washed out or leached out. The microbiogenic element manganese showed relatively high values increasing with decreasing depth (VR 6, analysis No. 11 – 297 ppm), VR 6, analysis No. 12 – 120 ppm). The values, however, are half as high as with Context 4. Extreme values again occur with titanium. Maximum value in layer 6 is 332 ppm and it probably gives evidence of increased presence of heavy opaque minerals with dominant magnetite and ilmenite. Strontium was detected in lower concentrations with values of up to 87 ppm. The concentration increased with increasing depth.

Conclusion

With the help of kapameter, layers with humus admixture were clearly distinguished from sandy layers. The differences in measured values were very similar with layers 4 and 6 but layer 6 showed higher values. From a micromorphological point of view, layer 4 is a soil with well visible marks of soil development. The matrix contains dissolved organic acids mixed with clay and with iron and manganese oxides. This trend, however, is not followed up with regard to soil chemistry where iron was not detected. Manganese reaches higher values than those with layer 6. Further attribute is represented by clay coatings around the channels and mineral grains. These occur in soil horizon Bt. As far as the chemistry is concerned, sample 4 shows increased values of potassium which decomposes into clay minerals. Significant difference between layers was indicated by an increased zinc and mercury content in the case of Context 4. From the point of view of micromorphology, in layer 6 a soil horizon distinctly enriched with organic matter was recognised. The sample in general might correspond to settlement remains, that is an occupation layer which subsequently underwent soil development.

On the basis of geoarchaeological analyses conducted we can conclude that the two contexts compared (No. 4 and 6) are not identical. Their magnetic susceptibility is different and the micro-structure and chemical composition of samples taken indicate different genesis of the layers. For their interpretation and statistical evaluation it is necessary to take more samples and carry out further analyses focused on detection of organic elements as well. However, we can conclude that layer 4 showed a higher representation of elements (in ppm). This condition is probably associated with later post-depositional development of the layer when some of the elements were leached out of the upper horizons.

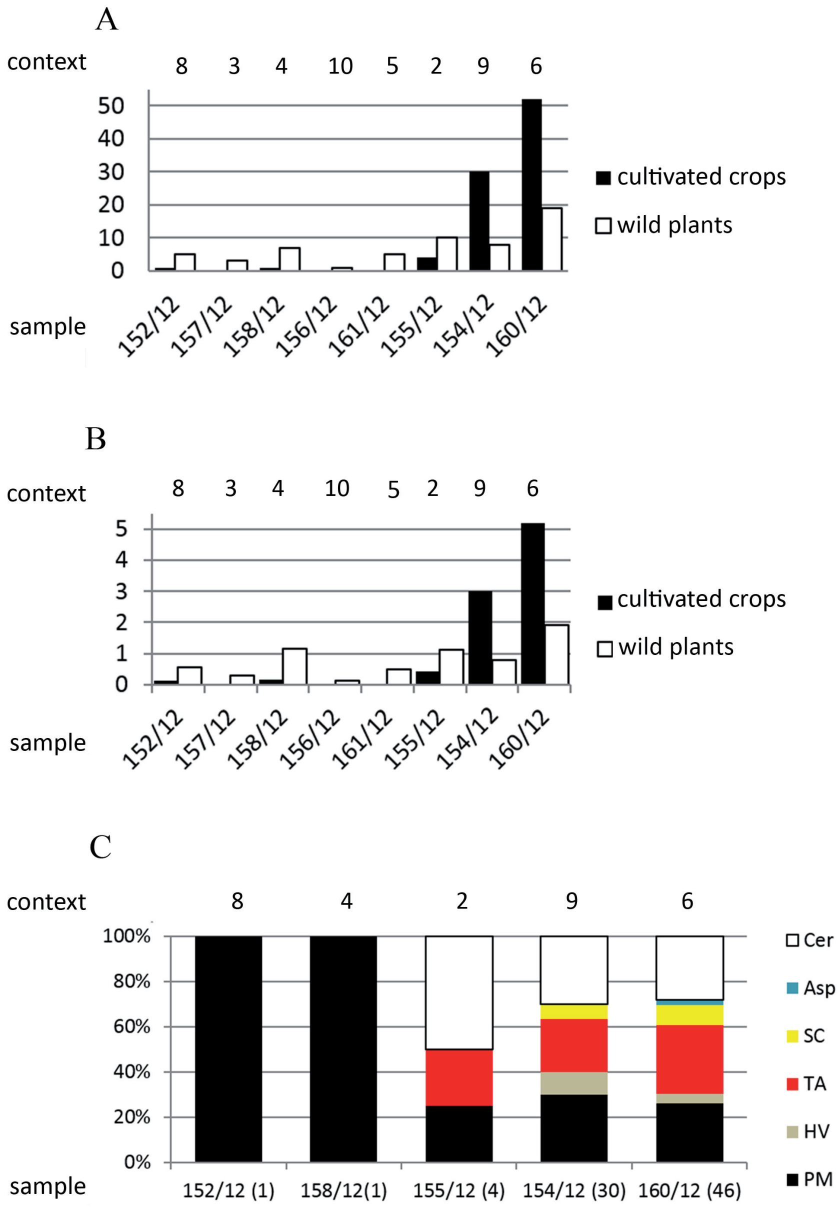


Fig. 21. Mikulčice-Valy, suburb, area P 2012, Results of archaeobotanical analyses

A – ratio of finds of cultivated crops to wild species; B – average density of cultivated crops and wild species per one litre of sediment; C – ratio of cereals in individual samples (the number in brackets represents the absolute number of finds). ASP – *Avena sp.*, SC – *Secale cereale*, PM – *Panicum miliaceum*, HV – *Hordeum vulgare*, TA – *Triticum aestivum*, Cer – indeterminable cereal grains or their fragments

5.2. Archaeobotany

For the purpose of archaeobotanical analyses, sediment from all stratified layers was used. We took 10 sediment samples using systematic sampling. Among them were two sterile samples, which did not contain any plant macroremains (one sample from Context 5 and the other from Context 7) (Fig. 21). Plant macroremains were obtained by a combination of multiple flotation techniques. All sediment samples were floated in a flotation tank in combination with hand washing method (H a j n a l o v á and H a j n a l o v á 1998). The organic material consisting of light macroremains rising in water column was caught in a sieve with a square mesh of 0.25 mm. The separated seeds and other parts of plants were identified using a stereo microscope Zeiss Discovery V8 by maximum magnification of 40×.

The total volume of floated sediment is 91 litres. The analysis of plant macroremains identified 145 carbonised seeds of cultivated and wild plants. The ratio of volume of floated sediment to the number of seeds determinates the average density of finds per one litre of sediment to 1.6 (L á t k o v á 2012). The samples are relatively poor from a quantitative point of view. Only a single sample from the settlement (Context 6) contained more than 50 finds (Fig. 21: A).

Macroremains from a cross section laid out through the fortification can only be evaluated on the level of analysis of the spectrum of cultivated crops. The archaeobotanical data obtained from the area P 2012 are mainly represented by cultivated crops, i.e. cereals. The samples comprise a relatively wide range of species. All samples containing cereals include millet finds. Millet counts among the most abundant cereals analysed. Mixed samples show an almost balanced ratio of millet and common wheat (Fig. 21: C). This combination of crops is typical of the early medieval period (K o č á r et al. 2010). Regarding the low number of analysed samples it is not possible to clearly determinate the "principal crop". This trend, however, was also attested in samples containing a higher number of finds.

The finds of legumes are present in only a single sample, moreover, in a small amount. The assemblage of legumes comprises one specimen of lentil (*Lens culinaris*) and most probably pea (*cf. Pisum sativum*). Carbonised fragments which could not be exactly determined were labelled with the term *Leguminosae sativae* (4 specimens).

The analysed assemblage of wild species comprises 14 determined botanical taxa. The collection of wild species contains carbonised macroremains as well as those conserved by water. Most of the species are represented by a small amount (1 up to 4 pieces) or are present in only a single sample. The samples most often contain typical field or garden weeds. These weeds grow on fields together with spring crops (e.g. the species of genus *Chenopodium* and *Setaria viridis/verticillata*). In the samples also occur species from fields with autumn-sown cereals (e.g. *Galium aparine* and *Galium spurium*). The assemblage also comprises species of fallow fields as well as those from sites other than fields. These finds indicate the existence or exploitation of further plant communities such as for example glades or edges of riparian forests (*Humulus lupulus*) or mesophilic through to waterlogged meadows (*Carex* sp.). Interesting in this context are the finds of an aquatic plant determined as *Alisma sp*., which commonly occurs in stagnant waters or slow-flowing watercourses (J u r k o 1990).

The samples from the occupation layer (Context 6) and from the bottom of the river bed are very similar to each other, as far as the ratio of cultivated to wild species is concerned. The analysed samples from the rampart of the defensive wall (Context 3) prove to be sterile at all, or containing only sporadic finds of wild species. The histogram of samples based on the density of finds per one litre of sediment indicates that samples with low density come from the rampart or from the layers below, respectively. The samples with high density come from the occupation layer (Context 6) and from the bottom of the river bed (Context 9) (Fig. 21: B).

The analysis of carbonised and water-conserved macroremains contributed to solving the problem of utilitarian plants within the Mikulčice agglomeration. The obtained knowledge of the range of cultivated crops, despite the low number of finds, corresponds to early medieval tradition (K o č á r et al. 2010). From the analysis is evident that the most frequent and most abundant cultivated crops are millet (*Panicum miliaceum*) and common wheat (*Triticum aestivum*) (Fig. 21). Field weeds indicating spring or autumn sowing occur in an almost balanced ratio within the analysed assemblage. The presence of these species is probably caused by consumption of both spring- and autumn-sown cereals. The other wild species characterise to a certain degree the surrounding landscape and can represent possible exploitation sources. The highest recorded concentration of macroremains was found in the occupation layer of the settlement behind the fortification (Context 6). A significant ratio of wild and cultivated species was also recorded within the layer at the bottom of the river bed in front of the defensive wall (Context 9). The presence and accumulation of settlement garbage at the bottom of the river bed may be associated with its liquidation.

5.3. Pollen analysis of sediments

12 samples were taken for pollen analysis, with total weight of about 100 g. The sediment was not taken from spots of a section placed immediately one above the other, but from archaeologically stratified layers. The sediment was processed by a standard method of maceration using HCl, HF, KOH and acetolysis (Erdtman 1960). In order to obtain a higher yield of palynomorphs, the resulting macerate was concentrated in a heavy liquid ($ZnCl_2$) and observed directly in this medium on a microscope slide (26×76 mm) covered with cover slip (22×22 mm). The determination of individual palynomorphs was carried out using a biological light microscope Nikon, magnification 200-1000×. Examined were always multiple

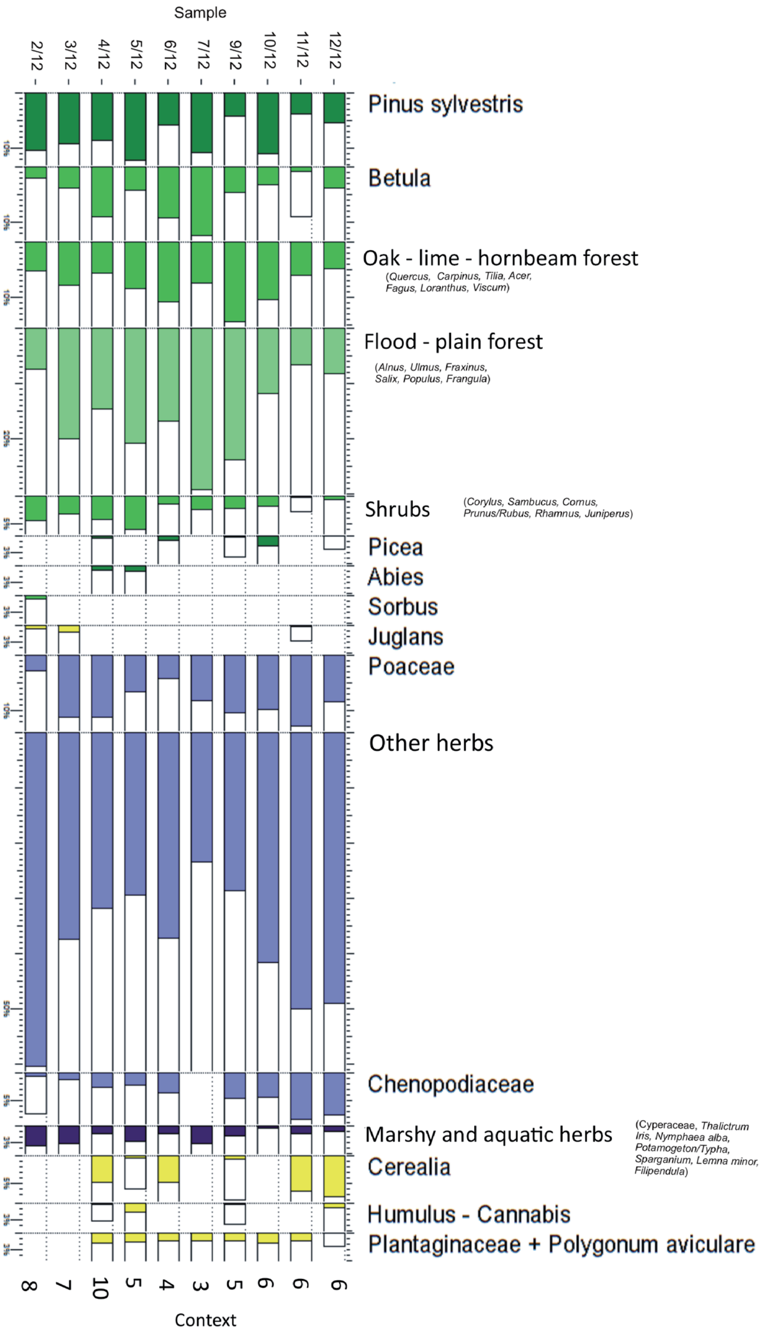


Fig. 22. Mikulčice-Valy, suburb, area P 2012, Pollen diagram according to ecological groups based on division of contexts from section P 2012.

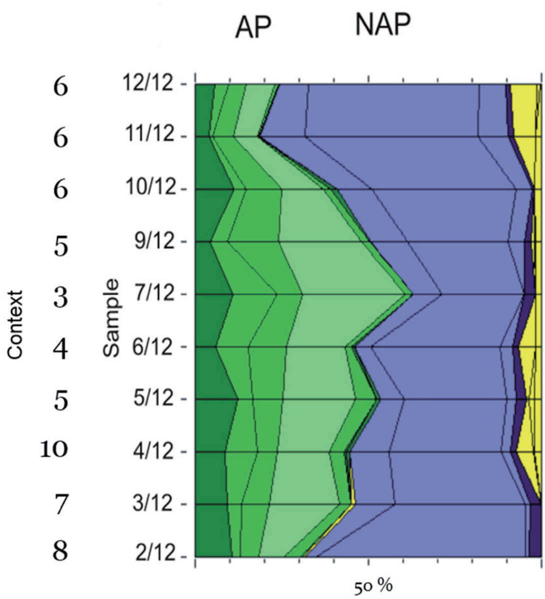


Fig. 23. Mikulčice-Valy, suburb, area P 2012, Pollen diagram of the ratio of woody to herbaceous plants

smears from the same sample. The samples contained a varied amount of organic matter (destroyed plant tissues) and insoluble minerogenic admixtures, respectively.

The following analysis is based on total pollen diagram as well as a diagram set up according to ecological groups and a diagram of ratios of woody to herbaceous plants (Fig. 22, 23) (Dohnalová 2012). In the analysis presented, the samples were ordered by contexts to emphasize the link to archaeological situations. The first eight samples come from contexts in the area of the fortification and the settlement; the last two samples then from sediments in the river bed. We do not present here samples from contexts 2 and 9, which were either sterile or the number of palynomorphs in them was smaller than 100. Therefore they may have been burdened with significant statistical error.

Sample 7/12, Context 3

The sample was taken from a clayey sediment with charcoal resting above sample 6/12. The ratio of woody to herbaceous plants is 60% : 40%. Determined were woody plants of oak-hornbeam-lime forest as well as species of softwood riparian forest; woody plants of this group are dominant in the sample (29%) and it is at the same time the highest representation among all samples. The presence of *Sambucus nigra* indicates nitrogen-rich soil. The spectrum of plants is dominated by *Poaceae* accompanied by rather hygrophilous species, e.g. the *Lamiaceae*, *Liliaceae*, *Ranunculaceae* and *Rosaceae* families. Cereals are absent. Determined were non-pollen objects, which indicate stagnant waters – algae, cyanophytes (*Cyanobacteria*) and amoeboids (*Rhizopoda*) – and pollen of *Lemna minor*, which overgrows the surface of meso- through to eutrophic stagnant or slow-flowing waters. Cretaceous palynomorphs *Normapolles* also were identified in the sample.

Sample 6/12, Context 4

Clayey sample from sediments lying above layer 5; the ratio of woody to herbaceous plants is 46% : 54%. Among the woody plants identified are *Alnus*, *Betula*, *Corylus* as well as species of oak-hornbeam-lime forest – *Quercus*, *Carpinus*, *Tilia* and *Acer*. *Fagus* and *Picea* probably represent natural seeding from distant locations. Herbaceous plants are dominated by *Asteraceae Liguliflorae*, *Poaceae* and *Chenopodiaceae*. Also determined were *Brassicaceae*, *Cyperaceae*, *Daucaceae* (*Chaerophyllum*), *Chenopodiaceae*, *Lamiaceae* (*Mentha*), *Plantago major/media*, *Alchemilla*, *Rumex*, as well as wetland species *Iris* and *Sparganium*. The sample contains cereals, both *Cerealia* indet. and *Secale*. Among synanthropic species are *Artemisia, Chenopodiaceae* and *Plantago major/media*. Hornworts (*Anthocerophyta*) can serve as indicators of disturbed or fallow soil.

Sample 5/12, Context 5

The sample was taken from a clayey sediment lying above sample 4/12. The ratio of woody to herbaceous plants also is almost balanced (54% : 46%). Dominant species are *Alnus*, *Pinus sylvestris*, *Tilia* and *Corylus*. Identified was *Fraxinus* as a newly occurring species of hardwood riparian forest, as well as the *Rhamnus* shrub. The group of riparian forest is generally dominant. Meadow herbs occur, some of them representing species of waterlogged meadows, e.g. *Daucaceae*, *Rosaceae*, and species of forest edges, e.g. *Epilobium*, *Pulmonaria*, *Anemone* and *Pteridophyta*. Determined were aquatic plants such as *Potamogeton*, *Sparganium* and water algae. The cereals *Cerealia* indet. represent 1%. Among the other synanthropic species can be classed *Artemisia* (8%) and *Urtica*. Tertiary redeposited palynomorphs also were present.

Sample 9/12, Context 5

The sample was taken from below the occupation layer. It was a clayey sediment containing charcoal. The ratio of woody to herbaceous plants is 51% : 49%. Some palynomorphs showed incrustation marks. Woody species of hardwood riparian forest (14 %) show the highest representation among all samples. Woody plants of softwood riparian forest are dominant in the sample. Conifers are represented by *Pinus sylvestris* and *Picea*. Most abundant are *Alnus* (16 %), *Ulmus* and *Quercus* (equally 6 %). Palynomorph of a tree parasite of the *Viscum* genus was identified. The herbaceous vegetation is varied – identified were both cultural crops (*Cerealia* indet.) and synanthropic indicators such as *Boraginaceae* (*Symphytum*), *Lamiaceae* (*Mentha, Teucrium*), *Poaceae, Rosaceae* (*Alchemilla*). Synanthropic indicators such as *Artemisia, Chenopodiaceae, Plantago lanceolata, Rumex acetosa/acetosella* and *Urtica* also occur. Cereals are absent in the record. The sample contained spores of ferns and *Sphagnum* mosses, algae and fungi living on wood, bark and roots of plants. Cretaceous redeposits also occurred.

Sample 11/12, Context 6

The sample was taken from the middle part of the occupation layer. Woody plants are less abundant than herbs (24% : 76%). The curve of woody plants of the oak-hornbeam-lime group shows a decrease compared to sample 10/12, and so does the riparian forest group. The sample contained the thermophilous *Loranthus*, which mostly parasitizes oaks. Palynomorphs of *Prunus* and *Juglans* can indicate their cultivation. The pollen spectrum of herbaceous plants is rich, the herbs are dominated by *Asteraceae* followed by *Poaceae*. These families can be classed with meadow species, together with *Centaurea* sp.*, Hypericum, Verbascum, Primulaceae, Geranium, Echium* and *Rosaceae*. Plants such as for example *Daucaceae, Lamiaceae, Polygonaceae, Ranunculaceae, Rosaceae* and *Valeriana* can fall within the category of genera growing close to forest edges or at humid sites. Also represented were wetland and aquatic plants (*Cyperaceae*, *Potamogeton*). *Cerealia* represent 5.5 % in total. They comprise both *Cerealia* indet. and the *Secale* and *Triticum* genera. Synanthropic species also occur, including *Artemisia* and some of the other *Asteraceae* (e.g. *Carduus*), *Chenopodiaceae*, *Plantago majo/media*, *Polygonum aviculare*, *Silenaceae*, *Urtica*. The sample contains various spores of fungi, both those growing on wood and some others parasitizing plants (e.g. *Epicoccum*, *Alternaria*).

Sample 12/12, Context 6

The sample was taken from the upper part of the occupation layer. Woody plants are again less abundant than herbs (24% : 76%). Woody plants of the oak-hornbeam-lime group again show a decrease compared to the situation captured in sample 11/12. The curve of the riparian forest group, however, is on the rise. Present are *Fagus* and *Picea*. Compared to previous sample, here newly occur pioneer wood species *Betula* and *Pinus sylvestris*. The pollen spectrum of herbs is again rich, dominated by *Asteraceae* and *Poaceae*. These families can be classed among meadow plants, together with *Centaurea jacea*, *Symphytum*, *Primula*, *Rosaceae*. Plants such as for example *Daucaceae*, *Cyperaceae*, *Lamiaceae*, *Liliaceae*, *Lythraceae*, *Pulmonaria*, *Polygonaceae*, *Ranunculaceae*, *Rosaceae*, *Urtica* and *Valeriana* can fall within the group of genera growing close to forest edges or at humid sites. *Cerealia* represent 7.5% in total, which is the highest value among all samples. Identified were *Cerealia* indet., *Secale*, *Triticum* and *Hordeum*. Also determined were synanthropic species such as *Artemisia* and some of the other *Asteraceae* (e.g. *Carduus*), *Brassicaceae*, *Humulus – Cannabis*, *Chenopodiaceae*, *Polygonum aviculare*, *Silenaceae*, *Urtica*. Interesting is the find of *Allium*. Non-pollen objects comprise spores of fungi, algae, and hornworts *Anthoceros laevis* which can be considered an indicator of disturbed soils. The sample also contained other structures – probably parts of hairs, which might come from larvae of scavenger beetles. They can decompose skin, fur, feathers, hair, dead insects and other organic matter.

Sample 4/12, Context 10

The sample shows a balanced ratio of woody to herbaceous plants (44% : 56%). It was taken from a sandy sediment in the area behind the rear of the defensive wall. It comprises the same tree species as the previous samples and is dominated by *Alnus*, *Betula* and *Pinus sylvestris*. Elements of oak-hornbeam-lime forest occur, woody plants of softwood riparian forest are dominant. *Fagus*, *Abies* and *Picea* probably represent natural seeding from distant regions. According to E. Opravil (O p r a v i l 1983), *Fagus* and *Picea* may have been growing in close neighbourhood. A pollen grain of *Prunus*/*Rubus* also was determined. Herbaceous plants are dominated by the *Asteraceae Liguliflorae* group, grasses and other meadow species. Pollen of *Plantago major*/*media* was found as an indicator of trampled habitats. Cereals also occur (5%). They were mostly determined as *Cerealia* indet., *Secale* and *Triticum*. Aquatic and wetland plants, such as *Potamogeton/Typha* and *Sparganium*, and hygrophilous species, such as for example *Mentha, Lythrum* t.*, Rumex acetosa/acetosella, Valeriana*, also are present. Large amount of fern spores (*Pteridophyta*) occur, and species like *Botrychium lunaria* may indicate open forest or pasture land. The *Anthoceros punctatus* hornworts can be considered indicators of disturbed or fallow soil.

Sample 3/12, Context 7

The ratio of woody to herbaceous plants is almost balanced (46% : 54%). The sample taken from a sandy sediment contained pollen of woody plants similar to those in previous samples. Species of oak-hornbeam-lime forest occurred – *Carpinus*, *Tilia*, *Acer*, *Ulmus*; *Quercus* is absent. Woody species of softwood riparian forests also were found – *Alnus*, *Populus* and *Ulmus*. An interesting find is *Juniperus*, which is considered an indicator of dry pasture land. *Juglans* also was determined. Also identified were meadow species – *Asteraceae*, *Brassicaceae*, *Daucaceae*, *Fabaceae*, *Lamiaceae*, *Poaceae*, as well as hygrophilous *Cyperaceae*, *Filipendula*, *Symphytum*, *Urtica* and wetland species *Sparganium*. *Polygonatum multiflorum* can be classed with grove species. Spores of the *Sphagnum* mosses and the water algae found also give evidence of the existence of water areas.

Sample 2/12, Context 8

The pollen spectrum is characterised by a lower ratio of woody plants (32% of the total amount). Among them are woody plants growing close to watercourses and water surfaces – *Alnus* and *Betula*, species of oak-hornbeam forest – *Quercus*, *Carpinus* and *Acer*. *Corylus* and *Pinus sylvestris* are quite frequent. The palynomorph identified as *Fagus* probably represents natural seeding from higher elevations. According to E. Opravil it might also have grown in the neighbourhood of Mikulčice (Opravil 1983). Pollen of *Juglans* was determined. The herbaceous component of the sample is dominated by pollen of the *Asteraceae Liguliflorae* group. This might be connected with the fact that the sediment type (sand) represents an aggressive environment to palynomorphs and has a selective effect so that these pollen remain preserved better than others. The sample also contains pollen of the *Asteraceae Tubuliflorae*, *Brassicaceae*, *Chenopodiaceae*, *Poaceae* and *Silenaceae* groups, the hygrophilous and nitrophilous species *Acris* t. and *Urtica*, and plants of riparian communities, *Cyperaceae* and *Sparganium*. The sample also contained the so-called non-pollen objects, among them spores of wood- and bark-decay fungi. Redeposited protists *Dinoflagellata* also were determined. Also present were Cretaceous and Tertiary redeposited palynomorphs.

All samples but one were positive with pollen. Except in samples 5/12 (Context 5) and 7/12 (Context 3), the pollen spectrum is dominated by herbs at the expense of woody plants. Wetland and aquatic herbs occur in all samples. Synanthropic indicators occurred from sample 4/12 onwards. Among them is *Artemisia* and some other *Asteraceae*, *Chenopodiaceae*, *Humulus – Cannabis*, *Plantago major/media*, *Polygonum aviculare*, *Silenaceae*, *Urtica*. Cereals are most abundant with two samples from the occupation layer (Context 6). Identified were *Cerealia* indet., *Secale*, *Triticum* and *Hordeum*. *Juglans* and *Prunus* also may have been cultivated. Interesting is the find of pollen of *Allium*, which may have been gathered or cultivated and used as kitchen vegetable. Other herbs also might have been used for cooking and healing etc.

6. DISCUSSION

Essentially, all the hitherto published hypotheses and conclusions on the fortification in the suburb are mainly based on the archaeological situation in 1966-1968 (K 1966-1968). It is an area delimiting the suburb from the northwest, where also the so-called north-western gate into the fortified part of the agglomeration was discovered (Fig. 2). The other segments of the defensive wall are only briefly mentioned in summarising reports on the research into Mikulčice from individual excavation campaigns.

The fortification at the western edge of the suburb identified in 1963 and 1964 (P 1963-1964) is described by the site director as a stonewall connected with a palisade (K l a n i c a 1964). This fortification was situated at the edge of the river bed (K l a n i c a 1965). Also in 1965, Z. Klanica reported that the fortification was built on a dark charcoal layer which contained 7th-8th century ceramics together with fragments of yellow pottery and a fragment of terra sigillata. Two ritual graves of dogs were found in the horizon immediately underlying the fortification (K l a n i c a 1965).

The results of field research in 1966 and 1968 in the area of the north-western gate were continuously published by the site director in the form of brief reports at the turn between the 1960s and 1970s already (K l a n i c a 1967, 1968, 1970, 1974). The results were also briefly treated in a synthetic work on the pre-Great Moravian settlement in Central Europe (Klanica 1986). The problem of fortification in the suburb of the Mikulčice agglomeration was also marginally treated by J. Poulík (P o u l í k 1975). And finally, B. Kavánová published an attempted elaboration of relative chronology and absolute dating of the defensive wall (Kavánová 1996). Interpretations of the constructional type, relative chronology and absolute dating of the defensive wall are different in the above works (Tab. 2).

Despite multiple differences in interpretation of the archaeological situation in the area of the fortification in the suburb, all the above authors take into consideration two or three fortification horizons (H l a d í k 2013). However, this interpretational concept which, at first sight, is accepted unanimously, encounters several problems when analysed in detail. The first surprising fact is that three authors speak of multiple constructional phases of the defensive wall, but the construction itself is interpreted by them differently, even though they base themselves on the same archaeological situation (Tab. 2). Absolute dating of individual phases of the defensive wall is different as well. The entire hypothesis of a two-phase or three-phase development of the defensive wall is based on the discovery of burnt layers and charred wood remnants in the bottom part of the clay rampart. So, the hypothesis is based on the fact that these layers were interpreted as contexts which do not belong to the clay rampart, in whose lower part they were found, but give evidence of some earlier structures. On which fact, however, such an interpretation can be based?

From the published works under review emerge following decisive arguments:

- the layer containing charcoal and carbonised pieces of wood was found below the clay block and the charred beams created “chambers”; in squares -E/-24, -25, the clay rampart was situated above the grey layer with charred pieces of wood;
- the layer containing charcoal and carbonised pieces of wood – the burnt horizon – does not continue beyond the area of the clay rampart towards the river bed, but continues without restraint on the inner side and covers the whole stronghold area;

Tab. 2. An overview of older published hypotheses of dating and construction of the fortification in the suburb of the Mikulčice agglomeration

Author	Phase		Phase		Phase		Phase	
	Construction	Dating	Construction	Dating	Construction	Dating	Construction	Dating
Klanica	“hollow wooden chamber, wooden palisade“	8th century			“stone wall, wooden palisade, a clay wall?“	9. - beginning of the 10th century	stone destruction	?
Poulík	“a clay wall, wooden chamber, wooden palisade“	Pre-Great Moravian period	“stone wall, wooden palisade, a clay wall?“	9th century				
Kavánová	“burnt layer of clay (chamber), wooden palisade, inner trench“	Pre-Great Moravian period	“wooden chamber filled of clay, wooden palisade”	9th century	“stone wall, a clay wall, inner wooden structure (retaining wall)”	end of the 9th and the beginning of the 10th century		

- in square -B/-24, two grey horizons with charcoal remnants, which continue below the stonewall, occurred in the eastern cross section laid out through the rampart; at some places these two layers merged together and elsewhere they were separated from each other by a clay layer.

If we want to assess the stratigraphic relation between the burnt layer, the clay rampart and the settlement layers, we must look in more detail on the situations documented in cross sections laid out through the defensive wall. Z. Klanica corroborates his argumentation with cross sections in squares -E/-24, -25 (H l a d í k 2013) (Fig. 15, 16, 17). The situation documented in these sections, however, is not so unequivocal. We discussed it in detail in 2013. Probably the most important conclusion drawn from the post-excavation analyses is in this regard the fact that burnt layers are situated not only below the clay rampart but also in its upper part and they do not continue neither beyond the fortified area towards the river bed nor to the settlement behind the defensive wall. Based on this documentation I therefore do not regard the burnt layers in the lower parts of the clay rampart as chronologically older, but as structures which are contemporaneous (directly associated) with constructional features identified in the upper parts of the clay rampart. With regard to interpretation of this construction we thus cannot accept the hypothesis of a defensive wall built of hollow chambers, either.

Important for the discussion on relative chronology of the defensive wall is the knowledge obtained from geoarchaeological analyses. As we already stated above, before sampling we posed ourselves two main questions: 1) are the dark burnt layers below the rampart (Context 4) and the dark layer rich in organic matter behind the rear of the defensive wall (Context 6) identical?; 2) is there any evidence of a continuous burnt horizon below the defensive wall and in the settlement as well? The geoarchaeological analyses conducted enhanced the certainty of our assumptions based on post-excavation analyses of older research and lithology of layers unearthed in 2012. Both these questions are therefore answered in the negative. 1) Contexts 4 and 6 are not identical regarding the microstructure and chemical composition, therefore we consider them on a culture-historical level as relics of different structures and events. 2) No evidence exists of a continuous burnt horizon below the defensive wall and the settlement. Dark layers below the rampart contained organic material which was oxidised, not burnt. The relativity of these answers is discussed in the conclusion of this work, but here already we consider it necessary to emphasize that these answers are only hypothetical.

As far as the chronology is concerned, besides the rampart proper the authors also were dealing with the position of two wooden palisades which were built in front of the stone revetment wall. In this case all three authors agree with each other when they consider the palisade immediately in front of the stone revetment as contemporaneous with the stonewall, and the palisade at the edge of the river arm is dated by them to the pre-Great Moravian horizon. The connection between the first (closer) palisade and the defensive wall follows from the archaeological situation. Problematic is the chronological classification of the other palisade. Stratigraphy in this case only points to the fact that the palisade rested below the ruined defensive wall and therefore must be either contemporaneous or older. With regard to the above doubted existence of the pre-Great Moravian phase of the fortification we consider this palisade also contemporaneous with the other constructional elements of the defensive wall.

7. INTERPRETATION AND CONCLUSION

As we already stated in the introduction, the main questions which we are trying to follow up are first of all the chronology of the fortification, spatial arrangement of the fortification with its determinants, construction of the defensive wall and the terminal horizon of the fortification. In the following text we therefore concentrate on structure, construction and demise, significance and function of the defensive wall with a gate within the fortified agglomeration. Even though our analyses made progress since the first part of the work was published (Hladík 2013), in interpretation we still choose from a whole range of options based on only a limited amount of information.

7.1. Construction of the defensive wall

From the interpretation of stratigraphic situation in individual areas followed several questions associated with construction of the fortification in the suburb. We must point out the finding that there are considerable differences between the fortification relics from individual areas analysed. This fact can be explained in two ways. Considering the post-depositional processes we can declare a hypothesis that the differences observed are caused by different degree of preservation of the fortification. Or, we can search for an explanation on the culture-historical level and suppose that the construction of the defensive wall was different in individual segments of the fortification. If we would prefer the former hypothesis, our conclusions on the construction of the defensive wall would be based on the area where the fortification is best preserved, namely the area K 1966-1968 at the north-western edge of the suburb.

The main constructional element in this entire segment was a wood-and-earth rampart fronted by a stone revetment wall. The embankment contained a timber latticework inside. The square wooden chambers with sides of around 1.5 m were filled in with clay. The total width of the defensive wall in its bottom part varies around 4 m. Immediately in front of the stone revetment wall was a palisade built of oak posts. The dry stone wall on the front side of the rampart was about 1 m thick. In some places it was built of large quarry stones, in the area of the gate of smaller stones. Behind the stonewall was a bank piled up of clayey loam containing small stones. This structure filled in the space between the stonewall and the wood-and-earth construction in the core of the defensive wall. It is, however, very likely that the clayey loam bank with small stones represents the ruined front stone revetment (exploited in the Late Middle Ages and Modern Times). Some remnants of charred pieces of wood indicate that the earthen bank between the chambers and the front stone revetment may have been reinforced with wood. The width of the clayey loam bank varies around 1.5 m. Behind the earthen bank was the above-mentioned wood-and-earth rampart. The whole defensive wall was closed on the inner, rear, side by a timber construction (maybe a wall of boards or beams) supported by pairs of inclined posts at distances of 1.5-2.5 m. The last constructional element which was unearthed during excavations was a second palisade in the forefield of the defensive wall. This palisade was situated immediately at the edge of the river bed, some dozens of centimetres lower than the bottom stones of the front stone revetment. The space between the stonewall and the palisade was about 1.5 m wide. We consider this palisade mainly an anti-erosive measure (Poláček 2007; Procházka 2009). This advanced palisade may have been intended not only for defensive but also stabilisation purposes. On the top of the wood-and-earth rampart (the main body of the defensive wall) we can suppose a wooden walkway and a palisade. On the clay rampart in some places a burnt layer remained preserved. It is quite problematic to estimate the height of the above-described construction of the fortification on the basis of preserved sources. The ruined defensive wall was secondarily heavily damaged in the past by stone mining and ploughing. The preserved height of the wood-and-earth rampart varies between 50 and 90 cm. If we take into consideration the lowermost burnt horizon in the defensive wall and the situation in the neighbourhood of the gate, where the occupation layer with remnants of animal bones and ceramics reached about 1 m deep below the ruined defensive wall, we can estimate the height of the fortification without the upper palisade to approximately 1 or 1.5 m (Fig. 26). The construction of the defensive wall, as described above, corresponds in many regards to some segments of defensive wall at the acropolis of the stronghold. The fortification in the suburb, however, was smaller in size. Apart from dimensions, the main difference between these defensive walls consists in the use of timber latticework construction in the suburb and grid structure at the acropolis. Simpler construction was identified with the anti-erosive measure in the forefield of the defensive wall in the suburb. Here only a palisade of posts was built, whereas the acropolis was fortified by a stonewall and a palisade.

If we would take into consideration the second hypothesis, namely that the fortification was not constructed in the same way over the whole of its length, we could demonstrate it on the situation from area P 1963-1964 in the western part of the fortification (Fig. 10). In this area it was not possible to identify clearly the wood-and-earth rampart. From among the constructional elements of the fortification remained preserved the stones of the ruined stonewall and remnants of wooden palisades, which have most probably paralleled this wall. The defensive wall

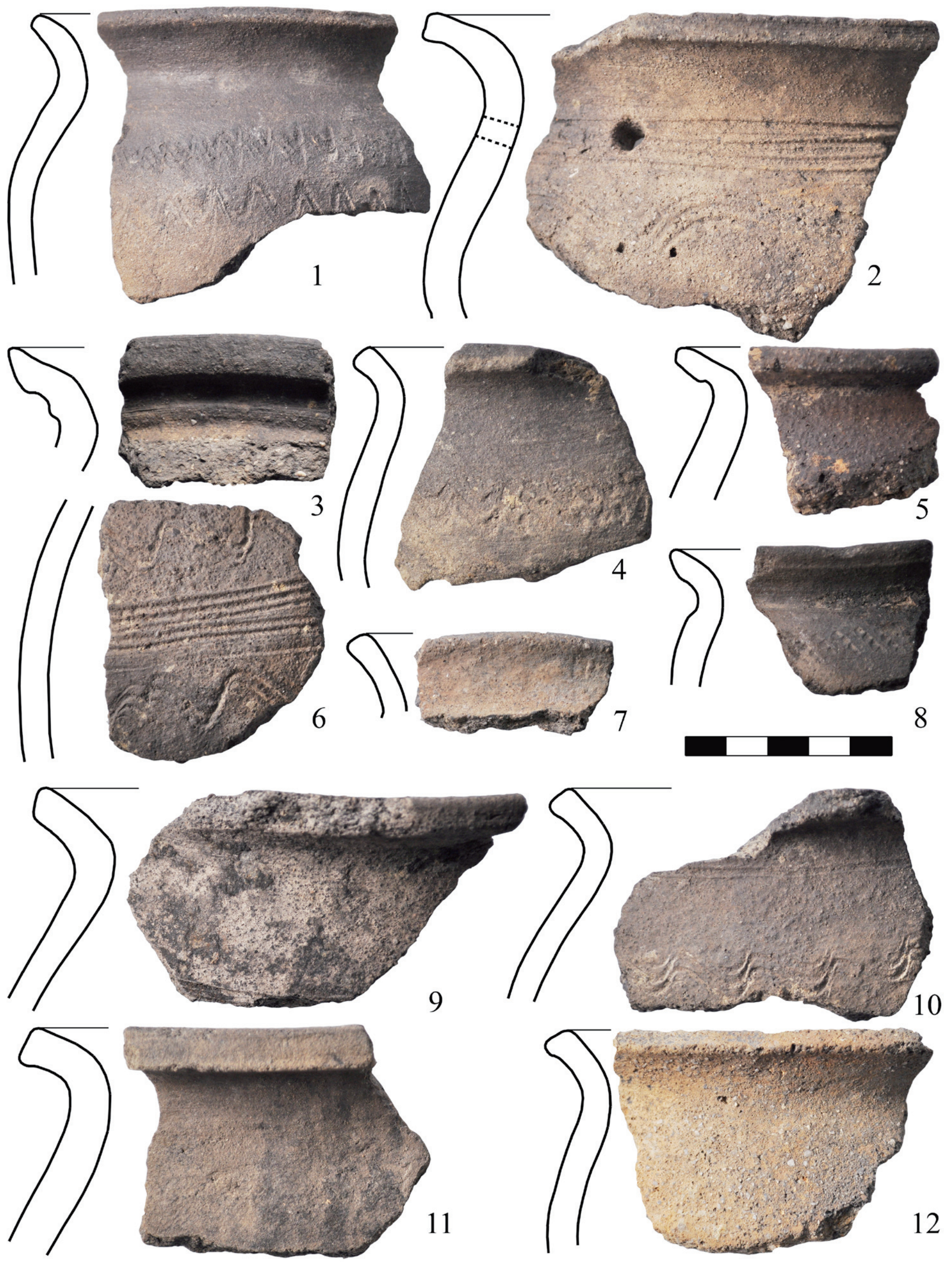


Fig. 24. Mikulčice-Valy, suburb, area P 1963-64, Ceramic fragments from the black burnt layer below the ruined defensive wall (layer No. 3 on Fig. 12) from square -J/3 (find No. 1285 – selection).

would thus have a much simpler construction than in the previous case. Such an interpretation may also be supported by the fact that in the settlement immediately behind the fortification (the rear palisade) there is an approximately 4 m wide space, within which we do not find any evidence of building activity, but animal bones and human skeletons are found below the stones of the ruined defensive wall. In the previous case, on the other hand, houses and accessory buildings were built immediately behind the rear of the defensive wall. The empty undeveloped space behind the defensive wall in the western part of the fortification may have substituted a classical walkway on the elevated rampart.

Based on the data obtained we are not able to clearly identify, which of the two basic hypotheses is more likely. Provided that the relics of the defensive wall were affected by very similar post-depositional processes within the whole suburb, the hypothesis of different construction of the defensive wall in individual segments of the fortification in the suburb appears to us more likely. This conclusion, however, must be verified by further field research.

7.2. Chronology

In the north-western suburb only a single chronological phase of the fortification was examined. Neither the post-excavation analysis nor the field research yielded any evidence that some of the archaeological contexts unearthed in the area under investigation could represent the relic of an older fortification, on the ruins of which the above-described defensive wall would be built. With the help of post-excavation and environmental analyses we rejected the theory on a continuous burnt layer, which would rest both in the settlement and below the defensive wall. Very important with regard to relative chronology is the fact that in neither of the excavations analysed we could identify any older settlement feature or grave below the fortification. In absolute dating of the defensive wall in the neighbourhood of the north-western gate we can base ourselves above all on material culture. The largest amount of stratified movable material comes from excavations in 1966-1968. This material was presented in more detail in a 2013 publication (H l a d í k 2013). My assumption that the defensive wall fulfilled its function in the second half of the 9th century or in the early 10th century is based on finds of pottery from the Mikulčice and Blučina production circles inside and below, the ruined defensive wall, on a 9th century spur discovered below the ruined defensive wall, and on the finds of settlement features and graves above and inside, the ruined defensive wall. In area P 1963-1964 in the western part of the fortification also we made an attempt at stratification of pottery. Most important for the chronology of the fortification are two assemblages. One of them comes from a layer between the collapsed stones of the defensive wall (Fig. 25). Similarly as with the north-western segment of the fortification, here also predominates the pottery of the Mikulčice production circle. The other assemblage comes from a dark layer, which was dis-

Fig. 25. Mikulčice-Valy, suburb, area P 1963-1964, Ceramic fragments from the layer between collapsed stones of the defensive wall (layer No. 2 on Fig. 12) from square -J/3 (find No. 167 – selection)

covered below the ruined fortification (Fig. 24). According to Z. Klanica it should be ceramic material of the 7th-8th centuries (Klanica 1965). These finds were used by Z. Klanica as a further argument for the existence of a pre-Great Moravian fortified settlement in the suburb. Even if we would not take into consideration the fact that the stratigraphic relation between the defensive wall and the layer which contained the finds is not clear, the above material represents ceramic production which commonly occurred at the Mikulčice stronghold in Great Moravian features in association with pottery of the Mikulčice and Blučina production circles. This material therefore does not attest to the existence of a pre-Great Moravian fortified settlement. More light into this discussion would undoubtedly bring an exact quantification and statistical evaluation of movable finds from the area of the fortified settlement in the suburb. Such a step, however, is only reasonable with material from modern excavations which are currently carried out in the suburb.

7.3. Research into the fortification and natural environment

Analysing the plant macro- and microremains we followed up changes in the spectrum of species of cultivated as well as wild plants, from which resulted several very important findings with regard to construction and destruction of the fortification. Both the archaeobotanical and the pollen analyses captured changes in the spectrum of plants in individual archaeological contexts. Based on these changes we can set up models of changes in natural environment in wider surroundings of the fortification. The following text therefore describes the basic developmental tendencies of quantity and the range of species of plant remains with regard to construction and destruction of the fortification. One of the most important phenomena, which we follow up in association with questions concerning the impact of the agglomeration on natural environment, is maybe the process of deforestation or reforestation of the landscape. The development of the ratio of herbs to woody plants in individual contexts is clearly shown on Fig. 23. Woody plants predominate over herbs in contexts 5 and 3. Therefore it can be supposed that the landscape was quite wooded at the time when these sediments emerged. This conclusion corresponds well to the hypothesis of deforestation of the landscape during the period of bloom of the Mikulčice agglomeration in the floodplain. Context 5 is older than the early medieval settlement and Context 3 represents the rampart (Fig. 17). So it is a context dated to the Great Moravian period. However, it is important to emphasize that it was formed by transport of material exploited from older layers. The above ratio of woody plants to herbs thus corresponds to the period before the construction of the fortification. The opposite, that is the lowest amount of woody plants and predominance of herbs in combination with cultivated plants, is evidenced in Context 6, i.e. in the occupation layer behind the fortification which is dated to the Great Moravian period. This finding again supports the hypothesis of deforestation of the landscape in the 9th century. Further evidence of this hypothesis is given by the spectrum of cereals and field weeds in the occupation layer (Context 6) and at the bottom of the river bed (Context 9), which was active in the 9th century (Fig. 21: C). Other important information is offered by botanical macro- and microremains from deposits in the filled-in river bed. Context 9 at the bottom of the river bed contains a relatively large volume of cultural crops which predominate over wild plants. In layers 7 and 8, infilling the river bed, we can observe an increase in woody plants and decrease in cultural crops. We suppose that the river arm was not filled in until the regression of settlement in the agglomeration after the decline of Great Moravia (see below). This fact is reflected in botanical record from these layers by an increased representation of woody plants, on the basis of which we suppose that the forests in the surrounding landscape began to regenerate after the collapse of the agglomeration. Also important is the fact that the increase of the curve of woody plants is already visible with Context 7 (fine flood sediments above the river bed), which is stratigraphically older than the ruined defensive wall. An important information in this regard also is the presence of the so-called pioneer woody plants in the uppermost parts of the 9th century occupation layer. These plant species again attest to forest succession already in the terminal phases of the early medieval settlement in the agglomeration.

The above hypotheses are based on a relatively limited amount of data. However, they correlate in many regards with conclusions drawn on the basis of older pollen and archaeobotanical analyses (O p r a v i l 1983; S v o b o d o v á 1990; J a n k o v s k á et al. 2003), which increases their stability.

7.4. Demise of the fortification, destruction of the defensive wall

The research also contributed with new knowledge to the questions associated with loss of function of the fortification and its destruction, and the relation between the demise of defensive wall (destruction) and the changes in activity of the river Morava. In a work focused on the research into the settlement structure in the economic hinterland of Mikulčice (H l a d í k 2014) we presented the basic parameters of discussion on the changes in intensity of courses of large rivers on the territory of Moravia during the 10th-12th centuries and on the impact of these changes on settlement agglomerations in floodplain valleys. In general we can conclude that the cardinal question of the discussion is, when the floodplain valleys began to be intensively flooded and the related sedimentation of river mud was renewed. In the case of Mikulčice it was mainly E. Opravil (O p r a v i l 1983) who supposed that the river current in arms of the river Morava became faster during the 10th century, which caused a partial infilling of the river bed with sand. The loamy-sandy sediments did not begin to deposit until the end of this period, which attests to the incidence of floods. Further deposition of loamy-sandy sediments and the subsequent formation of loamy-muddy deposits on this river sediment already did not occur. Therefore it is likely that after the end of the 10th century, the river beds in the neighbourhood of the stronghold were dry and floods occurred only sporadically. Similar situation was identified at Pohansko. The ruined defensive wall in section R 18 was covered from outside with a layer of flood loam. It means that after the decline of the stronghold, the neighbourhood has been flooded again. The research did not give the authors (M a c h á č e k et al. 2007) a clear answer to the question of when the floods have begun. However, they suppose a fast destruction of the Great Moravian defensive wall.

The relationship between the ruined defensive wall and the sediments inside and above the river bed can be best observed in areas K 1966-68 and P 2012 in squares -B/-25, -E/-25 and -E/-24. Crucial information in this regard is provided by cross sections laid out through the ruined defensive wall. On the eastern section of squares -E/-25 and -E/-24 (Fig. 15, 16, 17) (H l a d í k 2013) we can see that the debris from the ruined defensive wall lies in a clayey-sandy layer above the sand-filled river bed. A different situation is visible on the western section of squares -E/-25 and -E/-24. The ruined defensive wall is situated directly in the river sand. The above two cross sections are placed only 5 m from each other. The situation in square -B/-25, unfortunately, is not documented on the section. Area plans (Fig. 3, 4) and textual documents, however, show that in the area of the square above the filled-in river bed (at whose bottom rested drifted wood) occurred the ruined stone defensive wall and thereunder a layer containing fragments of pottery of the Mikulčice production circle. Only below this latter layer rested further stones (maybe from the ruined defensive wall) in the filled-in river bed.

So how can we explain the above findings? And how can they help in dating of the infilling of the river bed, which passed below the 9th century fortification in the suburb? First we must take into consideration the assumption that the partial infilling of the river bed took place within a relatively short time horizon in the course of the 10th century, that is the hypothesis by E. Opravil. In this case, the ruined defensive wall in the river sand on the one side and the ruined defensive wall in flood loams above the river sand on the other side would attest to a slower and irregular decline of the Great Moravian defensive wall. If we would accept the conclusion that the flood mud did not begin to sediment until the 13th century (O p r a v i l 1983), the situation documented in the eastern section of squares -E/-25 and -E/-24 would indicate that some parts of the stone-built Great Moravian defensive wall collapsed as late as in this period. If we would, on the other hand, suppose that the destruction of the defensive wall took place within a short time horizon soon after the decline of Great Moravia, the situation would turn and the documented findings would support the hypothesis of the beginning of intensive floods already in the mid-10th century. It means that the river bed would have to be filled in (ruined defensive wall on the river sand below the flood mud) and large floods would have to occur (ruined defensive wall on flood loams) very soon after the decline of Great Moravia.

The stratigraphy of the examined archaeological situation thus proves that the defensive wall has already collapsed into the filled-in river bed and most probably also into the emergent layer of flood mud which has deposited as a consequence of short but intensive floods. More problematic, however, is the absolute dating of the ruined defensive wall. Under the current state of research we can base ourselves only on a few pieces of indirect evidence. The first among them is the assumption that the dry stone front revetment of the defensive wall collapsed relatively soon after it has lost its function. Further arguments are associated with the overall situation in the stronghold where the evidence of a sudden and probably also violent interruption of settlement at the time of decline of Great Moravia in the early 10th century begins to appear with increased intensity (Hladík and Mazuch 2010; Mazuch 2012b; Kouřil 2008). If we accept the assumption that the agglomeration collapsed for violent reason at the beginning of the 10th century and the settlement after these events survived in a quite reduced form, we are justified to conclude that the defensive wall was destroyed in the first decades of the 10th century. This conclusion also correlates with finds of human skeletons below or inside, the ruined defensive wall (Fig. 4). These finds could be considered a further evidence of an unexpected and relatively intensive collapse of the agglomeration in consequence of military attacks at the turn between the 9th and 10th centuries (Hladík and Mazuch 2010). With the exception of Grave No. 833, which yielded semi-globular cast pendants, all deceased were buried (or rather only left) without grave goods, which makes any more detailed dating of the graves impossible. Z. Měřínský considers the finds from Grave No. 833 an evidence of contacts with the territory of the Carpathian Basin in the 10th century (Měřínský 1986). This conclusion represents a further indirect evidence that the agglomeration (and herewith also the fortification) has lost its function at the turn between the 9th and 10th centuries, or in the first decades of the 10th century respectively.

7.5. Conclusion

Using the combination of spatial and stratigraphic analyses in the GIS environment, stratigraphic analyses with the help of the Harris matrixes, and scientific analyses (archaeobotany, pollen analyses and geoarchaeology) we set up a new interpretational model of the fortification in the suburb of the Mikulčice stronghold. This model differs considerably from older hypotheses of the appearance and dating of the fortification. An important result of our research on the functional level was the application and presentation of a combination of several scientific analyses in the search for answers to the questions posed. The applied analyses, above all those from the field of geoarchaeology, are currently being developed. It is evident that in the future we will be witnesses to many discussions on paradigmatic starting points as well as methodical and interpretational possibilities of

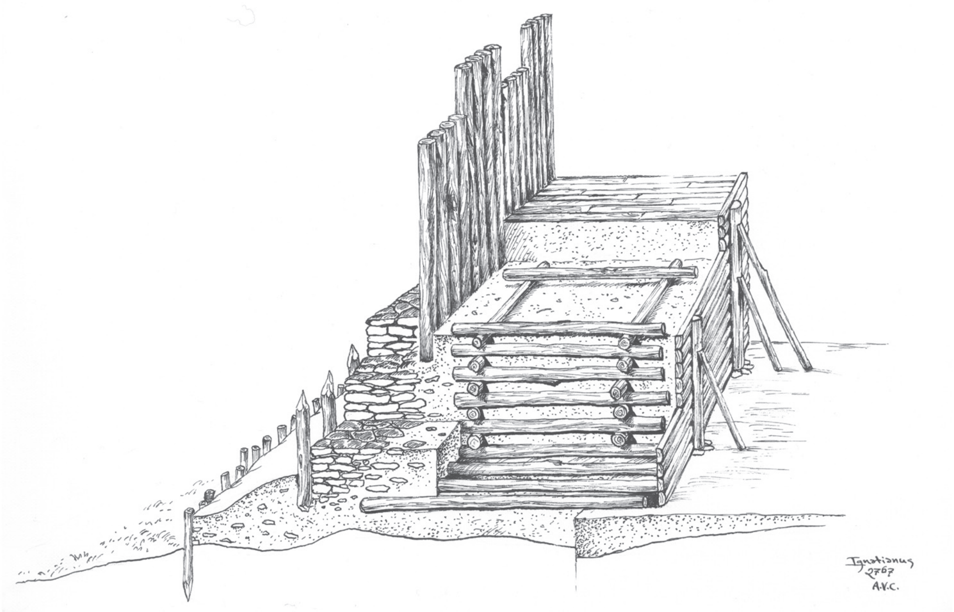


Fig. 26. Mikulčice-Valy, suburb, Hypothetical appearance of the fortification in the suburb, based mainly on the archaeological situation in squares -E/-25, -E/-24, -D/-25, -D/-24, east of the gate (drawing by Jan Knýbel)

such an approach. The research presented here foreshadowed multiple methodical questions and we certainly do not intend to draw any definitive conclusions on its basis. This is already not possible due to the very essence of the method that we apply. It means that when we try to verify our hypotheses (premises) empirically, that is we apply an inductive method, we encounter the problem of incomplete induction, which affects out conclusions (H l a d í k 2014).

Based on hitherto discovered and analysed sources we suppose that the fortification in the suburb of the Mikulčice agglomeration was built at the time of the highest bloom of Great Moravia during the second half of the 9th century. From a constructional point of view, this defensive wall resembles very much several segments of the defensive wall at the acropolis of the stronghold, but its dimensions are smaller. We could speak of some kind of simplified and reduced variant of the fortification at the acropolis. The basic constructional elements of the defensive wall comprise a wood-and-earth rampart (timber latticework), a front dry stone revetment wall, two wooden palisades in the forefield of the defensive wall, a wooden supporting wall in the rear of the defensive wall and probably a wooden walkway and palisade on the top of the rampart (Fig. 26). However, it is likely that the fortification in the suburb did not have the same construction over the whole of its length. Based on archaeological finds from the western part of the fortification we also could take into consideration a simpler variant of the defensive wall, which consisted of a wooden palisade in the forefield on the shore of the river bed, which originally fulfilled an anti-erosive function. The fortification itself consisted of a dry stone wall, behind which there was a second wooden palisade in the rear part.

The defensive wall lost its function relatively quickly, somewhere at the turn between the 9th and 10th centuries (or in the first decades of the 10th century respectively), which was most probably associated with geopolitical development in Central Europe (decline of Great Moravia, military activities of the Old Magyars). However, it is very likely that an important role in this process was played by ecological factors, which caused significant changes in natural environment in the area of the agglomeration (changes in dynamics and intensity of the river current, infilling of river beds, floods). These changes accelerated the depopulation and subsequent destruction of all components of the agglomeration in the floodplain valley of the river Morava. The sources do not yet make us possible to decide, which from the above phenomena played the crucial role in the collapse of the agglomeration, or whether the settlement has collapsed due to synergy of multiple phenomena.

The interpretational concept presented is by far not exhaustive. Specification of this model is the task of future revision analyses of older research but above all of new excavations. We must focus our attention to more detailed examination of the relation between the fortification and settlement features within the fortified area but also beyond the defensive wall. This comparison will certainly bring more exact information on the development of the settlement in the suburb of the Mikulčice agglomeration and on the reasons of emergence, construction and way of decline of its fortification.

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